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Wednesday 16th of December 2009

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Wednesday 16\textsuperscript{th} of December 2009
Keynote 1
How can new assessment forms improve (e) learning?

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Developing insights in the field of learning and instruction have led to the development and implementation of many so-called innovative learning environments. The main goal is to enhance learning, not only with respect to the learner’s cognitive performance, but also in terms of his meta-cognitive skills and study strategies. The growing interest in innovative learning environments in the school context as well as in the context of organisations, has stimulated researchers to look for empirical evidence for the conditions for these learning environments to reach the aforementioned goal. Additionally, and more recently, the important role of assessment for the enhancement of learning is stressed. It is argued that, although many studies have evidenced the negative effects of traditional modes of assessment (mostly called ‘testing’) on various aspects of learning, empirical evidence for the expected positive effects of new modes of assessment is scarce. It is of scientific as well as societal relevance to develop research programmes aiming to study the variables mediating the effect on learning of innovative learning environments with new modes of assessment as an integral part of it.
Describing the current transitional educational practices in Europe

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Abstract: As a result of the Studies in Transitional Educational Practices (STEP) project, descriptions of transitional courses were collected by means of an online questionnaire and results were stored in a searchable online database. During February-May 2009, 118 course descriptions were collected. These 118 course descriptions are analyzed here with the aim of describing the main educational scenarios in this collection of courses. As a result, the courses are characterized on five different dimensions, and six clusters of transitional courses are portrayed. Respondents generally evaluated their courses positively (roughly 90% of the courses in each cluster) with the exception of the “no ICT, no assessment” cluster which was evaluated positively by only 66% of the submitting respondents.

Introduction

In an increasingly globalising world, businesses are looking for excellent graduates with international experience with state-of-the-art knowledge and skills (Mintzberg, 2004; Van der Wende, 2003). An increasing number of students is studying abroad in order to acquire international experience and increase their attractiveness for international companies. In Europe the number of students that are studying at a higher educational institute outside their home country has increased with 57% from 327,500 in 1998 to 515,400 in 2006 (EUROSTAT, s.d.). Given this increased heterogeneity of enrolments in higher education, it is reasonable to expect that transitional problems have become larger.

In addition, there is a growing concern among educators and policy makers that learners are not well-prepared to start a bachelor or master programme. For example, Hoyles et al. (2001) found that students in the United Kingdom are lacking sufficient mathematics skills in order to start a bachelor programme. Several groups of students in the UK start less prepared at higher education institutes due to unfavourable social structures (Christie, Munro, & Fisher, 2004). In Lithuania, high drop-out rates are partly caused by the wide opportunities for students to choose among a range of 16 study programs (Saparniene, Virgailaitė-Meckauskaite, & Saparnis, 2008). In the Netherlands, the average drop-out rates after one year of studies range between 25-30% in the Netherlands, which is primarily attributed to transitional problems (Onderwijsraad, 2008). As a result, the estimated costs of students dropping out is 180 million Euro per year in the Netherlands (Onderwijsraad, 2008).

An increasing number of higher educational institutes is tackling transitional problems by designing bridging courses, remedial courses, summer courses, developmental courses or preparatory courses (1) to equip learners with required knowledge, skills and competences before entering a higher education program (Attewell, Lavin, Domina, & Levey, 2006; Bettinger & Long, 2005; Brants & Struyven, 2009; Brouwer, Ekmova, Jasinska, Van Gastel, & Virgailaitė-Meckauskaite, 2009; Rienties & Tempelaar, 2009). Bettinger and Long (2005) argue that the goal of remedial education is to provide underprepared learners with necessary skills and knowledge to succeed at university. For example, in the U.S. most institutes offer some form of remedial education and recent research indicates that more than 40% of
As the number of learners enrolled into higher education increases, one reasonable response to facilitate the diverging needs of international learners as well as under-prepared learners is to offer preparatory education in an online or blended learning format. Information Technology (IT) has some powerful Web 2.0 tools that might benefit learners. In fact, IT has gained the power to support independent learning as well as to learn irrespective of time and geographical constraints with the wide-spread implementation of Internet (Bryant, Khale, & Schafer, 2005; Lou, Bernard, & Abrami, 2006; Resta & Laferrière, 2007). Using internet technologies, learners can follow individually tailored online courses such as mathematics (Brouwer et al., 2009; Tempelaar, Rienties, & Van Wesel, 2008), statistics (Tempelaar, Rienties, & Giesbers, 2009) or accounting (Bryant et al., 2005) while being at home. This enhances the flexibility of learners to combine work, internship or holiday with study. Besides enriching independent learning experiences for learners, recently several powerful IT tools and methods for learning in collaborative settings have been developed where learners work and learn together, commonly referred to as Computer-Supported Collaborative Learning (CSCL) (Jonassen & Kwon, 2001; Resta & Laferrière, 2007)

Although an increasing number of universities across Europe offer preparatory courses to facilitate transitional problems of students, limited research in main scientific journals is published about this trend (Brants & Struyven, 2009; Rienties, Tempelaar, Dijkstra, Rehm, & Gijselaers, 2008). In contrast to “typical” distance learning courses where participants mainly follow their complete programme in blended or virtual settings, participants will only follow (online) education for the duration of several weeks in most preparatory courses. Despite the increased usage of IT in remedial education, limited research has been conducted in order to assess what successful ingredients are for effective online remedial education.

This research is part of a EU-funded project called Studies on Transitional Electronic Programs (S.T.E.P.) , which aims to develop a validated European Framework of Transitional Preparatory Courses (EFTPC). The research is conducted using an extensive multi-method research approach consisting of a literature review and needs-analysis (Brants & Struyven, 2009; Rienties, Luchoomun, Giesbers, & Virgailaitė-Meckauskaite, 2008), description of practices (e.g. Brouwer et al., 2009; Giesbers, Rienties, Gijselaers, Segers, & Tempelaar, 2009; Tempelaar et al., 2009), and the development of a Framework to describe existing good practice in transitional courses. The aim of the present study is to give an overview of existing good practice by describing and comparing educational designs and to interpret the main variations in educational designs in connection to variations in content and organizational context of the courses. The research questions are:

1. What are the main dimensions along which transitional courses differ from each other?
2. What constellations of educational decisions, course content, ICT-use and institutional circumstances often co-occur and can therefore be considered tested practices?
3. To what extent can these tested practices also be called good practices, based on the respondents self evaluation?

This will provide the empirically-driven input to the framework to be designed. Apart from this, theoretical considerations will also play a role in setting up the framework, but we will not report on that part here. A European database, filled by means of a questionnaire, provide the data for this analysis.

**Methods**

**Data collection**

An online questionnaire was built based upon the literature review and needs-analysis and was distributed via the EARLI and EDINEB network to teachers, designers and organizers of remedial courses, with an open invitation to share their course designs. A total of 118 remedial courses reported by 84 respondents from 65 institutions and from 22 countries were gathered in the period February-May 2009.

As to the successfulness of the gathered educational designs, one open field was provided to share evaluation results. However, no prescriptions were given about the method of evaluation or the type of data to put into this open field. Also, filling this field was voluntary and was not a condition for being considered.

For establishing the framework, we will lay down a set of variables that are supposed to characterize transitional courses. They will create a parameter space with a dimension equal to the number...
of variables. A current practice of a transitional course is represented by a point in this space. Taking all the points representing all practices of transitional courses, a landscape is curved out.

Based on literature study (Brants & Struyven, 2009) and previous nationally oriented projects (e.g. WebSpijkeren) the following list of variables was set up, that determined the contents of the questionnaire:

1. **Identification**: country, organising institution, and course name were asked, as well as name and email address of the respondent. Respondents could indicate whether they wanted their course design to be publicly viewable on the web (75 out of 118 gave permission).

2. **Content**: Respondents were asked to name the discipline as well as the skills that are taught in their course. Regarding the aim of the remediation respondents were asked to choose between "reviving" forgotten knowledge, or learning new knowledge, or both. Flexibility of the content was probed: was the content differentiated according to the individual, to the group, to subgroups, or not at all?

3. **Context**: the scheduling of the remedial course relative to the regular higher education program was probed: is it scheduled before the start of the program (e.g. summer course), or in parallel to it? In case of parallel scheduling, it was asked how the remedial activity was related or integrated with the regular program.

4. **Organisation**. This category includes these variables: who organises the course, university staff or a commercial party, whether special funding was available for developing and implementing the course, whether students pay for participation, whether attendance of the course is obligatory, the number of students attending the course, and whether it's distance learning / blended / face-to-face.

5. **Pedagogic approach, including support**. This category includes: individual versus collaborative work (or both), types of individual tasks (exercises, presentations, ...) types of group tasks (discussions, projects, ...), who helps the students (teacher, peers, digital tutor, ...).

6. **Assessment**. This category includes: when assessment is done (before, after, during the remedial activity), for what purpose (formative, summative, both), in what form (exam, essay, ...), whether it was adaptive, and whether it focussed on knowledge, skills, or both.

7. **ICT use**: for a range of possible purposes it was asked whether ICT was used for that purpose (for assessment, for collaboration, to submit work, ...) and in case of blended or distance learning, a collection of ICT tools were presented (like: video conferencing, digital tutor, wiki, ELO,...) with checkboxes to indicate whether they were used.

8. **Evaluation**: There was one big open text field in which respondents could write their evaluation of the course. Authors were left free to either give personal impressions or cite formal evaluation results. This approach was chosen to provide as little barriers as possible. Opportunity was given to support evaluations by uploading documents or providing references to publications.

For each of the above categories there was an open field in which respondents could freely state their view or add explanations to their standardized answers. Also there were separate open fields for providing comments, feedback on the questionnaire, and a rationale for the remedial activity as a whole. However in the following analysis emphasis will be on the standardized responses.

**Data analysis**

Multiple Correspondence Analysis (MCA) was used to determine the independent dimensions explaining most of the variance in the dataset (SPSS Inc, 2007). A total of 47% of variance was explained by the first five dimensions found. The decision to ignore higher dimensions was based on Cronbach's alpha (0.73 for dimension 6, and lower for the higher ones), as well as on the result that explained variance is only slowly increasing for dimensions higher than five (about 4% extra variance explained for each added dimension). A good introduction to MCA is given in Michailidis & De Leeuw (1998). The dimensions found are interpreted by reviewing the variables that correlate highly or exclusively with each of the dimensions, and by checking significance of correlations (chi-square test, P< 0.05) between such variables.

The "TwoStep clustering" technique (SPSS Inc, 2007) is used to divide all courses into clusters based on similarity, with Schwarz's Bayesian criterion (BIC) as the clustering criterion, and log-likelihood as the distance measure. The optimal number of clusters based on the BIC was 4, however one of these four clusters had an unclear profile and contained half the courses in our sample. Therefore a clustering into 5 and 6 clusters was forced. The quality of the obtained clusters was checked by plotting the clusters in the
first two dimensions as revealed by MCA and requiring that clusters have clear boundaries in the MCA picture (for background, see Michailidis and De Leeuw, 1998). Using that same criterion, a clustering into 7 or more clusters was rejected.

Finally, a content analysis was done on the "evaluation" open text field, as well as other open text fields. Based on this, course evaluations were categorized on a 4-point scale, ranging from clearly negative to clearly positive. For each of the clusters it was checked if being a member of that cluster correlates with course evaluation. Also, for each of the dimensions it was checked if it correlates with course evaluation.

Results

Dimensions for describing remedial teaching practices

As a result of Multiple Correspondence Analysis, the following dimensions were found. The dimensions are named according to our interpretation, which is to be justified below.

1) **ICT.** From the 68 variables in our questionnaire, 30 can be a priori classified as being about ICT. From these, 25 have their main component along this dimension. The strongest of those (correlation > 0.4) are: ICT used for assessment, ICT for submitting and ICT for feedback after a test. Furthermore, correlations of these variables with other dimensions are smaller by a factor of 3 or more, meaning that they correlate well with each other, but not with variables that are strong on the other dimensions. Reversing the argument: there are 11 variables that point "almost purely" along this dimension (the next component is at least a factor 3 smaller) and all of those are about use of ICT. We conclude that this dimension measures use of ICT: on one side are courses that use little or no ICT tools, on the other side are courses that use even quite exotic tools, in the middle are selective users of ICT.

Interestingly, some variables that score intermediately (0.3 < correlation < 0.4) on this ICT dimension also correlate strongly with one or more of the other dimensions. The most notable one is the choice between distance learning / blended / face-to-face, which has intermediate strength on both dimensions 1 and 2 (see below).

2) **Mathematics versus language.** This dimension is on the one hand related to the content of courses: Mathematics courses are at the negative end of this scale, courses teaching a specific language are at the positive end. This content aspect correlates with a number of didactical decisions: the negative half of the scale correlates with individualized work forms, individualized course content, and distance learning. The positive half correlates with work forms involving collaboration, course content differentiated according to subgroup, non-distance learning. One organisational variable plays a role: courses on the negative half of the scale more often have funding.

3) **Lower versus higher Bloom levels.** Courses positioned on the negative half of this axis tend to have: assessment focused on knowledge, exercises done individually, content is adapted for subgroups, assessment is done for summative purposes, and a commercial institute (instead of the university) is often organizing such a course. These courses possibly aim at realizing university entrance requirements in a short time. They are more often scheduled before the regular university program. At the middle and other end of the scale are university-organised courses, less focused on knowledge, less individually doing of exercises, content is not adapted to subgroups, scheduling is more often during the regular study program and assessment is less often summative. We might interpret that these courses have less time restrictions and therefore more freedom in choosing work formats that cater also to the higher Bloom levels.

4) **Gamma sciences versus the rest.** This dimension separates the social-, business and managerial sciences from the other disciplines: they are on the positive side of the scale, all other sciences have their center of gravity on the negative side. Courses at the positive half of the scale have assessments focusing less often on skills.

5) **Very small group size versus the rest.** This dimension separates a relatively small number of courses far on the negative side of the scale, while the majority is on the positive half, but close to the origin (see Figure 7). The separated small group has: very small group size (1-10 participants),
collaborative work form, the remedial activity is optional and scheduled in parallel to the regular course that needs the skills, and assessment is less often done for formative reasons.

These results show that content or "discipline" is not a one-dimensional thing: two of the five dimensions found are strongly related to content. This is to be expected: why would mathematics, languages and gamma sciences fit on one line?

In the same vein: pedagogy is seen to be not a one-dimensional thing, pedagogical choices are appearing in three of the five dimensions. Dimension 2 "mathematics versus language" shows many pedagogical design choices correlating with the content aspect of this dimension.

Seeing that both content and pedagogy appear as multi-dimensional, it may come as a surprise that ICT-use appears as only one dimension: Relatively many ICT related variables correlate with each other, in the sense that using ICT for purpose X increases the likelihood of also using it for Y. However, ICT-related variables in general are not playing a prominent role in other dimensions than 1. The notable exceptions (c > 0.3 on other dimension) are: (i) The choice between distance learning, blended and face-to-face (dimensions 1 and 2) and the use of assessment in the form of a digital exam (stronger on dimension 2 than on 1).

The five dimensions presented above are ordered according to their decreasing contribution to the explained variance in our dataset. However, this ordering in itself is not to be viewed as a result, because it is in large part an artefact of the questions asked. For instance, the fact that the ICT dimension explains the largest part of the variance reflects the number of questions asked about ICT, therefore reflects our research interests rather than being a result. The above observation about the ICT-variables mainly correlating among themselves, in contrast, is to be regarded as a result, because each of these ICT variables had the possibility to correlate with e.g. each of the pedagogic variables, but only few of them did show such correlation: this outcome is determined by the data.

Six clusters of remedial courses portrayed

The "2-step clustering" procedure as described in 3.2 divided all courses in our sample into six clusters, to be described below. We use the first four dimensions found by MCA to achieve an insightful presentation of differences between the clusters (Figures 1, 2, 3 and 4). The number of courses in each cluster, as well as the number of countries involved, is shown in Table 1.

When we label all the courses with their cluster-number and then plot all courses in the first two dimensions as revealed by MCA, the result is as in Figure 1. It can be seen that each of the clusters occupies its own region, with only very little mixing at the boundaries.
Typical values for variables that turned out strong discriminators (2) during MCA for each of the clusters are given in Figure 2. In this figure, the clusters are again spread out in MCA-dimensions 1 and 2 (cf. the more accurate Figure 1), and those variables related to these dimensions are highlighted.

The six clusters found can now be characterised as follows, using as names their place in the MCA-dimensions 1 and 2 with respect to the origin (in clockwise order):
Figure 2: all clusters pictured in MCA dimensions 1 and 2 (properties relevant to other dimensions are greyed out)

3. **Left.** These 30 courses have in common that they use little or no ICT, therefore face-to-face teaching is the only teaching, collaborative work is used relatively often, and there's often (14 courses) no assessment. This relative absence of assessment is unique to this cluster: outside of this cluster all courses have assessment in one form or another. With respect to content, this cluster is mixed.

5. **Upper left island.** These 11 courses all originated from one author in one institution. Like the previous cluster, ICT is not used, teaching occurs face-to-face. Half of these courses focus on learning a language, the other half focus on other discipline specific skills. Work form is equally often collaborative as individual. The courses are organised by a commercial party, have small group size (11-20), exercises are done individually and assessment focuses on knowledge.

1. **Near upper right.** These 36 courses use ICT for various purposes but not for assessment, that's why they appear in the middle of the "ICT" dimension. They are on the language-half of the "language versus math" scale, however they are not about language but about academic skills. Like most language courses they prefer an equal mix of collaborative and individual work. They use blended learning.

4. **Far upper right archipel.** These 10 courses use ICT for almost all possible purposes and they use ICT tools whose use is rare in other clusters. Half of these courses are language courses, the other half teach other discipline specific skills. They use blended learning and work form is more often collaborative. Assessment focuses on skills. Relatively often, i.e. for half of these courses, a commercial party organises the course.

6. **Lower right two islands.** These 9 courses are from four authors in one institution. They use ICT for assessment as well as for collaboration, which places them on the right half of the ICT-dimension. They are on the "mathematics" half of the "Mathematics versus language" dimension, but their
content is gamma sciences: they share with most mathematics courses the use of distance learning, individually doing of exercises, and assessment that focuses on knowledge. A difference with the cluster of mathematics courses is the work form that has emphasis on collaborative work.

2. **Downward peninsula.** These 22 courses are in large majority about mathematics. They in majority use distance learning, have flexible content adapted to the individual, have individual work form, help is often provided by an online tool instead of a teacher, and the assessment focuses on knowledge. ICT is important for this group of courses but it is used for a limited number of purposes, and the number of different ICT tools used is therefore also limited, making them earn a place in the middle of the ICT-dimension.

Table 1: Sizes and names for the six clusters found

<table>
<thead>
<tr>
<th>Cluster</th>
<th>N</th>
<th>% of Total</th>
<th>Countries</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, near upper right</td>
<td>36</td>
<td>30,5%</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2, downward peninsula</td>
<td>22</td>
<td>18,6%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3, left</td>
<td>30</td>
<td>25,4%</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>4, far upper right archipel</td>
<td>10</td>
<td>8,5%</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>5, upper left island</td>
<td>11</td>
<td>9,3%</td>
<td>1</td>
<td>institution, 1 author</td>
</tr>
<tr>
<td>6, lower right two islands</td>
<td>9</td>
<td>7,6%</td>
<td>1</td>
<td>institution, 4 authors</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>100,0%</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

From the clustering it becomes obvious that there's some granularity in our data: sometimes many courses share a design because they originate from one institution, or even from one author. Two such single-institution clusters were found. Finding such clusters was not our priority, but on the other hand, separating them off helped in giving the remaining clusters a clearer profile.

The same six clusters can also be pictured in the higher MCA-dimensions 3, 4 and 5. In Figure 4, the distinguishing variables for the "Lower versus higher Bloom levels" dimension 3 are highlighted. From our six clusters, three of them are on the "no nonsense" half of this dimension, two of those three relatively close to the origin: they have exercises done individually relatively often, and assessment focussed on knowledge. The third cluster, being positioned farther down on that same half, has also small group size, content differentiated according to subgroups, and a commercial party organising the course.
In Figure 6 the distinguishing variables for the "Gamma sciences versus the rest" dimension 4 are highlighted. One cluster of nine courses singles itself out on the "gamma" half of the scale: it has assessments that focus less often on skills. One other cluster singles itself out at the other half of the scale, but stays relatively close to the origin: it has assessments that do focus more often on skills. The other four clusters have near-neutral positions on dimension 4.
About dimension 5, "very small courses versus the rest", we have found that none of our six clusters singles itself out on either side of this dimension.

**Evaluation results**

This investigation started from the assumption that respondents would by and large report transitional practices that they were proud of and satisfied with. And was not to be expected that an equally good sample of negatively evaluated courses would be obtained. Therefore, our idea is to regard all clusters found as good practices, until the opposite is proved.

Content analysis of the "evaluation" open question and various other text fields confirmed our expectation that authors of submitted course descriptions in large majority evaluated their courses positively, while only 9 out of 82 evaluated their course negatively (Table 3). The data and reasoning mentioned to support these evaluations varied widely in kind and quality. This was expected and part of the trade off we made (see data collection).

**Table 3: Course evaluations**

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>45</td>
</tr>
<tr>
<td>Moderately positive</td>
<td>28</td>
</tr>
<tr>
<td>Moderately negative</td>
<td>7</td>
</tr>
<tr>
<td>Negative</td>
<td>2</td>
</tr>
<tr>
<td>No evaluation given</td>
<td>36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>118</td>
</tr>
</tbody>
</table>

The nine "negative" evaluations were unequally distributed between the six clusters of courses (see Table 5): six of those nine negative evaluations occurred in the "no ICT, no assessment" cluster 3 (leftmost in Figure 2). On the other hand the "no ICT + language" cluster 5 has a more than expected number of purely positive evaluations. Both these correlations are significant.

**Table 5: Evaluation results per cluster**

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Evaluation</th>
<th>Total</th>
<th>Spearman Correlation coefficient**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unknown</td>
<td>Positive</td>
<td>Moderately positive</td>
</tr>
<tr>
<td>1</td>
<td>15</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36</td>
<td>45</td>
<td>28</td>
</tr>
</tbody>
</table>

* Significant, P < 0.01 (2-tailed).
** Correlation of evaluation with cluster membership as a yes / no variable.

For cluster 5, the result is explained by all courses having been submitted by a single author, who consistently evaluated the submitted courses as positive. For cluster 3: this is a large cluster with 30 courses from 13 countries and many different authors. For 18 of these courses evaluations are known: 1/3 of these is negative, while 2/3, still a majority, is positive. From the other clusters (1, 2, 4, 5 and 6), none has more than 1 negative evaluation and this amounts to a maximum of 11% per cluster. As a conclusion we may
state that all six clusters can be considered as good practices, however for members of cluster 3 this is less
sure than for the other clusters.

Table 6 shows correlations of course evaluation with each of the five dimensions as revealed by
MCA.

Two of the found five dimensions correlate significantly with course evaluation. On the
"language" side of dimension 2 and on the "no nonsense" side of dimension 3 evaluations are more often
positive.

Table 6: Positive evaluation as a function of the five dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Spearman correlation</th>
<th>Direction of effect:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ICT, less -- more</td>
<td>0.09</td>
<td>More positive on ...</td>
</tr>
<tr>
<td>2. Mathematics -- language</td>
<td>0.23*</td>
<td>&quot;language&quot; side</td>
</tr>
<tr>
<td>3. Bloom level: no nonsense -- academic</td>
<td>0.38**</td>
<td>&quot;no nonsense&quot; side</td>
</tr>
<tr>
<td>4. Gamma sciences -- the rest</td>
<td>-0.05</td>
<td></td>
</tr>
<tr>
<td>5. Small courses -- the rest</td>
<td>0.20</td>
<td>(&quot;the rest&quot;)</td>
</tr>
</tbody>
</table>

* Significant, P< 0.05
** Significant, P<0.01

These findings fit well with the found high proportion of negative evaluations in the "no ICT, no
assessment" cluster 3, because that cluster is wholly on the "academic" side of that dimension. Also, the
"no assessment" (14 of the 30 courses in this cluster have no assessment, while all courses outside of this
cluster have assessment) suggests why some of these "academic" courses might be doing less well: it is
likely that they ask too little commitment from their participants.

**Conclusions**

1) Five dimensions were identified and interpreted that together catch the main differences between
transitional practices as we no know them. Two of these dimensions (2 and 4) showed tight
relationships between content on the one hand and pedagogical choices on the other. Two others
showed relations between organisational context and pedagogy (3 and 5). A fifth dimension (1)
summarizes the close correlation between the majority of ICT related variables, and the lack of
correlation of most of these with other aspects of courses.

2) Portraits of six clusters of courses were painted. These clusters show often-occurring combinations
content, pedagogical decisions, use of ICT, and by institutional context. Each cluster is to be regarded
as a tested combination of design decisions, for given content and context.

3) The six clusters found are regarded each as good practices. However, for one of these clusters, the "no
ICT, no assessment" cluster (number 3 in figures 1-4) we must cast some doubt, as the number of
negative evaluations was higher (33%) in this cluster than in the others (11% maximum). Part of the
courses in this cluster are "academic" in a less favourable sense of that word: not asking commitment.

**Endnotes**

(1) Throughout this article, the terms bridging course, developmental course, preparatory course, remedial
course, remedial education, remedial teaching, and summer course are used interchangeably. For a
review of these terms, see Kozeracki (2002) or Brants and Struyven (2009).

(2) Correlatation > 0.4 with one dimension or > 0.3 with two or more dimensions.

**References**


Bettinger, E. P., & Long, B. T. (2005). Remediation at the community college: Student participation and


Acknowledgments

The authors would like to thank the EU Lifelong Learning programme funding the S.T.E.P. project (http://www.transitionalstep.eu/), which enabled this research project. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein. Also special thanks to Lotte Brants for the extensive literature review that she has conducted on remedial and developmental education within this project.
Unveiling the landscape of transitional courses

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Abstract: In the European project Studies on Transitional Electronic Programmes (S.T.E.P.) an audacious attempt is made to understand the nature of transitional educational situations and the ICT support for these. The final goal is a European framework that helps to understand effects of design choices. An important phase in the project is the collection of many instances of transitional education trajectories. In this paper we give an account of this process. The work involves identification of practices recognizing knowledge gaps and preparatory teaching within Europe. We show the first results and try to understand these in view of the goal of the development and establishment of the European framework. We explain our plans for gathering actual instances of transitional education and for the design of a “good practices” database. The difficulties encountered are discussed and a justification of the final choices concerning the design and functionality of the database is provided.

Introduction

The increased student mobility in Europe due to the Bologna process has increased the need to develop programmes which help students in their transition to higher education. Many universities in Europe nowadays offer programmes in English in order to welcome and facilitate students from different countries. However, it has been often observed that due to insufficient pre-knowledge of students starting a Bachelor or a Master study universities suffer from too high drop-out rates (Onderwijsraad, 2008; Saparniene et al., 2008). The need to tackle high drop-out rates due to transition problems, such as regional differences in curricula and differences in admission requirements among universities, has lead to the need for organizing preparatory and remedial education (Brants & Struyven, 2009; Rienties et al., 2006). The issue of how to prepare students who have successfully finished one step in education to start the next one (e.g. a Bachelor or a Master study) has recently been the concern of many educators and policy makers (Hoyles et al., 2001; Onderwijsraad, 2008; Straetmans & Eggen, 2005; Tempelaar et al., 2006) because transition issues are very relevant for lifelong learning in general.

The project Studies on Transitional Electronic Programmes (S.T.E.P. http://www.transitionalstep.eu) aims at examining the ways by which European institutes deal with the transitional problems related to increased student mobility and how they support the lifelong learners in tackling these. In the S.T.E.P. project information about transitional preparatory courses was collected from many institutions in Europe. Given that very few good practices for effective preparatory teaching have been identified in Europe (Brants & Struyven, 2009), an attempt is made by the S.T.E.P. project to provide an analysis of the best practices for transitional courses currently available. The collecting of the information about the ways the institutions support student mobility was done in three cycles:

1) S.T.E.P. project partner institutions (University of Maastricht, University of Amsterdam, Katholic University Leuven, Maria Curie-Skłodowska University and Siauliai University),
2) S.T.E.P. project partner countries (The Netherlands, Belgium, Poland and Lithuania), and
3) other countries within (and outside of) Europe.

The aim was, first, to analyze the ways the project partners assess their own prospective students and to determine how the needs for transitional help are recognized, next, to analyze the patterns of how this is done within each project partner country, and finally, to gain insight on whether there is a general approach about how European institutes assess prospective students and offer them transitional help. A further goal of the S.T.E.P. project was to build a community of educators/researchers interested in preparatory education. Focusing on these aims, we have built a database in order to collect the descriptions
of preparatory courses organized at the higher education institutions in Europe. This paper explains the design of the database and its motivation and offers some first results derived from the data currently available in the database.

**Database of European Practices in Preparatory Education**

For designing the database a theoretical model, as well as a methodology, were established. The following sections describe these processes.

**Theoretical Model**

ICT may have several advantages for university education (Rosenberg, 2001; Baars et al., 2006). It can support flexibility in education and at the same time make possible the realization of courses without the necessity of face-to-face contact. ICT may also facilitate lecturers in organizing learning activities, such as the computerized checking of tests. It is well known that the interaction between the students and between the student and teacher is very important for the learning process. The place-independent synchronized and non-synchronized communication using ICT can support and intensify this interaction. In many cases there is not enough teaching staff able to solve the pre-knowledge problems efficiently in a face-to-face setting. E-learning is often seen as the appropriate approach for remedial teaching because of its strengths mentioned above. However, in order for the use of ICT to efficiently facilitate preparatory teaching, strong efforts are needed in planning, designing and executing the educational process (Baars et al., 2006).

Wieland et al. (2007) developed a model for a preparatory teaching scenario based on experiences with mathematics preparatory courses during the transition from secondary to higher education in the Netherlands. In their model the educational goals, educational vision, context, teaching methods and assessment procedure describe a remedial teaching scenario (Figure 1). The goals, educational vision and the context represent boundary conditions which work as a filter and limit the number of feasible remedial teaching scenarios. The educational vision (institution, lecturer and the learning style of the student), as well as the context which is determined by the available means such as computer tools, expertise of staff and number of students, all limit the number of possible remedial teaching scenarios. They can be seen as intervening variables and represent a filter which limits the choice of the suitable teaching methods, types of teaching material available and the assessment methods which can be used.

The primary goal of remedial teaching is to eliminate deficiencies. Such deficiencies might be gaps in pre-knowledge or lack in skills (e.g. algebraic skills). Students can be divided into two target groups: the ones who have forgotten the requested pre-knowledge and the ones for whom the requested pre-knowledge is new because they have never learned it before. The second target group often does not have the right certificate to follow the particular educational programme. A preparatory course can be provided before the entrance to an educational programme or can take different forms during the regular programme. Considering the target groups, the timing of the preparatory course is an important variable.

A secondary goal of preparatory teaching programmes can be to attract students from abroad. This can have a strong influence on teaching methods because in such a case the distant learning activities might become more important.

According to the above model a Dutch database of the descriptions of preparatory courses in mathematics was set up. In the S.T.E.P. project the model by Wieland et al. (2007) was applied to the situation of preparatory teaching in Europe, and the Dutch database was expanded. The context of transitional problems was expanded to pre-knowledge problems in disciplines other than mathematics. We could thus recognize several new variables which were important also for preparatory teaching courses. For example pedagogical models used in different countries were defined as an important issue. The items in the Dutch database of mathematics preparatory courses were translated into English. Based on research made in the S.T.E.P. project we expanded the number of variables which influence the preparatory teaching scenario. Specifically, the Polish partners of the project examined different features influencing the teaching and learning approach of preparatory education and presented the results of this process in Jasinska & Podgórska (2008). Each item in the preparatory course form of the database was based on the expanded set of variables that resulted from the research mentioned above. This set of variables is described in more detail later in this paper.
Methodology

The design process of database was highly iterative. All S.T.E.P. project partners contributed descriptions of their own preparatory education practices. Based on the results collected from the partners, we made a first attempt to distill the most significant aspects of preparatory education practices taking into account the model by Wieland et al. (2007). The model was expanded accordingly by adding new variables, and a fill in form was developed. The form was distributed among all partners of the S.T.E.P. project.
Implementation

The final fields of the database form

Based on the feedback of the partners the final form was set up with the following fields:
- Title/Institution/Contact details,
- Discipline,
- Skills,
- Short Description,
- Rationale,
- General Aim,
- Scheduling and relation of the course to the regular higher education programme,
- Number of students,
- Organizational aspects/Cost/Staff,
- Flexibility of the Programme,
- Didactic Approach,
- Assessment,
- Educational Aspects,
- ICT in learning process,
- Support/Supervision methods
- Evaluation Results,
- Attachments, Comments, and Feedback.

The online form was distributed to many institutes within the partner countries (The Netherlands, Belgium, Lithuania and Poland). Finally the form was distributed in the rest Europe using several calls within the educational networks such as EARLI and EDINEB and personal networks of the project partners. The official call from the S.T.E.P. project is available on the project webpage (http://www.transitionalstep.eu).

Database Workflow for Contributing Descriptions of Preparatory Courses

A description of a preparatory course can be contributed to the database online at the following URL: http://www.science.uva.nl/onderwijs/database/step/files/modules/language.php. The participants can use the option for selecting among 8 European languages the language in which they will fill in the form (see Figure 2). After selecting the language the contact details of the author or contact person of the preparatory teaching course are filled in (see Figure 3).

First step in the process of course contribution to the S.T.E.P. database
By pressing the button “Next” (see Figure 3) the form is opened. Instantly an e-mail, including the URL where the form can be found, is sent to the address provided by the author. Following this URL the author can return to the database at any time to edit the information provided previously by him or her.

The next step is to fill in the form. The database form has 37 fields of which 11 are open questions, 11 are multiple choice questions and 12 are multiple answer questions. The rest are two open questions to give comments and feedback to the project and one multiple question about the privacy issues. In Figure 4 the print screen of a part of the multiple choice section in the form is given and in Figure 5 some examples of the open questions included in the form are presented.

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**Figure 3:** Author’s contact details

**Figure 4:** Part of the form section with multiple choice questions
After submitting a course description, the author is offered an option to attach any available documents in order to give more information about the course (see Figure 6). As already mentioned there is a possibility offered for an author to come back later and edit or delete his or her own contributions.

Search engines and public view of the database
The database provides to the public two different kinds of search options (which are available at http://www.science.uva.nl/onderwijs/database/step/public/): a text based search and a scenario based search. Both options have a simple and an advanced mode.

In the simple text based search mode preparatory courses can be found by typing a keyword in the search box. In the advanced text search mode the fields to be searched are specified (see Figure 7).
The scenario based search focuses on the specific discriminators of a preparatory course scenario. In the simple scenario based search the list of discriminators is limited only to three characteristics: general purpose of the preparatory course, scheduling, and the way ICT is used. By selecting your preferred discriminators the database will return any courses meeting the chosen requirements (see Figure 8). With every result the description of the chosen scenario is explicitly given as well.
In case a course corresponding to the selected scenario does not yet exist in the database, the visitor gets an automatic message with an invitation to contribute to the database a description of such a course (if available). For this purpose there is a link redirecting the interested visitor to the database fill in form (see Figure 2).

**Pedagogical benefits of the search functions**

The discriminators given in the scenario search mode were identified as relevant variables in designing preparatory teaching courses in Europe. Making a choice in the online search form the visitor can find the preparatory teaching courses with a given scenario and read more about them. The list of variables can also be used as a support in the course design process. The course designer can consider the variables and decide which combination is suitable for creating a preparatory teaching course in a given situation (see Figure 8). In such a case the long list of the discriminators in the advanced, scenario based search mode can be considered.

**Technical Aspects of the database**

The MySQL database engine was used and the software for the public search, as well as the authoring site, was written in PHP. This language has good built in possibilities for generating web pages as well as sending emails. The database has separate tables for: (i) authors’ contact details, (ii) transitional course descriptions, and (iii) file attachments. A view was used to realize confidentiality if no explicit permission for public viewing was given.

**Results and discussion**

At the moment of writing this paper the S.T.E.P. database consists of 119 descriptions of preparatory teaching courses in Europe. More specifically, 45 of them originate from the Netherlands, 16 from Poland, 15 from Lithuania, 10 from Belgium, 5 from Israel and 4 from Spain. The general purpose of 28 of the courses is to fill the knowledge gaps of the participant, 6 courses are there only to revive the previously learned concepts, 66 courses have the ambition to do both, while 19 courses in the database have
the aim to address some other transitional problem and are not focused in filling knowledge gaps. 102 courses use ICT for one or more purposes. Most preparatory courses use ICT for communication with students (79) and for storage and distribution of materials by the teaching staff (74). 59 courses use ICT for researching information on the Internet, 55 courses use ICT to facilitate collaboration and 50 for testing and giving feedback on knowledge and skills. 17 preparatory courses in the S.T.E.P. database don’t use any ICT facilities. The latest statistics about the courses in the database are displayed automatically on the welcome page of the S.T.E.P. public search engine.

One of the main worries through the process of filling in the form was that having to fill it in in English might be a problem for some of the people who would like to offer a description of their own preparatory course. However, in order to be able to do the research it was crucial for us to receive enough responses. For solving this problem, we provided the form and the call for participation in eight different European languages: English, French, German, Greek, Italian, Lithuanian, Polish and Spanish. The search options and the records found are only in English. When a course is filled in in a different language than English, the process of translation of multiple choice and multiple answer questions proceeds automatically while the open questions need to be translated manually. During the project S.T.E.P. all the open question fields written in a language other than English were translated into English. After the end of this project, the database will still provide the option to be filled in by choosing among multiple languages. However, there will be no possibility to translate the open questions; therefore they will not be displayed in English. The choice is left to the person contributing a course to decide whether the course should be available in their own language (thus making it accessible only to people who speak that language) or in English (aiming at sharing the contribution with the whole European community and the whole world).

Conclusion

The results obtained from the database give an insight into the existing approaches of designing preparatory courses in Europe and can help in establishing a European preparatory teaching framework. In the S.T.E.P. project more research is currently being done in order to reveal the relationships among the various answers given in the database. The results of this research will be published at a later stage.

We hope that in the future course designers and lecturers will feel the need to share their experiences with preparatory education via the S.T.E.P. database. This way new information will be gathered from the database which will show us whether and how the approaches to preparatory teaching in Europe change over time and which factors led to these changes.

References


Acknowledgements

Many thanks to all the people who have contributed their courses to the S.T.E.P. database. Many thanks also to Diederik Slob (University of Amsterdam) who has designed the S.T.E.P. search engine and to Martin Beugel (University of Amsterdam) who has done the development work for the S.T.E.P. database.
Student Learning Preferences in a Blended Learning Environment: what Students opt for what Type of Tools?

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Abstract: In this article, we investigate the relationship between student learning choices and student profiles in the use of an innovative learning environment for statistics. In the teaching of introductory statistics to first year students economics and business, Maastricht University uses a blended learning environment. It allows students to individualize learning by attuning available learning tools to personal preferences. The blended learning environment consists of tutorials based on the problem-based learning principle, lectures, independent learning and an electronic learning environment based upon knowledge space theory: ALEKS. In this study, we will focus on the intensity of the use of the electronic learning environment ALEKS and investigate its relationship with student learning dispositions in a regression study. Data of about 1950 students taking this course are used. Findings indicate that e-tool use relates to other background factors as e.g. course achievements, suggesting that students who profit most from the e-tools have profiles that differ from those of other students.

Introduction

In this empirical study, we investigate the revealed preferences for using the e-learning component in a blended learning environment for learning introductory statistics in a large group of first year university students following an economics or business program. This blended learning environment consists of tutorials based on the problem-based learning principle, lectures, independent learning and an electronic learning environment based upon knowledge space theory: ALEKS (Tempelaar, Rienties, Rehm, Dijkstra, Arts et al., 2006). Except for the tutorial sessions, for which attendance is required, students can set the intensity for each of the components of the blended learning environment according their personal preferences. Some of these preferences become revealed, e.g. by measuring connect-time in the e-learning mode. This study aims to explain patterns in these revealed preferences by individual differences in learning styles or approaches to studying, subject attitudes, achievement motivations, self-theories on intelligence and dispositions toward empathy and systemizing.

Not much research has been directed to the role of student learning approaches, the existence of variability over students, and its relationship to the use of e-learning tools in a blended learning environment. A recent special issue on learning styles and e-learning environments, see Cools, Evans and Redmond (2009) and Vigentini (2009), reports on an empirical study investigating the relationships between learning approaches, intensity of e-learning, and academic performances, and finds weak evidence for the existence of such relationships. However, in the Vigentini study, the use of e-learning is operationalized by the number of clicks in the learning environment, which might be different from learning time, the prime focus of our study. In the area of statistics education, some studies focus on the design of courses using blended learning to accommodate individual differences in learning. For example, Utts (2007) provides an overview of several instruments available to measure student learning styles, and some empirical outcomes of the application of these instruments. Main theme of her contribution is the mismatch that more often than not exists between learning styles of students and preferred styles of lecturers. To avoid such mismatch, Pearl (2005) proposes a buffet system in which students are assessed on their learning styles, and subsequently are matched to an educational setting that best accommodates individual student preferences. In such a setting, accounting for student variability takes place when the student is assigned to one unique educational setting; after this assignment, the instructional format is fixed.
The ALEKS module College Algebra is the kernel of a preparatory summer course that is offered by the authors of this article from 2003 on (Tempel aar et al, 2006). This summer course is a typical example of what Brants and Struyven (2009) describe as the European perspective on developmental education: its prime aim is to address transitional problems that are the effect of differences among national secondary educational programmes in Europe. The summer course is offered in an online, distance mode, making it crucially dependent on the proper functioning of the e-tool. To investigate whether adaptive tutorials like ALEKS satisfy the needs of a broad range of learners with different learning styles and preferences, this study analyses the relationships between learners’ characteristics and learners’ use of a second ALEKS module: business statistics. Shifting the focus of our study to this module allows us to make use of a much richer data set, both in terms of the number of students and available learner characteristics, as would have been the case of investigating the summer course itself.

The adaptive e-tutorial ALEKS

The ALEKS system, in full Assessment and Learning in Knowledge Spaces, is an intelligent tutoring system based on principles of knowledge space theory, a branch of artificial intelligence (Falmagne, Cosyn, Doigon, & Thiéry, 2006; Ford, 2008; Tempelaar et al., 2006). In contrast to the more static Maple TA-tools described by Brouwer and colleagues (2009), the ALEKS system combines adaptive, diagnostic testing with an electronic learning and practice tutorial in statistics, business statistics and several other domains relevant for higher education. First pillar of ALEKS is the description of all such domains by a hierarchic knowledge structure that specifies the interdependencies between the individual items spanning the domain. This knowledge structure indicates what knowledge states are feasible, and what are inconsistent. All these feasible knowledge states together constitute the knowledge space.

Second pillar of the system is the adaptive assessment engine that provides in an efficient way a probabilistic estimate of the knowledge state of any individual student. Based on that assessment, the system offers material that the student is best able to learn at a given time. In fact, the student can choose from two types of tasks: those belonging to the outer fringe, and those belonging to the inner fringe of the student’s knowledge state. The outer fringe consists of new activities, not practiced before, for which the student masters all prerequisite items (new items ready to learn). The inner fringe consists of items the student has practiced before, but for which the mastery level is estimated as less than complete (items suggested for review).

The ALEKS assessment module starts with an entry assessment in order to evaluate precisely a student's knowledge state for the given domain (e.g. Business Statistics). Following this assessment, ALEKS delivers a graphic report analyzing the student's knowledge within all curricular areas for the course, based on specified standards. The report also recommends concepts on which the student can begin working; by clicking on any of these concepts or items the student gains access to the learning module. All problems of the assessment module are algorithmically generated, and require that the student produce authentic input (see Figure 1 for a sample assessment item). The assessment is adaptive: the choice of each new question is based on the aggregate of responses to all previous questions. As a result, the student's knowledge state can be found by asking only a small subset of the possible questions (typically 15-25). Assessment results are always framed relative to specified educational standards that can be customized with a syllabus editor (part of the instructor module). Both the assessment and learning modules are automatically adapted to the chosen standards.
The learning report, of which Figure 2 shows a part, provides a detailed, graphic representation of the student's knowledge state by means of pie-charts divided into slices, each of which corresponds to an area of the syllabus. In the ALEKS system, the student's progress is shown by the proportion of the slice that is filled in by solid color. Also, as the mouse is held over a given slice, a list is displayed of items within that area that the student is currently ‘ready to learn’, as determined by the assessment. For example, Ina has completed four from eight slices in Business Statistics. Ina can choose to start fulfilling the eleven lessons about inferences, eight about regression, twelve about ANOVA or 10 about Time series. Also, as the mouse is held over a given slice, a list is displayed of items within that area that the student is currently ‘ready to learn’, as determined by the assessment.

At the conclusion of the assessment ALEKS determines the concepts that the student is currently ready to learn, based on that student's current knowledge state. These new concepts are listed in the report, and the learning mode is initiated by clicking on any highlighted phrase representing a concept in the list. The focus of the learning mode is a sequence of problems to be solved by the student, representing a series of concepts to be mastered.

Setting an participants

Participants in this study were 1950 first year university students in two programs based on the principle of problem-based learning: International Economics and International Business Studies. Data has been collected in two cohorts: 08/09 and 09/10. Somewhat more than one third of the participating students is female (36%), against 64% males. About one third of the students (28%) is of Dutch citizenship, the remaining 72% being international students, mostly from Germany. In the first term of their first academic semester, these students took two required, parallel courses: an integrated course organizational theory &
marketing, two subjects from the behavioural sciences domain, and an integrated methods course mathematics & statistics. The methods course is supported by ‘practicals’. Those for statistics are based on the e-learning environment ALEKS, and allow for the measurement of user intensity operationalized as the number of connect hours into the system. Doing practicals is not a requirement, and is especially beneficial for students who lack prior knowledge, need to refresh mathematics or statistics due to schooling discontinuities, and/or experience methods courses as difficult. Therefore, data on practicals are not representative for students’ learning efforts in the whole course.

**Instruments**

The Inventory of Learning Styles (ILS) instrument, developed by Vermunt (see Entwistle & Peterson, 2004; Vermunt, 1996; Vermunt & Vermetten, 2004), has been used to assess preferred learning dispositions. Vermunt distinguishes in his learning styles model four domains or components of learning: cognitive processing strategies, metacognitive regulation strategies, learning conceptions or mental models of learning, and learning orientations. Each component is composed of five different scales. The two processing strategies Relating and structuring and Critical processing together compose the ‘deep learning’ strategy, whereas Memorizing and rehearsing, together with Analysing, compose the ‘stepwise learning’ strategy (also called surface learning in several theories of learning). The fifth processing strategy is Concrete learning. Similarly, the two regulation scales Self-regulation of learning processes and Self-regulation of learning content together compose the strategy ‘self-regulation’, hypothesised to be prevalent in deep learning students. The two regulation scales External regulation of learning processes and External regulation of learning results constitute the ‘external regulation’ strategy, supposed to be characteristic for stepwise learners. The fifth regulation strategy signals absence of regulation: ‘Lack of regulation’.

In addition to the ILS, attitudes or achievement motivations toward the subject statistics based on Eccles’ expectancy-value theory (Eccles, 2005; Eccles, Adler, Rutterman, Goff, Kaczala et al., 1983; Wigfield & Eccles, 2000, 2002; Wigfield, Tonk, & Eccles, 2004) are measured with the instrument Survey of Attitudes Toward Statistics (SATS) developed by Schau and colleagues (1995; also see Dauphinee, Schau, & Stevens, 1997; Hilton, Schau, & Olsen, 2004). Expectancy-value models take their name from the key role of two components in the motivation to perform on an achievement task: students’ expectancies for success, and the task value, that is the value they attribute to succeeding the task. The SATS instrument measures four aspects of post-secondary students’ subject attitudes: two expectancy factors that deal with students’ beliefs about their own ability and perceived task difficulty: Cognitive competence and Difficulty, and two subjective task-value constructs that encompass students’ feelings toward and attitudes about the value of the subject: Affect and Value. Validation research has shown that a four-factor structure provides a good description of responses to the SATS-instrument in two very large samples of undergraduate students (Dauphinee et al., 1997; Hilton et al., 2004) for the subject statistics. Subsequently, the adequacy of the SATS-instrument for measuring achievement motivations for business subjects has been demonstrated in Tempelaar et al. (2007). Recently, the instrument is incremented by two more attitudes scales: Interest and Effort, where the last scale represents the willingness of the student to invest time and other efforts in learning the subject. The naming of the Difficulty scale is somewhat counterintuitive, since in contrast to all other scales, lower scores and not higher scores correspond to higher levels of conceived difficulty. Therefore, the scale is mostly addressed with ‘lack of Difficulty’ in the next sections.

A third group of students’ background factors is based upon Dweck’s self-theory of intelligence and goal orientations. Dweck’s self-theory of intelligence distinguishes two polar types of student beliefs: Entity Theory, the view that intelligence is something one can't change much, and Incremental Theory, the belief that intelligence can be increased through effort and persistence. Dweck (1999) demonstrated that students with the first view are stronger mastery than performance oriented, as opposed to students with the second view. Profiles with regard to these achievement goals will be measured by the Grant and Dweck (2003) inventory. That instrument distinguishes six goal types: outcome, ability, normative outcome, normative ability, learning, and challenge-mastery. The last piece of information making up students’ profiles is based on Baron-Cohen’s (1995) empathizing–systemizing (E-S) theory. It consists of two scales: the Empathy Quotient (EQ) and Systemizing Quotient (SQ).
Beyond performance in the e-tool (connect time ‘HoursALEKS’ and final mastery ‘MasteryALEKS’), course performance indicators are available, achieved with different assessment instruments being part of the course performance portfolio: quizzes in statistics (StatsQz), and the score in the final written exam (StatsExam).

Results

On average, students spend 23.5 hours in ALEKS; somewhat more than 25% of total learning time of 80 hours available for introductory statistics. In this amount of time spend on e-learning, students achieve an average mastery level of 46.5% of available items in ALEKS (where a 60% mastery is the maximum score, since part of the module content is beyond the goals of the course). The adaptive entry test the ALEKS module starts with determines the entry point of any student in the module. For that reason, ALEKS time and ALEKS mastery will be different indicators both for differences in time spent on average in each item, and the level of the entry point. Also the first performance indicator, the score in the quizzes, is strongly related to two other e-tool indicators, and especially mastery in ALEKS: quizzes are administered in the ALEKS-tool, and quiz items correspond to practice items. The second performance indicator, score in the exam, is quite unrelated to the e-tool.

For all four outcome variables, multiple regression models are estimated using all scales making up the student profiles as explanatory variables. Table 1 contains the beta’s, the standardized regression coefficients, of these models, with in the last row the percentage of explained variation ($R^2$). In the top of the table, three indicator variables are included: Gender (indicating female students), Dutch secondary education, and Math at advanced level in secondary education. The Gender dummy is nowhere significant. The dummy indicating Dutch secondary education is significant in all four regressions, and is the most powerful predictor of both HoursALEKS and ALEKSmastery. That is an expected outcome, in fact even the prime reason to introduce the e-tool: Dutch secondary math education is very different from math education in many European countries, with a large share of teaching time devoted to statistical topics. For that reason, the use of the e-tool is not much added value for students educated in the Dutch system, explaining the large negative beta’s in the equations explaining hours of use and mastery. A similar, but much weaker role is played by the dummy variable MathMajor: students from these advanced tracks may both have more prior knowledge, and more talents, making them less dependent on the use of the e-tool. Other important predictors of connect time are the goal orientation Learning Goal, the ambition to acquire new knowledge and skills (also called mastery orientation), and Effort Planned: the willingness to invest a lot of efforts, and certainly time, in one’s study.

The outcome variable that is most unrelated to the use of the e-tool is the score in the final exam: StatsExam. Its main predictors are first the MathMajor dummy, next two attitudes scales Cognitive Competence and Value, and Critical Processing, the most outspoken aspect of deep learning. Amongst the goal orientations, it is the Ability Goal, striving for good performance with a nonnormative goal, that best predicts this achievement measure.

The two e-tool related achievement measures, ALEKSMastery and StatsQuiz, take an intermediate position. Like connect time, the dummy indicating Dutch secondary education has a strong negative impact. But learning approaches act more similar as in the score in the exam, as do subject attitudes (besides planned effort). With regard to goal orientation: both patterns are inherited, that is, both Learning Goal and Ability Goal do predict ALEKSMastery and StatsQuiz.
Table 1: Beta’s, standardized regression coefficients, of four regression models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>HoursA</th>
<th>ALEKSM</th>
<th>StatsQuiz</th>
<th>StatsExam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (Female)</td>
<td>-0.11</td>
<td>0.31</td>
<td>-0.015</td>
<td>0.020</td>
</tr>
<tr>
<td>DutchEducation</td>
<td>-0.344</td>
<td>-1.55</td>
<td>-0.061</td>
<td>0.089</td>
</tr>
<tr>
<td>MathMajor</td>
<td>-0.095</td>
<td>0.026</td>
<td>0.060</td>
<td>1.58</td>
</tr>
<tr>
<td>Relating and structuring</td>
<td>-0.016</td>
<td>0.018</td>
<td>0.004</td>
<td>0.040</td>
</tr>
<tr>
<td>Critical processing</td>
<td>-0.042</td>
<td>0.031</td>
<td>0.045</td>
<td>1.28</td>
</tr>
<tr>
<td>Memorizing and rehearsing</td>
<td>0.006</td>
<td>-0.016</td>
<td>0.012</td>
<td>0.050</td>
</tr>
<tr>
<td>Analysing</td>
<td>0.059</td>
<td>0.057</td>
<td>0.038</td>
<td>0.019</td>
</tr>
<tr>
<td>Concrete processing</td>
<td>0.004</td>
<td>-0.063</td>
<td>-0.082</td>
<td>-0.087</td>
</tr>
<tr>
<td>Self-regulation of learning processes</td>
<td>0.034</td>
<td>-0.069</td>
<td>-0.076</td>
<td>-0.069</td>
</tr>
<tr>
<td>Self-regulation of learning content</td>
<td>-0.002</td>
<td>-0.007</td>
<td>-0.022</td>
<td>-0.072</td>
</tr>
<tr>
<td>External regulation learning processes</td>
<td>0.031</td>
<td>0.012</td>
<td>0.042</td>
<td>0.030</td>
</tr>
<tr>
<td>External regulation of learning results</td>
<td>0.056</td>
<td>0.113</td>
<td>0.118</td>
<td>0.071</td>
</tr>
<tr>
<td>Lack of regulation</td>
<td>0.044</td>
<td>0.045</td>
<td>0.057</td>
<td>0.025</td>
</tr>
<tr>
<td>EntityTheory</td>
<td>0.007</td>
<td>0.033</td>
<td>0.070</td>
<td>0.006</td>
</tr>
<tr>
<td>IncrementalTheory</td>
<td>-0.011</td>
<td>0.011</td>
<td>-0.002</td>
<td>-0.049</td>
</tr>
<tr>
<td>LearningVsPerformanceGoal</td>
<td>0.088</td>
<td>-0.115</td>
<td>-0.137</td>
<td>0.088</td>
</tr>
<tr>
<td>EffortAsNegative</td>
<td>0.060</td>
<td>0.023</td>
<td>-0.018</td>
<td>0.016</td>
</tr>
<tr>
<td>EffortAsPositive</td>
<td>-0.001</td>
<td>-0.072</td>
<td>-0.087</td>
<td>-0.093</td>
</tr>
<tr>
<td>OutcomeGoal</td>
<td>0.021</td>
<td>0.041</td>
<td>0.056</td>
<td>0.031</td>
</tr>
<tr>
<td>AbilityGoal</td>
<td>0.055</td>
<td>0.109</td>
<td>0.124</td>
<td>0.135</td>
</tr>
<tr>
<td>NormativeOutcomeGoal</td>
<td>0.028</td>
<td>0.060</td>
<td>0.073</td>
<td>0.040</td>
</tr>
<tr>
<td>NormativeAbilityGoal</td>
<td>-0.039</td>
<td>-0.074</td>
<td>-0.088</td>
<td>-0.066</td>
</tr>
<tr>
<td>LearningGoal</td>
<td>0.129</td>
<td>0.111</td>
<td>0.141</td>
<td>0.052</td>
</tr>
<tr>
<td>ChallengeMasteryGoal</td>
<td>-0.043</td>
<td>0.003</td>
<td>-0.002</td>
<td>-0.010</td>
</tr>
<tr>
<td>EmpathyQuotient</td>
<td>0.022</td>
<td>-0.018</td>
<td>-0.060</td>
<td>-0.048</td>
</tr>
<tr>
<td>SystemizingQuotient</td>
<td>-0.086</td>
<td>-0.081</td>
<td>-0.063</td>
<td>-0.037</td>
</tr>
<tr>
<td>Affect</td>
<td>0.016</td>
<td>0.110</td>
<td>0.088</td>
<td>0.037</td>
</tr>
<tr>
<td>CognitiveCompetence</td>
<td>-0.031</td>
<td>0.039</td>
<td>0.108</td>
<td>0.159</td>
</tr>
<tr>
<td>Value</td>
<td>0.025</td>
<td>0.053</td>
<td>0.089</td>
<td>0.113</td>
</tr>
<tr>
<td>DifficultyLackof</td>
<td>0.009</td>
<td>0.011</td>
<td>-0.035</td>
<td>-0.068</td>
</tr>
<tr>
<td>Interest</td>
<td>0.045</td>
<td>-0.047</td>
<td>-0.079</td>
<td>-0.082</td>
</tr>
<tr>
<td>EffortPlanned</td>
<td>0.098</td>
<td>0.105</td>
<td>0.094</td>
<td>0.017</td>
</tr>
<tr>
<td>R-square</td>
<td>26.4%</td>
<td>16.4%</td>
<td>19.3%</td>
<td>15.7%</td>
</tr>
</tbody>
</table>

**Discussion and conclusion**

Students investigated in this empirical study learn statistics in a blended learning environment that allows them to adapt the use of different learning resources according to personal preferences and dispositions. It appears that differences in learning dispositions and achievement motivations or subject attitudes account for a substantial part of the variation observed in the intensity of using e-learning. But that is as well true for course performance indicators. When contrasting the four regression models, some striking differences show up.

- Two of the dummy variables, having taken Dutch secondary education (with a lot of statistics in its program), and having taken advanced math in high school, have a strong negative impact on the intensity of use of the e-tool, and a strong positive impact on course performances, especially score in exam. That pattern was the mere reason to introduce the e-learning tool: aimed at students...
with no or few prior schooling, it is no surprise that these students use the tool more frequently, but still not completely bridge the gap in knowledge caused by prior education differences.

- E-learners, especially with regard to their performance in the e-tool, rather than time in e-tool (ALEKS mastery, Quiz score) stand out in external regulation.
- Critical processing, the most outspoken aspect of deep learning, is a strong predictor of score in Exam, but is unrelated to any aspect of the use of the e-tool. Apparently, the e-tool does not discriminate between different profiles of learners with regard to learning approaches, and in this way is especially helpful for the more surface oriented learners.
- An opposite pattern can be found in the LearningGoal scale, the active striving toward learning new things: strong predictor of all e-tool variables, but not of the exam score. In contrast, the best goal predictor of exam score is AbilityGoal, the aim to validate one's ability or avoid demonstrating a lack of ability. A strong learning or mastery orientation is a must to be successful in the e-tool, but no guarantee for success in the exam.
- E-learners exhibit only a very weak profile with regard to subject attitudes: it is only high levels of planned Effort that distinguishes intensive e-learners from other students. This profile deviates from the profile of academically successful students, for whom Affect and Cognitive Competence stand out most, not the willingness to do a lot of studying.

The picture that emerges of the intensive e-learner is that of a learner aware of her or his lack of knowledge, being learning goal oriented, willing to invest a lot in remediating this shortage, and having an orientation toward external regulation. Some of these differences in the profiles between e-learners and academically successful students might be an artifact of a drawback of this study: the fact that the observation of learning intensity is one-sided, in that we were able to measure the intensity of studying with the e-learning tool, but not the intensity of using other components of the blended learning environment. Therefore, one cannot totally exclude the possibility that e-learners not only use the e-tool with higher intensity than other students, but do so for all components of the blended learning environment. However, given the strong correspondence between the principles on which the e-learning tool ALEKS is based, and the type of learning dispositions of these e-learners, it is highly plausible that the e-tool is of greatest support to students of this specific profile. So although accommodation of individual differences should not go at the cost of the ultimate goal of raising students to the desired level of self-regulated deep learners, the availability of a blended learning environment encompassing different components that are able to support different types of learners seems of great value, especially in difficult service courses as statistics.

References


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Social relations in the classroom and their power for learning

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Abstract: To what extent do learners inside and between teams share knowledge? The main contribution of this work is to analyze the classroom as a place where small working teams work and learn together and co-construct knowledge. We propose that the transfer of knowledge between students occurs not only through the work they are doing in their small teams but also through the activities all teams actively share in the larger physical and virtual classroom. These inter-team relations should reinforce the socio-cognitive processes taking place inside each working team. So, the social learning space will reinforce each team’s socio-cognitive factors and create a knowledge-sharing environment that will improve learning.

Main goal of research

The main goal of this research is to understand intra-and intergroup learning behaviour in a blended learning environment. Small working teams construct (shared) knowledge and try to reach successful collaboration in their social learning space. We want to know if knowledge is really transferred among learners (individual students and small working teams), how this transfer occurs inside and between teams and if this process is influenced by the social learning space that learners actively shared within the classroom:

Learning in teams

In recent years collaborative learning has been granted as one of the options to obtain better learning outcomes (Dochy, Segers, Van den Bossche, & Struyven, 2005; Häkkinen & Järvelä, 2006; Kirschner, Beers, Boshuizen, & Gijselaers, 2008). Groups of learners are increasingly acknowledged as the source of knowledge construction (Lindblom-Ylänne, Pihlajamäki, & Kotkas, 2003; Roschelle, 1992; Roschelle & Teasley, 1995). Collaborative learning environments enrich learning through interaction and therefore obtain better performance on the ascribed tasks than traditional learning environments. In this process Information Communication Technologies (ICT) have increased the possibilities to support collaboration, opening the door to Computer-Supported Collaborative Learning (CSCL) (Häkkinen & Järvelä, 2006; Jonassen & Kwon, 2001; Kirschner et al., 2008). However, research in CSCL and collaborative learning in general shows that the potential effectiveness of group learning is not always reached (e.g., Barron, 2003, Jonassen & Kwon, 2001, Van den Bossche, Gijselaers, Segers & Kirschner, 2006).

The two primary perspectives on collaborative work and learning are cognitive and social (Olivera and Straus, 2004, Roschelle & Teasley, 1995). The cognitive perspective stresses the influence of team work on cognitive processes. The social perspective examines the social factors constituting successful performance in team work. So, conceptualizing learning in collaboration has to entail both of them; an understanding of how socio-cognitive processes give rise to cognitive development and an understanding of the social, interpersonal dimension of teamwork. This means that the identification of the social conditions under which teams make this effort to reach shared knowledge is an essential prerequisite for developing enhanced understanding of successful collaboration. As Van den Bossche, et Al. (2006) state, viewing
collaborative learning as reaching mutually shared cognition, and thus as fundamentally social, stresses the need to take into account the social context in which these processes take place. In other words, Van den Bossche et al. (2006) have developed a theoretical framework for conceptualizing learning in collaboration that entails both an understanding of how socio-cognitive processes give rise to cognitive development and an understanding of the social, interpersonal dimension of teamwork. The team learning model specifies when and how teams in collaborative learning environments engage in building and maintaining mutually shared cognition, also referred to as shared mental model (Van den Bossche et al. 2006). Research on shared mental models has highlighted that team who develop a shared mental model perform superior than other teams (Van den Bossche et al., 2006). This paper presents an integrative perspective, building on the strengths of different research strands. It includes both the learning behaviour of the team and conditions in the interpersonal context that contribute to engagement in the development of mutually shared cognition practices. So, the learning behaviours that positively influence the development of this mutually shared cognition are the co-construction of meaning and the constructive conflict in the interaction of the team. Besides, this research focuses in the beliefs about the interpersonal context which influence this team learning behaviour. The group-level beliefs that potentially affect the learning behaviour are psychological safety, cohesion, potency and interdependence. Thus, this research states that “the identification of the social conditions under which teams make the effort to reach shared knowledge is an essential prerequisite for developing enhanced understanding of successful collaboration” ((Van den Bossche et al., 2006, page. 497). But, as Webb and Palincsar (1996) noted, few researchers have investigated these kinds of social factors that influence team learning in educational settings.

**Proposition 1**: Effective teams are able to create the right social and cognitive environment, fostering the development of a shared mental model.

### Learning inside and across teams: a common learning space

The socio-cognitive processes through which members of a team collaborate in class do not occur in a vacuum but are influenced by the social context in which they take place (Keyton, 2000). The social context affects the certain learning space: a place where the agents in the learning process, teachers and students, are together; in a collaborative classroom which nourishes the willingness to engage in the (joint) effort to build and maintain mutually shared cognition (Barron, 2003; Crook, 1998). Within educational psychology, limited research has been conducted in order to assess whether (sub)teams in a classroom-setting also learn from the experiences of other teams in their class and what the underlying mechanisms for these learning spaces are. However, this capacity of a space to improve agent’s outcomes is well studied for firms and its innovation process, in a stream of literature related with regional economics. This strand of research can provide insights to study learning across teams.

When the determinants of innovation are studied, the so-called “intra firm” determinants of innovation are considered the main explanations of different innovations performances, specially the size of the firm appear to be the most important (Acs & Audretsch, 1993; Audretsch & Vivarelli, 1996; Pavitt & Townsend, 1987; Rothwell, 1989). However, the empirical results of these studies identified small firms as much more innovative than bigger ones. These contrasting results underlined the need for introducing other explanatory variables vital for fostering the innovation process. In some recent literature (Acs, De la Motthe & Paquet, 2000; Anselin, Varga & Acs, 1997, 2000; Audretsch & Feldman, 1996;De Groot, Nijkamp & Acs, 2001; Feldman, 1994; Feldman & Audretsch, 1999) much emphasis has been put on determinants that are external to the firm to explain innovative capacity. These external factors are named “knowledge spillovers” and refer to positive influences that firms received in terms of knowledge from the environment in which they operate. As Gerosky (1995) underlines, the proximity to other firms can be essential in increasing the innovation capacity of a firm independently of internal firm characteristics. There is an agreement in literature on the fact that physical proximity among firms plays a crucial role in improving their innovative capacity. Space matters because of the existence of knowledge spillovers but this space is not only physical but also made of all the different relationships built among local actors. Capello (1999) and Capello & Fagian (2005) describe how influences from outside the firm (from the local environment) foster the innovative process developed by a firm. So, following Capello & Fagian (2005) the precondition for the creation of knowledge spillovers is the cultural proximity of economic local actors, i.e. their sense of belonging to the geographical area, their capability of interacting and the sharing of common
values. This cultural proximity is the basis for the existence of explicit and implicit cooperation among actors and public and private partnership.

The main contribution of the present study is to combine the findings of shared mental models in team-based research with the concepts of knowledge spillovers between learners, which are drawn from research on regional economics. In other words, we want to offer a theoretical framework to analyze the classroom as the place where small working teams develop their social and learning exchanges. In Figure 1, the development of a shared mental model within teams and the development of knowledge spillovers between teams are illustrated using social network analysis techniques (Hurme, Palonen, & Järvelä, 2007; Wassermann & Faust, 1994). Team 1 consists of five members who learn and work together on several tasks, which is represented by the five actors and their links. In order to effectively learn from each other, the five members of the team have to focus on both the cognitive and social processes in order to develop a shared mental model (Barron, 2003; Van den Bossche et al., 2006). Teams who effectively establish a shared mental model are illustrated by the circle around each team in Figure 1. The new element in our research is that teams not necessarily learn in isolation in a classroom. In fact, learners in a classroom naturally interact or link with their peers outside their team, which might lead to knowledge spillovers from Team 1 to Team 2 or to Team n. These inter-team relations, based on daily personal contact and learning interaction should reinforce the socio-cognitive processes taking place inside each working team. We propose that the transfer of knowledge between students occurs not only through the work they are doing in their small teams but also through the activities all teams actively shared in the classroom. So, we argue that the social and learning space in a classroom is able to reinforce each team’s socio-cognitive factors and is able to create a knowledge-sharing environment that will improve learning.

**Figure 1:** Shared Mental Model and Knowledge Spillover

**Proposition 2:** In addition to interacting within a team, learners are also interacting with other learners outside their team, which will enhance knowledge spillovers across teams.

**Learning inside and across teams in blended learning**

Recent research has highlighted that ICT tools like discussion forums, online lectures of WIKIs can enhance the learning experiences of students in class (Jonassen & Kwon, 2001; Schellens & Valcke, 2005; Rienties, Van Wesel, & Gijselaers, 2008). One of the main (assumed) advantages of using ICT in education is that learners can learn in a flexible and challenging manner. In addition, the developments of ICT in the last years are so rapid that currently several ICT tools offering rich blended classrooms can be used by teachers and students to learn in a challenging and interactive manner (Cho, 2002; Hurme et al., 2007; Rienties, Van Wesel, & Gijselaers, 2008; Tempelaar, Rienties, & Giesbers, 2009). For example, at Maastricht University in a course E-business and E-Economics students were assisted in their learning process when they were not physically at the university by using discussion forums. Students in the intervention cohort were more satisfied with their learning processes than students who did not use discussion forums (Rienties et al., 2008). A similar finding was found by Arts and colleagues (2002) and Schellens & Valcke (2005), who used discussion forums to allow students to discuss cases in small teams to extend the learning experience from the classroom to a blended learning setting. As a result, in Figure 2 the integration of the blended learning space with the face-to-face learning space is illustrated. Figure 2
illustrates that some teams actively use the online setting to share knowledge within their team, as for example Team 1 and Team n, which has been found previously in other blended-learning courses (Caspi, Gorsky, & Chajut, 2003; Rienties et al., 2008; Schellens & Valcke, 2006). At the same time, some individuals are more active in online settings than in face-to-face settings (Hills & Argyle, 2003; Scaley, Phillips, & Stevenson, 2002).

**Figure 2**: Shared Mental Model and Knowledge Spillover in a blended learning environment

**Proposition 3**: Extending the learning space from a face-to-face environment to a blended learning environment will lead to more knowledge spillovers.

**Proposition 4**: The extent to which teams use the online settings for knowledge construction is explained by the degree in which teams have developed a shared mental model

**Setting**

In the near future, a study is conducted to test the above formulated proposition. This study takes place in an elective 3rd year course of Business Administration in the Economics Faculty at University of Oviedo. The aim of this course is to introduce students in international economic relations. The participants are between 100-120 Spanish and Erasmus students enrolled in this course. The students are assumed to meet twice a week, in two-hour session, during 14 weeks period. The course uses a blended learning approach with collaborative learning methodology, combining whole class work with team work. The working teams have to solve five authentic tasks related with international economics. These working teams consist of five members, who are self-selected by the students themselves. The instructional design offers the teams several opportunities to share knowledge. Intra-and inter-team interaction tools have been planned both in the face-to-face and in the online environment. Table 1 summarize the elements of the instructional design that promote the different types of teams’ interactions.
Table 1 Teams’ interactions and learning environments

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face environment</th>
<th>Virtual Learning Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-team interaction</td>
<td>Class time devoted to team working: teams work on their own elaborating materials, reading and summarizing, discussing…</td>
<td>Private team forum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wikis to develop specific written assignments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedback and corrections through the forum</td>
</tr>
<tr>
<td>Inter-team interaction</td>
<td>Class time devoted to whole class work: presentations, discussions, analysis and assessment of other teams’ products…</td>
<td>Task-specific forum to discuss about tasks and analyse and assess other teams’ products.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedback and corrections through the forum</td>
</tr>
</tbody>
</table>

In the face-to-face setting, during the class time, each team could reach mutually shared cognition in the moments devoted to team work, when the teams work on their own on the different tasks. The inter-team exchanges in the face-to-face setting could happen in the moments devoted to whole class work: presentations, discussions, questions asking and answering, analysis and assessment of other teams’ products… Besides the face-to-face, the online environment serves as support and collaboration tool for teams working. All important information about the subject and the working plan are available using the Virtual Learning Environment (VLE, Campus Virtual in Moodle). The intra-team interaction in the VLE is canalized through team private forum and Wikis. Some tasks are provided with a Wiki so teams can collaborative writing assigned papers or presentations. The use of a wiki tool is a big help to introduce comments and corrections about a work in process and assist teams in their co-construction processes. The learning across teams in the VLE is promoted through task-specific fora. These are general fora where all team members can participate and make possible to discuss about the different tasks, ask doubts and propose solutions and share information between teams. This design tries to resemble the face-to-face setting, where there are moments for collaborative teams to work on their own and moments for the whole class to work all together (see figure 2). The online tools are also an important element to provide feedback. So, electronic means of communication available on the VLE are used to return corrections and comments both about the final quality of the products but also about the discussion and construction process. Thus, special emphasis is placed by the teacher on ways to improve the tasks, focusing on process rather on content. Once the tasks are finished all working teams can analysed the products from the other classmates both by presentations to the whole class and through the VLE.

So, each working team elaborates and actively construct their knowledge in the face-to-face sessions and in the VLE. Normally the assigned activities are presented, explained and began in the physical classroom and then continued through the online tools. During all type of interactions, students are supposed to actively construct knowledge together in collaboration and both settings become the common learning space for all teams.

References


Blended learning, blended ideas – collaboration vs. self-learning

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Abstract: The main aim of blended learning is to combine the benefits of both classical classroom training and e-learning. The role of collaboration and self-learning in this kind of learning methodology is still a subject of theoretical and empirical studies. This paper will present the question of collaborative learning in blended learning and, in general terms, ICT supported course. Starting from theoretical deliberations, the text will focus on the researches conducted in frame of two European projects. We would like to present lessons learned from two kinds of ICT supported courses: for students and for teachers. These courses show that collaborative learning can be seen as a subject to be studied and at the same time constitutes the way the course participants are learning. Finally, we would like to present the outcomes of the second project research on collaborative blended learning while trying to design effective ICT supported remedial course.

Theoretical approaches to blended learning

In fact, there are a lot of definitions and approaches describing what blended learning is. Some of them point that blended learning can be understood as the mixture of media and tools engaged in an e-learning environment, the mixture of a number of pedagogical approaches, regardless of learning technology use (Whitelock & Jelfs, 2003), also as a result of different delivery methods combination (software, Web-based courses, EPSS, and knowledge management practices) (Harriman, 2004) or different training “media” combination (technologies, activities, and types of events) (Bershin, 2004). Therefore, the term “blended learning” concerns both pedagogical approach, learning methods, using media, technology and relations between all of them, bearing in mind what to learn (Gynther, 2005). Thus, blended learning is a term multidimensional and with wide number of meanings.

However, the clearest and the most popular of all these definitions is blended learning as a kind of learning method combining face-to-face classes and e-learning. Because it is not a pure e-learning, there is an opportunity to eliminate the defects which many of the educational researchers underline in pure e-learning. Likewise, not being a pure face-to-face traditional learning – blended learning let us take all the best from this kind of learning, minimizing its negative aspects.

Obviously, the important question is still how to mix these two approaches (techniques, methodologies) in order to obtain effective course or training – what should be the content of the curriculum, which part of this content should be performed in a traditional way and which one with ICT support, finally – what ICT techniques and tools should be used. Having these problems in mind, blended learning allows maximization of the course effectiveness by matching the best methodology for each of the course parts. For example, blended learning course designer should remember that typical face-to-face classes are suited for workshops, coaching, exercises, feedback on activities and paper-based tests (moreover, in each learning situation where social interaction and the dialogue between a student and a teacher are needed). In turn “live” e-learning is good for application exercises, online coaching, interaction between students, online feedback, assessment, chats and instant messaging. What is concerned self-paced e-learning goes for simulations, online case studies, interactive learning modules, e-mail, bulletin boards interactions, online assessments, and other forms of computer based training (Harriman, 2004). The table presents another possible matching between activities and methods in a blended learning course.
Table 1: An example of matching between activities and methods in a blended learning course by Rossett, Douglos & Frazee (2009).

<table>
<thead>
<tr>
<th>Live face-to-face (formal)</th>
<th>Live face-to-face (informal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Instructor-led classroom</td>
<td>- Collegial connections</td>
</tr>
<tr>
<td>- Workshops</td>
<td>- Work teams</td>
</tr>
<tr>
<td>- Coaching/mentoring</td>
<td>- Role modeling</td>
</tr>
<tr>
<td>- On-the-job (OTJ) training</td>
<td></td>
</tr>
<tr>
<td>Virtual collaboration/synchronous</td>
<td>Virtual collaboration/asynchronous</td>
</tr>
<tr>
<td>- Live e-learning classes</td>
<td>- Email</td>
</tr>
<tr>
<td>- E-mentoring</td>
<td>- Online bulletin boards</td>
</tr>
<tr>
<td>Self-paced learning</td>
<td>- Listservs</td>
</tr>
<tr>
<td>- Web learning modules</td>
<td>- Online communities</td>
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<td>- Online resource links</td>
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<tr>
<td>- Simulations</td>
<td></td>
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<tr>
<td>- Scenarios</td>
<td></td>
</tr>
<tr>
<td>- Video and audio CD/DVDs</td>
<td></td>
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<tr>
<td>- Online self-assessments</td>
<td></td>
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<tr>
<td>- Workbooks</td>
<td></td>
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<tr>
<td>Performance support</td>
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<td>- Help systems</td>
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<td>- Print job aids</td>
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<tr>
<td>- Knowledge databases</td>
<td></td>
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<tr>
<td>- Documentation</td>
<td></td>
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<tr>
<td>- Performance/decision support tools</td>
<td></td>
</tr>
</tbody>
</table>

Undeniable advantages of blended learning are not only varied possibilities of combining and personal adaptation of pedagogical methods but also some specific benefits resulting both from implementing ICT support and face-to-face approaches. There are three basic assets of using online methods in blended learning course listed in the subject literature: cost reduction (especially the parts of the course realized online, personal costs related to the presence and mobility of teachers, rental costs, etc.); distance barriers eliminated (the students may learn wherever they are); time flexibility (the learners may study whenever they want, taking advantage of their proper efficiency rhythm and personal timing opportunities) (Alvarez, 2005). Taking into consideration face-to-face learning, the benefits are possibilities to take social interaction, live collaboration and the dialogue between a student and a teacher.

Collaborative learning as an element of ICT supported course

What is a place of collaboration in ICT supported learning, named also blended learning? To answer this question, it is worth to think about using collaboration tools in both ICT-based and traditional (face-to-face) learning. It seems that collaboration is one of the most important factors of learning, often listed with communication. In face-to-face learning collaboration is a main part of didactical process. Primarily, it is collaboration between a student and teachers, who communicate, discuss and assess each other. Secondly, a student may collaborate with his/her colleagues if we deal with course realized in a group. In turn, in an online course the collaboration is, of course, an opportunity to have a contact between a tutor and learners but if we consider online self-learning the collaborative learning may also manifests itself in using the collaborations tools as chat, instant messengers, forum or others Web 2.0 technologies. The collaborative learning in online self-learning may be a result of intentional teacher’s act or may be natural and informal reaction to interest field of a student. Moreover, as far as learners’ satisfaction is concerned:

Students who perceived high levels of collaborative learning tended to be more satisfied with their distance course than those who perceived low levels of collaborative learning (So & Brush, 2008, p. 318).
Therefore, collaborative learning is a crucial part of both kinds of learning. It is logical that the same position has collaborative learning in blended learning formula (Allen & Seaman, 2003).

Gülbahar and Orçun Madran (2009) have indicated four major areas of need analysis during designing blended learning environment. These are: technology, instructors, students, and pedagogy. On the basis of their research, they have defined several factors existing in each field. These factors are important in terms of creation effective and satisfactory blended learning course. But the most important factors common for all areas are: communication, collaboration, and interaction. The figure below visualizes this theory.

![Blended learning components](image)

**Figure 1:** Blended learning components by Gülbahar & Orçun Madran (2009).

Curiously enough, the same research shows that the perceived communication, collaboration, and satisfaction levels of students differ according to their levels of computer and Internet literacy (such as level of computer usage, level of the Internet usage, frequency of computer usage, and frequency of the Internet usage). The higher proficiency in the computer skills, the higher evaluation of collaboration (and communication) as well as satisfaction (Gülbahar & Orçun Madran, 2009). But, what seems to be a problem in terms of students is that they not always recognize how to implement saving ICT informal knowledge in educational context.

What are the main tools of collaboration in online environment? It depends on the level of course designer and/or teacher’s acquaintanceship of ICT possibilities as well as the level of ICT students’ literacy as mentioned above. While planning exercises, a designer can introduce online collaboration by using discussion in forum or during web conferences, resources sharing for creating common project or working together on wiki’s content, not to mention large scale of online materials presentation possibilities. But a special area of using ICT for reinforcing collaboration is assessment and giving feedback in blended learning course. The teacher can benefit from e-mails, dedicated web sites, forums, learning platforms and social sites for giving an immediate feedback and doing an individual as well as group assessment. What is more, these tools give an opportunity of peer assessment, providing informal feedback on the tasks (Enerson et al., 2007). In should be underlined that there is still one important point in the collaboration matter: a distinction between collaborative learning and cooperative learning. In cooperative learning students do the subtasks independently and then provide one, common solution. In collaborative learning working on the tasks always in groups and in interactive, communicative and synchronized way (Curtis & Lawson 2001). However, the task division into groups or, rather, roles (observer, evaluator, motivator etc.) is something natural and could be an effective collaboration element (Dillenbourg et al., 1996).
Success stories and lessons learned from the both COMBLE courses

Taking into consideration wide literature review and numerous experiences of different educational institutions, it is worth underlining that the idea of blended learning – generally groundbreaking, up-to-date and prospective – also may cause some problems. Both teachers/instructors, administrators and students may not have sufficient knowledge about the effective combining online and traditional course or, even if they have such knowledge, they may lack experience, or they may not know how to benefit from it. Most often, students are familiar with the Internet and its tools but – as we mentioned above – they often do not have experience in using them in educational context. On the other hand, we have teachers/instructors who have traditional teaching background and may find it difficult to integrate it with ICT. What also may cause a problem is the need for combining different pedagogical methods and learning activities into face-to-face classes with e-learning. Furthermore, at the institutional/administrative level, there are a lot of challenges ahead of administrators, related with specific construction of the course beginning from planning, through implementing, till evaluation of such a course. To sum up, administrators, instructors and learners are lacking the relevant organizational, methodological and technical skills and experience (McLaughlin & Mitra, 2001; Dirckinck-Holmfeld, 2002).

Within the EU-funded multilateral ICT project Community of Integrated Blended Learning in Europe (COMBLE) we conducted research on how to be successful with blended learning and how to prepare students, teachers and administrators to this form of education. It is the overall objective of COMBLE project and all its participating partners from three areas of education: higher education, vocational and continuing education, from four countries: Germany, Denmark, Poland and Estonia.

The main objectives of the project are:

- To assist administrators/managers in determining what is needed to implement successful learning outcomes in blended learning scenarios. To this effect, a Reference Model of Blended Learning Readiness is being developed, applied, and evaluated.
- To create a living community of Blended Learning Experts and instructors/trainers to share knowledge and experience regarding the implementation and evaluation of blended learning methodologies. Therefore, Methopedia, a European wiki-based community site (with methodological, informational and technical recourses concerning blended learning), is set up.
- To improve educators’/trainers’ ICT competencies to facilitate and design for interactive and collaborative learning. Blended Learning Train-the-Trainer Course, the tool of this aim, is set up and implemented first among the project partners. This course takes advantage of innovative didactical methods and is based on collaborative learning.
- To empower learners for using BL by providing them with a standardized baseline knowledge of blended learning tools, methods, and skills. In order to realize this objective, the European Blended Learning Driving License course was created. This course is based on self-learning online course with supporting of virtual learning platform.

Because of this meaningful knowledge gaps in instructional designing or usage of blended learning methods and techniques above mentioned and according to main objectives of the COMBLE project, two different courses were developed and conducted: one for students (Blended Learning Driver's License Course) and the second one for teachers (Blended Learning Expert Course). This paper will present them in the context of application the collaborative learning as an element of ICT supported course.

The first of created courses (BLDLC) is a typical self-learning course (multimedia course with e-learning platform support) and the second one (BLEC) uses methodology of collaborative and problem based learning (e-learning platform and lectures in Second Life). Taking into account different needs of these two target groups different methodologies are used in both cases. Collaborative learning in the case of student course is a subject to be learnt and in the second case (course for teachers) it is the way the participants are learning.

Students, as mentioned above, often have problems with applying blended learning tools in the process of learning. These students who are less familiar with ICT event don’t know what the possibilities this technology provides. Thus, course designers decided to prepare self-learning online course which would introduce the students into the world of the tools allowing them to use available online resources to supports the traditional education. The content of the BLDLC was divided into a few parts. Firstly, students could learn about blended learning in general terms and get to know the definitions. Then, they obtained
information about online learning technique, their own learning styles and also about Virtual Learning Environment. The next part of the course dealt with collaboration and communication in blended learning as the main body of this learning methodology. Collaboration is everything – that was a keyword of this part. Students could find there an explanation of synchronous and asynchronous communication, and then the various tools of communication were presented. Learners could find out and learn how they work (doing the exercises): forum, e-mails, chat/instant messenger and Web conferencing. Another part of the course concerned social aspects in online supported learning, based on Web 2.0 instruments: blogs, virtual galleries, wikis, video sharing, podcasts, and social networking sites. At the end of the course the psychological problems were covered (motivation, time management, resources management, searching requested information in online environment). The course and the participants were moderated and guided by the tutor on the Moodle platform where the additional tasks, place for sharing experiences and a final test were put.

Obviously, the most important parts of BLDLC were the second and the third part. The second part concerned collaboration directly. The third part, relevant to the tools of Web 2.0 trends, also dealt with collaboration but in an indirect way. Because in fact, what are creation of Wiki, taking part in the social networking sites, exchange of virtual video or voice resources? Here, collaboration is placed in the defined, interactive and open environment where its main sense is accomplished in the social space.

Generally the collaboration questions in BLDLC course were assessed well with average 4,5 points in a 5-point scale. The participants appreciated the course content and its organization. However, the comments like this also appeared: “maybe the course should be longer and connected with more time of synchronous activities”. The importance of collaborative aspects of blended learning possibilities was assessed quite high – between average 4,125 and 4,75 points. As the students indicated almost all collaborative aims achieved (only the ability to operate and use the six tools of social interaction: blog, virtual gallery, Wiki, You Tube, podcast and social-networking sites gained, on average, less than 4 points) – the effectiveness of the course could be classified as high. Knowledge about collaboration in ICT supported learning is really needed and an organized content of the appropriate course came across students expectations.

Blended Learning Expert Course was prepared as an online course, using PBL as a fundamental didactical approach and PBBL as a wide learning strategy. But the most important technique used in this course was collaboration of all the participants. The main objective of the course was to provide the participants with a combination of conceptual, theoretical and practical strategies with regard to designing, implementing and teaching/training courses of different duration in blended modality (starting from face-to-face course and with available online tools) using an overall PBL approach. The collaboration appeared during asynchronous, written communication on the Moodle platform and also during synchronous, oral activities in online world (Second Life). As far as SL is concerned, the course took advantage of innovatory forms of cooperation with virtual world offers. The participants, not having the possibility to interact with each other in real life (international teams), could become avatars and participate in a common event in the same place and at the same time. They had an opportunity to run live discussions which was great from the facilitators' perspective, giving a chance for an immediate feedback, quick assessment and appropriate reaction.

One of the exemplary activities in SL during the BLEC course could be „the opinionater”. This exercise is about expressing participants` opinions on the topic chosen by the teacher. It is based on an active participation of learners who are to express their opinion on a given subject by choosing one of the opinions (agree, against, neutral, etc.) placed on the special platform. Thus, this exercise is a kind of discussion based on virtual communication and synchronous participation.

Whole course lasted 6 weeks, with 9 lectures in SL and many asynchronous discussions on Moodle forums. Participants, divided into national groups, had an objective to fulfill (developing a miniproject related to real life and based on PBBL approach). After finishing the course the participants have evaluated the particular indicators, together with group collaboration and role of the facilitators in the course. Here are a few opinions from this evaluation discussion:

*I think learning in the international surroundings was very "enlightening" and I really enjoyed that!*

*I am still motivated to be active in Moodle and SL because of possibility to share experiences and points of view. Facilitators’ propositions stimulated my exploring SL as*
an educational platform. That was definitely the best part of the course. The facilitators were excellent. The atmosphere and motivation during the course was excellent.

It confirms what I maybe knew before: No one can be learning by a system alone. The systems are just supporters for all the good intentions and the heavy work done by the facilitators. The team process has been excellent with lots of good discussions.

I learned lot from Comble members in SL. Very useful was reading forum.

I feel connected of course mostly to the danish team but also to the rest of the participants in a way, that I never thought possible after 6 weeks working together only online and never meeting in RL. I have really learned a lot too.

To sum up, the lesson learned from this course: the collaboration and communication as a technique used in experts learning is really fruitful and effective during realization of the task based on the PBBL approach. The facilitators of the course, summarizing the evaluation and participants’ opinions underline that the course as a whole could not be considered as a total success. Particularly, it proves not to fulfill the main purpose of the course because from the teacher’s perspective the students could learn not “how to” prepare BL course but “what actually is” BL course. The number of planned activities (as SL lectures) was too large in relation to quite short duration time. What is more and curiously enough, there were some problems with cultural differences in what is to be considered the standards in working on the projects. However, the collaboration part of the course (leading in an innovative way) was a huge success and beside of being a tool for proper task preparation, it turned into an instrument of building the social community. The opinions were divided in what is concern the teams’ members. Some of the participants would like to work in international but interest-focused groups. Others enjoyed national teams as more cultural and language “tolerant”. It could constitute an inspiring aspect of another research – if we agree that collaboration is something good in ICT supported course. The question is how to organize people working in the international environment and being at different educational levels and having various needs. Likewise, the opinions about SL as a collaborative milieu were diversified, some of the participants pointed at too little time for asynchronous effective discussions on the platform and too much involvement into virtual meetings.

Suggestions on how to use collaborative learning in remedial course

We can also benefit from the outcomes of research on collaborative blended learning courses while we try to design effective ICT supported remedial courses in the frame of another European project STEP - Studies on Transitional Electronic Programs. Remedial courses are specific as their participants very often have different learning needs, competences and different social and educational backgrounds. They are also a challenge for teachers or designers who have to prepare one effective course for participants with a variety of needs. Many remedial courses are supported by ICT. The question which may appears: are collaborative learning tools needed in remedial courses and if so for what?

STEP Project was focused on analyzing of traditional and remedial courses – both real examples of the courses in European countries and world literature concerned the remedial education in general. Four partners in the project – the educational institution from the Netherlands, Belgium, Lithuania, and Poland – worked on collected data to choose the best practices and decide how to support remedial courses in the most effective way by ICT methods. The main aim of the project was to develop a framework of assessing and comparing (online) supported preparatory transitional programs. One of the actions in STEP project was gathering the empirical data on three levels – first from the partners’ institution, then from each partner country institutions and finally from various European institutes.

This research was conducted with the use of an online survey consisting of questions regarding didactical and organizational aspects of remedial teaching. The kind of the learning subject, didactical methods, general objectives of the course and, obviously, ICT support were taken into account. The survey took place between February and May 2009. The 118 courses from 65 institutions and from 22 countries were analyzed. One of the crucial parts of the survey was evaluation of collaboration (and communication) use in remedial courses. Application of this learning method or its elements seems to be very important
during transitional programs planning. Nowadays, we have to deal with a large number of international students within Europe. Their presence on the remedial courses rises increasingly because of necessity to be flexible and open not only on the educational area but also on the dynamic job market. They have to deal with cultural differences, not to mention the dissonances between levels of countries’ educational systems. Collaboration can be a kind of a factor combining different students’ needs, expectations and cultural conditions during common work in a course group. The involvement in learning course subject by using collaboration methods and tools, especially when they are ICT supported, lets the students not only improve their knowledge but also defeat communication and multicultural problems.

The results of STEP research show that area of collaboration work (vs. individual work) is one of the five dimensions providing characteristics of the remedial course. From 118 courses, 57 were specified as the courses which used collaboration method. Curiously enough, these are the courses concerning language and social disciplines rather than science. This phenomenon could be explained by higher ability of collaboration in social sciences in which education seems to be less formal, less focused on rigid knowledge, more skill- and cooperation-oriented. In this range of courses, collaboration is possible and expected, as the factor both facilitating the learning process and having value on its own. Another observation from project research is that, the more ICT in remedial courses, the more collaboration. It results from a wide range of possibilities of effective collaboration instruments which are accessible when ICT tools are used. It should be noticed that collaboration in social “soft” remedial courses does not exclude using individual work, which is also applied in these courses. But it is worth underlining that with the use of blended learning techniques, the use of the individual work is decreased.

However, in the global interpretation of the research results, it is evident that collaboration as learning methods or techniques is used in almost all analyzed courses. Only one group of 22 courses from science “hard” area is firmly classified as collaboration free. It leads to the statement and recommendation that collaboration is needed in remedial courses and is introduced especially if ICT is used. As mentioned above, collaboration not only provides the students with more effective learning of the subjects, but it is also integrated and acculturated in a new social environment faster than the one focused only on an individual work.

References


Lifelong Learning: Obstacles and Potential Resolutions

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Lifelong learning, an educational tradition, rests on a notion that it is the individual’s own choice of pursuit of knowledge, skills and values. However, the continual quest for learning is becoming more significant with the emerging technologies and changing lifestyle. The rapid change in innovations and interventions in the workplace makes it practically impossible for every individual to be “completely trained” in terms of transfer of learning. Workplace situation is a variable thereby posing different challenges for similar occupations. Thus, the question of choice becomes meaningless as the urgency arises. In this context, lifelong learning becomes critical to complement and supplement existing work-based learning or even primary, secondary and tertiary education.

This study highlights the obstacles in lifelong learning in the local context that can be extrapolated to the global perspective. Qualitative data was obtained through the inspection of policy documents and interviews. The findings showed that the vision for lifelong learning is well documented in the nation’s policies. The aspects discussed are potential resolutions in facilitating the concept of “education for all and “easy accessibility for all”. Democratization of education has been made possible by adopting multiple strategies. The “open entry” system for all citizens in the country to pursue lifelong learning programmes with a nominal and flexible fee structure facilitates the participation from community members. The wide range of courses offered, with features of customization, recognition and accreditation positions lifelong learning programmes as a “stepping stone” for facilitating development of human capital, social capital and culture capital.
E-portfolio for competence development during internships of teacher education

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Abstract This paper reports on the results of the implementation and acceptance, by course-instructors, of an electronic portfolio in a university preservice teacher education program. 25 course-instructors of 3 different Faculties completed a questionnaire, 14 of them were also interviewed about their experiences with the electronic portfolio. Results suggest that initial positive acceptance needs further support by providing further professionalization of pedagogical concepts and by clarification of standards for coaching and for assessment. These results are part of an ongoing broader study that aims to evaluate the electronic portfolio during internship by consulting different stakeholders: students, mentors and course-instructors.

Introduction

Portfolio as a concept originates from the world of arts and architecture. Artists use it as a medium to show a compilation of their best work to promote it to prospective customers. Through time the concept of a portfolio has been adopted in a variety of professional contexts, and also in teacher education, portfolio has come to stay, and to meet several purposes (Meeus & Van Looy, 2002; Bird, in Loughran & Corgnan, 1995; De Rijdt et al.,2006). The rise of the constructivism concept in education (Strudler and Wetzel, 2005a; Meeus & Van Looy, 2002) is mentioned as an important initiator for this boost. The particular purpose for use is the determining factor for the portfolio concept (Davies & LeMahieu, 2003; Strudler and Wetzel, 2005b). This is also illustrated by Meeus, Van Looy & Van Petegem (2006) who made a clear classification of the use of electronic portfolio in teacher education: PAS assessment, assessment and coaching during internships, electronic portfolio for employment and electronic portfolio for lifelong learning. Due to the proliferation in use and of different approaches to portfolio numerous definitions can be found (Janssens, Boes and Wante, 2002). However, Janssens, Boes & Wante (2002) deducted 5 shared components in different conceptualizations of portfolio. (a) A portfolio contains a collection of artifacts, gradually collected by the student during the educational process. (b) The concept of ownership lies with the student. It is his responsibility to “document his individual learning history” (Foote in Imhof & Picard, 2009). Based on review of literature on portfolios and research evidence Davies and LeMahieu (2003) claim that student choice and ownership are key factors for student motivation. Meeus and Van Looy (2005b) report that, depending on the purpose of the portfolio student choice varies concerning choice of competencies to be proven, choice of formal portfolio aspects and choice of portfolio content. Zeichner and Wray (in Van Tartwijk et al, 2007) underline the importance of finding a balance between students personal freedom and imposed formal criteria. (c) The selection of artifacts needs to illustrate student’s growth or development in achieving the aimed competences. The selected artifacts have to meet following criteria: prove the competence level at a particular moment, outline students own further objectives, illustrate how next steps in his growing process will be taken. (d) The reflection process is mentioned as a final crucial aspect in portfolios. If reflection is missing, portfolio is mere content without meaning (Imhof & Picard, 2009). An individual’s learning process can only be made visible through reflection. Korthagen and colleagues (in Driessen, 2008) defined reflection as the “mental process of trying to structure or restructure an experience, a problem, or existing knowledge or insights” and in line with this definition, they developed a model for cyclic professional development, based on reflection on experience, known as the ALACT model. Although reflection is indispensable, it does not happen automatically and demands cognitive and metacognitive skills (Kathpalia & Heah, 2008). Kathpalia and Heah investigated several ways to promote the process of self-reflection by students: defining reflection, modeling, completing reflective statements, reflective prompts, reflection checklist, reflective journals, weblogs. Reflection is not merely an individual and solitary act, on the contrary, it “often includes dialogue and conversation with a coach, a mentor, an adviser, or a peer.” (Chen in Young, 2002). So, coaching students to help them in developing these skills is essential. (e) This need for coaching by for instance a course instructor includes
several components: offering a frame of reference on which the student can hold on by offering ‘cognitively acceptable’ feedback to the student (Tillema & Smith, 2000; Strijbos et al., 2007; Imhof & Picard, 2009), training them on mentioned metacognitive skills (Dalton, 2007), and make assessment indicators explicit (Strijbos et al., 2007).

Evolutions in ICT led to a transition of paper portfolios into electronic portfolios in teacher education (Meeus & Van Looy, 2002; Strudler and Wetzel, 2005). This shift from a portfolio in a three-ring-binder to an electronic portfolio is more than just a change in format. As added value, electronic portfolios allow “students to create their own sense of interconnections between artifacts” (Norton-Meier, 2003). Moreover, Pullman (2002) proclaimed that hypertext was a new way of thinking that can lead to a new art-form. This adds a new feature to the portfolio concept. In addition to this, electronic portfolios are more portable (Pullman, 2002), look more sophisticated (Pullman, 2002) and permit coaching from a distance. E-portfolio is easily accessible (Johnson in Lin, 2008) and can be accessed from remote locations (Strudler and Wetzel, 2005). Interaction between students and lectures, students and peers (Chang, 2001; Pullman, 2002), and other possible stakeholders is possible (Chang, 2001; Janssens, et al., 2002). The capacity to store artifacts using different media e.g. sound, video, text, … enhances its convenience (Johnson in Lin, 2008). An additional benefit that comes with electronic portfolios is that it offers an opportunity to promote the student’s ICT-competence referred to as “media competence” by Meeus, Questier and Derks (2006). Students who worked with an electronic portfolio seemed more inclined to integrate ICT in their later teacher practice (Lin, 2008). Beside these advantages, some obstacles in dealing with this electronic portfolio have been recorded. Some students and lecturers are not ICT minded because of inadequate ICT-skills whereas for others more ergonomic reasons such as reading electronic pages lead to demotivation (Pullman, 2002; Imhof & Picard, 2009). Furthermore, constructing an electronic portfolio demands a lot of time for the student due to the handling of different media (Meeus et al., 2006) as well for the course-instructor because of navigating through these portfolios (Strudler & Wetzel, 2005b; Van Tartwijk et al., 2008; Griffiths & Miller in De Ketelaere et al., 2009).

Design of the study

The purpose of this study was to evaluate an implemented e-portfolio in an university teacher education program at K.U. Leuven. During one or two years, students are trained to be teachers in secondary education. To enroll in this program a masters degree is required or about to be acquired. The e-portfolio under study has been designed for the purpose of coaching and assessment of preservice teachers during their internship. During which they are expected to acquire teacher competences. To realize this, student teachers are expected to carry out several tasks during internship in different educational settings. These are partly mandatory and partly free to be chosen from a predesigned set of tasks. Prior to the internship a Personal Development Plan (PDP), to acquire teacher competences, is made up by the student teacher and shared with the course-instructor. It is made up to meet students individual training needs, and consists of all mandatory tasks and a selection of tasks from the predesigned task set. Students are also encouraged to adapt existing, or suggest new tasks, to suit their own training needs. During, and at the end of their internship, student teachers use this PDP to document their learning process, in acquiring all required competences. As mentioned in Driessen et al. (2007), it is important that portfolio is embedded in an overall coaching system. Coaching is provided by a mentor working in the educational setting, and by a course-instructor of the academic teacher education. For the latter, it involves a role as a coach and supervisor, face to face and on-line. Whereas, the mentors’ role is mainly based on face to face feedback. To stimulate student learning process during internship through reflection, the conceptual framework of Korthagen (1992) has been chosen as theoretical principle. All stakeholders (student, mentor and course-instructor) have an active role in the assessment of the preservice teacher. For this purpose a tool was developed and guidelines for coaching and final assessment were made up.

We want to investigate how the recent implementation of an electronic portfolio influences the coaching process of the teacher-students. Tillema and Smith (2000) noticed that however much is written about electronic portfolio as alternative assessment instrument, little is known about “how electronic portfolio is evaluated and subsequently used to guide further learning”. We intend to, after this study, give an answer on what actions are performed during the coaching process and assessment of teacher-students, what difficulties are encountered and how this process can be optimized.

Different stakeholders will be consulted in this study: students, mentors and course-instructors. This paper presents data gathered of the course-instructors.
Research questions
1. What was the initial, and is the actual, perception of the e-portfolio?
2. What actions perform course-instructors in coaching and assessing students?
3. Do course-instructors feel any need for further professionalization with regard to this implementation of e-portfolio, coaching and assessing students?

Subjects
Subjects (see Table 1) are course-instructors (N=25) working in one of 3 different teacher education programs in Humanities using this e-portfolio: Behavioral Sciences - Faculty of Psychology and Educational Sciences (SLO_BS, N=11), Economics - Faculty of Business and Economics (SLO_E, N=4), and Social Sciences & Philosophy - Faculties of Social Sciences and Law, Institutes of Philosophy, and Criminology (SLO_SP, N=10). Most respondents have been working for 5 to 10 years as course-instructor at K.U. Leuven and are experienced coaches; 18 have coached over 15 student teachers during their career at K.U. Leuven. During an introductory session the e-portfolio was explained to all subjects but also ICT-skills were trained to meet coaching needs. The e-portfolio was implemented in 2007, hence only part of the course-instructors have had hand on experience with the e-portfolio under study (N=18).

Table 1: Number of subjects for each teacher education program and experience in years as course-lecturer at K.U. Leuven

<table>
<thead>
<tr>
<th>Experience in yrs as course-lecturer at K.U. Leuven</th>
<th>SLO_E</th>
<th>SLO_BS</th>
<th>SLO_SP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 years</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5 – 10 years</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>No answer</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>11</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

Data collection and analysis
To measure course-instructors’ perspectives of the e-portfolio a questionnaire and semi-structured interview were developed. The questionnaire consisted of a set of propositions on a 5 point Likert-scale with 1 “totally disagree” and 5 as “totally agree”. In multiple choice questions respondents were asked what propositions fitted best their view and had to number the chosen items according to their personal importance. The questions addressed three topics: (1) respondents conceptual view of the e-portfolio (N=25), (2) respondents use of the e-portfolio and actual view of the e-portfolio (this part was answered by the subjects who were experienced in the use of the e-portfolio, N=18) and (3) their felt needs for further professionalization (N=25). All course-instructors answered the questionnaire (response rate 100%). Because of the small number of members in Economics - Faculty of Business and Economics (SLO_E, N=4), and Social Sciences & Philosophy - Faculties of Social Sciences and Law, Institutes of Philosophy, and Criminology (SLO_SP, N=10), both groups were taken together (SLO_E_SP) and compared to Behavioral Sciences - Faculty of Psychology and Educational Sciences (SLO_BS, N=11). Collected data by questionnaire were analyzed quantitatively using descriptive statistics, mean and standard deviation. A t-test was conducted to test for differences between course-instructors in SLO-E and SLO-SP (N=14) and SLO-BS (N=11). To score multiple choice questions the number of times answers were chosen was tallied. Answers were then classified into a scale: most important answer 5 points, the second most important answer 3 points and the third most important 1 point. Shortly after the questionnaire was filled in, all subjects were invited for a semi-structured interview, 14 subjects accepted (response rate 56%). The collected data by were first transcribed and then coded qualitatively.

Findings
1. What was the initial, and is the actual, perception of the electronic portfolio?
Although a broad range of initial (M=3.62; SD = 1.056; N=24) and actual (M=4; SD =.970; N=18) perceptions of the electronic portfolio by course-instructors was found, overall initial perceptions and overall actual perceptions were found to be positive. Given answers in interview indicate that course-instructors actual perceptions compared to their initial perception vary: showing disappointment “Initially, I was very positive about it, I participated in the construction of it, but now, I diagnose a lot of problems in evaluating the competencies: it is not easy finding the good fit between knowledge, skills and attitudes” (G12); astonishment: “… I thought, there they go again. Because I don’t have strong ICT-skills, I felt hesitant about it… and now, my experience and the possibilities of the e-portfolio made me feel positive about it.” (G10), and meeting initial expectations: “Initially, I was not complete positive about it. I knew, due to experiences on my other job, that it will bring along a lot of work. But fundamentally and conceptual, I supported it and up to now, I support it”. But a part of the course-instructors have not made up their minds yet.

Course-instructors claim that the purpose of e-portfolio is clear to them (M=4.24; SD =.879; N=25), in the interview they describe e-portfolio as “instrument to document growth process”.

Overall perceptions were that students are not expected to reflect too much on their growth as a teacher during their internship but perceptions differed (M=2,72; SD=1,100; N=25). Findings based on interview indicate that course-instructors unanimously declare students have to complete too many reflection forms. One respondent explained: “It would be better to use this time to reflect during face to face contact with the course-instructor. It would increase learning”(G3). Another course-instructor pointed out the pitfall of two many forms “We promote social wishful behavior in letting them write so many reflections”(G6).

On the topic time-investment different propositions were presented in the questionnaire. Answers on all indicate workload is experienced as high: (a) actual workload compared to the workload in the former program is experienced as increased (M=2,80; SD=.414; N=15; a 3 point Likert-scale was used), (b) actual and contractual expected workload are not in balance (M=3.00; SD=1,238; N=18) (c) workload in this teacher education program is too high (M=2,31; SD=.479; N=16; a 3 point Likert-scale was used). During interviews the majority of course-instructors indicate that workload has increased, due to the need for continuous coaching and, several course-instructors experience it more time consuming compared to the paper version of portfolio: “Previously, we read the portfolio once, at the end (of internship). Now, the workload is more constant, especially answering e-mails from both students and mentors is very demanding. You can’t afford not answering these in time, in my opinion” (G1).

A great dispersion was recorded concerning ICT-skills: those who were less ICT-minded experienced a lot of time investing in navigating through the e-portfolio, also ergonomic shortages were mentioned: “everything has to be read on a screen… I don’t like this”.

Desirability to grant access for other stakeholders to students e-portfolio has been inquired. Most of the course-instructors agree with giving access to the mentor for several parts of the e-portfolio (M=3,92; SD=,812; N=25), but only a minority agree to grant them access to the whole e-portfolio (M=2,68; SD=1,145; N=25). Permitting access for other colleague course-instructors is advisable for two reasons: course-instructors can see other practices and can consult a colleague if they have doubts regarding their assessment of students’ competences.

2. What actions perform course-instructors in coaching and assessing students?

Before starting the internship, students have to participate in seminars where they learn to make lesson plans and where they practice teaching skills in small groups (6-8 students). In Behavioral Sciences the aim is that the course-instructor of the seminar will coach the same students during internship. This concept is not adopted in other faculties. This is probably why a number of course-instructors (N=9) did not answer the question “During the seminars, I often refer to the e-portfolio”. Course-instructors disagree in answering this question (M=2.94; SD=1.237; N=16). During interviews, they point out several advantages of coaching students during seminars and later during internship: “The students already embark in microteaching and so I can observe the strengths and weakness of them.”

In their opinion course-instructors know what is expected of them regarding coaching students during their internship (M=3.94; SD=.639; N=18). Course-instructors do not feel the need to get in touch with mentors during internship to improve their coaching (M=3.80; SD=.957; N=25). A similar proposition was given to the course-instructors with on hand experience, although overall score is positive a lot of different answers were given (M=3.39; SD=.1037; N=18). In interviews course-instructors answers indicate that, unless problems arise during internship, no further contacts between mentor and course-
instructor take place. Communication with mentors runs mostly through e-mail, to make appointments, but face-to-face contact for feedback is most valued. Course-instructors also mention a wish to have more face-to-face interactions with the students. The quality of the relationship is seen as an imperative condition for sound and authentic coaching. One respondent feared that the implementation of e-portfolio would be a burden on the quality of relationship because of the curtailment to merely e-contact, but he experienced the opposite: "My experience is that I had a closer contact. I didn’t deem it possible that we would come to a dialogue by computer. It was surprising to realize I coached more than ever" (G10).

Considering selfregulation of learning process, a significant difference (F(1,16)=5.000; p=.040) is found between both groups (SLO_BS and SLO_E_SP) of course-instructors. Lecturers working in SLO_BS are more convinced (M =4.25; SD=.707; N=8) than colleagues working in SLO_E_SP (M=3.50; SD=.707; N=10).

Coaching reflection occurs mostly during face-to-face contact and the aim is to broaden the view of students. In coaching interventions course-instructors are expected to take the chosen conceptual framework as a starting point for intervention. However, given answers indicate that not all course-instructors take the adopted conceptual framework as a starting point for their intervention (M=3.59; SD=1.326; N=17). For this item a significant difference was noted between both groups (F(1,15)=7.477; p=.015). Course-lecturers, working in SLO_BS, claim stronger (M=4.38; SD=.744; N=8) than colleagues working in SLO_E_SP (M=2.89; SD=1.364, N=9) they use the conceptual framework for intervention. Not all course-instructors share the opinion that quality of students reflection is of poor quality (M =2.76; SD=1.200; N=17). But in an interview a course-instructor points out following pitfall: "We have to be the alert for students who possess strong verbal qualities. It is possible that we value them higher because of easier reflective writing than the less verbal skilled"(G3).

Course-instructors’ answers to the question "I know how to assess the portfolio" indicate they do not sufficiently know how to address this problem (M=3.00; SD=.767; N=18). The suitability of the evaluation tool for coaching purposes is judged neutral (M=3.29; SD=.920; N=17). Course-instructors answers also indicate that it is difficult to address a final score for the internship based on the evaluation tool (M=3.31; SD=.873; N=16). The interviews show that some course-instructors prefer a holistic assessment, whereas others prefer an analytic assessment. In the questionnaire course-instructors were asked what their assessment of the e-portfolio is based upon. PDP, mentor feedback and their own class observation prove to be determining factors for administering a final score by course-instructors. Course-instructors’ views about the idea of introducing a second evaluator differ (M=3.16; SD=1.179; N=25). Data gathered during interview indicate that a second opinion is desired where there is doubt or a risk of a student failing. Interview also indicates support for self-evaluation by the student, however course-instructors have different approaches to implement this.

All in all, course-instructors claim their tutoring of student runs well (M=3.94; SD=.416; N=18).

3. Do course-instructors feel any need for further professionalization with regard to e-portfolio-implementation, coaching and assessing students?

Course-instructors feel they are sufficiently skilled in ICT to coach students through e-portfolio (M=3.44; SD=.856; N=18). However a lot of different opinions exist about the need of extra support for working with e-portfolio (M=3.60; SD=1.323; N=25).

Data collected by questionnaire indicate that course-instructors are not sufficiently familiar with the underlying pedagogical concepts: constructivist learning (M=4.12; SD=1.269; N=25) and the reflection-cycle of Korthagen (M=4.08; SD=1.256; N=25). A significant difference concerning knowledge about Korthagens’ reflection-cycle was found (F(1,23)=9.072; p=.006) between both groups of course-instructors. Course-instructors working in SLO_BS claim to be acquainted with this conceptual framework (M =4.82; SD =.405; N=11) whereas course-instructors working in SLO_E_SP claim not to be (M=3.50; SD=1.401; N=14).

Introductory sessions, in which the e-portfolio was explained to all course-lecturers and training in ICT-skills was given, were perceived as useful (M=4.00; SD=.905; N=23).

All course-instructors indicate that they feel the need that standards for coaching (M=3.92; SD=.759; N=25) and standards for assessment (M=4.21; SD=.588; N=24) should be clarified. Perceptions about the need for professionalization on pedagogical concepts differ (M=3.20; SD=1.323; N=25). Further training by sharing experiences between colleagues (M=3.84; SD=.850; N=25) and good practices (M=3.68; SD=.852; N=25) between course-instructors seems to be a good way to meet professionalization needs.
Conclusions and discussion

In general, the e-portfolio was welcomed and perceived as positive by course-instructors of the investigated faculties. However, initial impressions compared to actual impressions differ among subjects. This indicates that different conceptualizations of e-portfolio exist among course-instructors. It is not likely that there is a lack of consensus regarding the concept and even formal use of the implemented e-portfolio. Most of the subjects had an active part in the developmental process of the concept. Moreover, the concept was also explained to all subjects during introductory training sessions: ICT-competences, coaching and assessment criteria. However, it is clear that developing a portfolio in a team does not guarantee that the fundamental underlying theoretical rationale of the e-portfolio concept is clear to, and shared among, all team members. Theoretical key concepts: constructivistic learning and the reflection-cycle of Korthagen are obviously not clear to, and shared among, all course-instructors. The reflection-model developed by Korthagen is therefore not being used by all in their coaching. PDP is seen as the most important part of the e-portfolio and coaching and assessment criteria were developed but, in spite of this, course-instructors perceive the assessment of the teacher-students as a responsible and difficult task. Nearly all course-instructors claim their coaching runs well but different approaches to assessment were reported. Underlying theoretical rationale of the e-portfolio should therefore be discussed and made explicit throughout conceptual development of the e-portfolio. If it should be considered to implement an existing e-portfolio, this process is probably equally important. Underlying theoretical rationale should, subsequently, be part of an initial training program of course-instructors. This seems imperative for sound theoretically based coaching and assessment. But, will it suffice to keep coaching and assessment sound over time? This is highly questionable. We argue that training is inherent for successful e-portfolio implementation and is needed well beyond. It is clear that even for highly trained and experienced professionals, of whom several received basic training in educational sciences, conceptual knowledge needs to be actualized over time. Exchanging experiences among course-instructors and good practices seem, however, a good way for ongoing professionalization. These findings confirm literature that time has to be taken to develop a clear framework and to train different stakeholders sufficiently.

Course-instructors’ need for clear standards for coaching and assessment remains unanswered. Further research is needed to determine if an universal conceptual approach for coaching and assessment fits all existing, and yet to be developed, e-portfolios. However, until now every portfolio needs a customized approach to coaching and assessment. When developing or implementing an existing portfolio, coaching and assessment standards have to be developed or questioned. Existing research is too scarce to determine whether shared components can be found in coaching and assessment among e-portfolio. Coaching and assessment standards should thus be derived from a sound underlying theoretical rationale.

References


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A special word of thank goes to Stephanie Verbeken, who contributed to this study by interviewing the course-instructors and by analyzing the results. Her dissertation delivered us a clear summary of the first part of our study.
A comparison of traditional face-to-face problem-based learning (PBL) and online PBL tutorial groups in a public health masters programme at Maastricht University: Experiences of the students and the tutor

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Abstract: With e-learning Maastricht University responds effectively to the lifelong learning trend and further education. In this study, the experiences of students and tutor in problem-based learning (PBL) face-to-face and PBL online tutorial group meetings will be outlined. Traditional face-to-face PBL (two groups) and PBL online (one group using a combination of web-conferencing and Skype technologies) were compared in the master Health Services Innovation (HSI). Qualitative and quantitative data were collected by means of questionnaires, interviews and focus group interviews. Experiences of students and tutors are presented. The results of this research show that online tutorial group meetings acceptable to both students and tutor as replacement for face-to-face tutorial group meetings. A possible confounding factor are the differences in age, work experience and motivation between the face-to-face groups and the blended learning group. In the future videotapes of the PBL sessions will be analyzed and compared to the experiences reported here.

Introduction

Maastricht University has distinguished itself both nationally and internationally with problem-based learning (PBL) since its foundation. PBL is a special educational model which centres on the student. It is based on the following learning principles (Moust & De Grave, 2000): learning is a constructive process, learning is goal-oriented, learning is a contextual process, learning is a cooperative process, and learning is a self-directed process.

The way of thinking and studying that revolves around collecting and exchanging information makes PBL more than just an educational method (Maastricht University, 2009). It nurtures the ability of learners to solve real-life problems and fosters communication and cooperation among students across a wide variety of disciplines (Suzuki et al., 2007). A key essential to PBL is that students should take responsibility and plan their own learning. Moreover, students engage actively in collaborating learning. Students construct knowledge for themselves. An important aspect is that the student is viewed as an active participant in learning rather than a passive recipient of knowledge (Mok, 2009).

In the strategic programme for 2007-2010, Maastricht University aims at further development of PBL, for example in adapting to the changed composition of the student population, technological and new insights into learning (Maastricht University, 2006). With the use of instruments such as e-learning the university can respond effectively to the lifelong learning trend and offer options for further education to, for instance, graduates who are scattered around the world. Suzuki et al. (2007) report that internet-based PBL offers many advantages: (1) it enables communication between students anywhere; (2) it facilitates learning on a global scale, which promotes not only the acquisition of knowledge and communication in English but also an understanding of the different social and cultural traditions in other countries; (3) it facilitates multidisciplinary learning, which helps nurture the spirit of teamwork and an understanding of the roles of other professionals; (4) it allows students in different academic years to participate in the same activities in a group, which gives them the opportunity to help each other out; (5) it allows faculty members from different institutions to jointly design and conduct unique learning courses, which is difficult to do in the formal curriculum; and (6) it allows institutions in remote locations or with limited resources, in collaboration with allied institutions, to adopt this system to complement their formal curriculum.

The shift from PBL to PBL online has brought with it divers ways of using different foci and a variety of design. Salvin-baden (2007) reports that different approaches to PBL that have been used face-to-
face will both guide and inform the way PBL is used in online settings (Savin-Baden, 2007). However, we cannot presume PBL approaches to work exactly the same when other media are used. There will be differences, activities, technical possibilities, communication patterns, group cohesion, etc. Research literature does not provide enough insight in which of those differences matter and which not, nor how PBL should be implemented in online settings. A complicating factor is that - just like for any educational method - the optimal design and implementation of PBL will not always be the same. Many factors play a role, e.g. the background, preferences and time-schedules of students, the content matter, the capacities and preferences of the teachers, the resources available, etc. The Faculty of Health, Medicine and Life Sciences is exploring blended learning solutions to use PBL for part-time, mostly working, students that participate in courses or master programmes from a distance. This means that students will participate in on-campus and online learning activities. A requirement for this is an online PBL model that will work (at least) just as well as face-to-face PBL. This study is meant to contribute to this purpose.

**Previous experiences**

In a previous study, in the academic year 2004-2005, the Faculty of Health Medicine and Life Sciences of Maastricht University has used a largely asynchronous form of online PBL. The preliminary discussion was synchronous in smaller subgroups without a tutor. The tutor gave comments on reports of these sessions and eventually delivered a set of learning goals on a discussion board. All members of the tutorial group could answer the learning goals asynchronously (monitored by the tutor). The tutor's experiences with this form of PBL were not satisfactory. A possible explanation is that the students' activities changed considerably by shifting an important part of the discussion from a synchronous meeting to an asynchronous discussion forum. Research literature indeed confirms that asynchronous spaces are less suitable for task-related negotiation, which is better conducted synchronously. Anchoring the discussion around students’ proposed solutions work well in the asynchronous mode (Hmelo-Silver & Derry, 2008).

Based on these experiences another form of online PBL was introduced that is as close as possible in implementation to face-to-face PBL. In this form tutor group discussions are held synchronously in a web-conferencing setting.

**Research questions**

The research question is: How and to what extent do online tutorial group meetings differ from tutorial group meetings in a traditional setting (face-to-face)?

**Based on what is known about effective tutorial group meetings and discussions in**
tutorial group meetings we have identified the following sub-questions:

- Are the discussions in online tutorial group meetings at least as effective as in face-to-face settings, i.e. are the aims of discussions in the preparatory phase and the reporting phase (see above) attained?
- Do all students participate equally in PBL online sessions?
- Does the tutor fulfil the different tutor roles in the PBL online setting and is this comparable to the face-to-face setting? If not, which roles are performed differently?
- Are online tutorial group meetings acceptable to both students and tutor as replacement for face-to-face tutorial group meetings?
- What are the advantages and disadvantages of PBL online tutorial group meetings versus face-to-face tutor group meetings in terms of supporting the learning process?
- What recommendations can be given to improve the effectiveness and efficiency of online tutorial group meetings?

This paper focuses on the experiences of students and tutor regarding the questions above. The qualitative analysis of the recorded sessions will be reported elsewhere (De Jong & Verstegen, in press).

**Methods**

**Research design**

The present study can be classified as design-based research (Collins, Joseph, & Bielaczyc, 2004) or development research (Van den Akker, 1999). In the search for innovative solutions the aim is to identify
critical elements for blended learning based on existing literature, design principles and experience, implement these in different ways and evaluate the results. Research is conducted in a complex real life setting where multiple variables play a role. Rather than trying to control these variables the situation will be characterized. The goal is not to test hypotheses but to look at many different aspects that characterize a design in practice, collecting both qualitative and quantitative data (Mayring, 2001). Eventually, this should lead to a gradually refined and optimized the concept for blended learning that fits the organizational setting and aims.

Setting

Master programme. The master programme in Public Health at Maastricht University exists of five specialisations. One of the specialisations is Health Services Innovation (HSI) which was designed to equip health professionals for the challenges of innovation in the medical field. (Maastricht University, 2008).

The programme is taught entirely in English and can be completed as a one-year (full-time) programme or as a two-year (part-time) programme. The part-time programme is a blended-learning programme (Maastricht University, 2008). Part-timers follow one module at the time whereas the full-timers follow two modules. One module corresponds to 5 ECTS point (European Credit Transfer System).

Problem-based learning (PBL). In the traditional problem-based learning, students work on tasks using the seven-step approach. The seven-step approach consists of: (1) clarifying concepts; (2) defining the problem; (3) analysing the problem/brainstorming; (4) problem analysis/systematic classification; (5) formulating learning objectives; (6) self-study; and (7) discussion. (Van Til & Van der Heijden, 2009). A tutorial group exists of a discussion leader (a student), group members (includes a minutes secretary) and a tutor (a lecturer or a senior student). The approach is also followed by the PBL online tutorial group. In the provided environment they can see and hear each other, chat, and present notes and/or learning goals in a pod (see Picture 1).

![Figure 1: Division of the screen in Surfgroepen during the PBL online tutorial group meeting (preliminary discussion and reporting).](image)

Timetable. The module lasts eight weeks and contains five PBL tasks. The five tasks are conducted in the first five weeks of the module. Each tutorial group meeting is on a fixed day during the week. The students in the traditional PBL will meet each other in five face-to-face tutorial group meetings. For the
blended learners one face-to-face tutorial group meeting is planned at the beginning of the module (week 1), so that they can get to know each other In this meeting the preliminary discussion of task 1 will be conducted, followed by an introduction about rules for PBL online and practice with the technical equipment used for PBL online. On the same day students meet the module coordinator. A social event (dinner) is included to get to know each other. The rest of the PBL online sessions are online. Before the start of the first PBL online session, the researcher will check the equipment of each student separately by executing an online test.

**Subjects**

**Students.** Three tutorial groups participated in this study: (1) two tutorial groups within a traditional setting; and (2) one PBL online tutorial group. All students had finished at least a bachelor, either at the Maastricht University or at another university. Based on previous experiences with PBL online sessions the number of participants of the online tutorial group was aimed at around seven. The traditional face-to-face tutorial groups were kept at the same size for this study (even though traditional tutorial groups are usually larger, i.e. 10-12 students).

Students in the traditional setting are studying full-time. In the PBL online tutorial group, only part-time students are involved. This group included (second-year) students, who have already studied for one year in similar online PBL settings (but following other modules), as well as (first-year) students who have just started their master.

**Tutor.** All groups had the same tutor. The tutor had knowledge of the module content, experience in PBL tutoring and is a native speaker of English. In one week the tutor was not available and all groups were guided by another tutor. This week has been excluded from this study.

**Approval**

Approval for the study was obtained from the Faculty of Health, Medicine and Life Sciences. Prior to the tutorial group meetings, the students received information regarding the study by the researcher. Students gave written informed consent to participate in the study.

**Technical equipment**

For the PBL online tutorial group meeting students needed a headset, a webcam and (reliable and consistent) access to internet. The following systems are used: Surfgroepen and Skype. The two systems are combined because surfgroepen on its own does not give the sound quality that Skype can give.

**Data collection and instruments**

*Data were collected on different time points (see Table 1).*

**Questionnaire T1.** *Questionnaire T1 was developed by the researcher and concerned demographic characteristics, baseline experiences in PBL, e-learning, level of English and discussion skills (all rated at a 5-point Likert scale with room for comments) and an open question regarding the students’ motivation to follow this master course.* The questionnaire was given at the start of the first tutorial group meeting (face-to-face for all groups).

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Time</th>
<th>Before*</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Afterwards‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire T1</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaire T2</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Focus group interview</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tutor</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Interview tutor T1</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview tutor T2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

* before the start of the first tutorial group meeting  
‡ after finishing the complete module
**Questionnaire T2.** Questionnaire T2 contained questions regarding the content of the module, and -for the blended learning group- the technical equipment that was used (rated on a 5-point Likert scale) and some open questions regarding the online discussions and the advantages and disadvantages of online tutorial group meetings. Questionnaire T2 furthermore included an instrument developed by Dolmans, Wolthagen and Van der Vleuten (1998) which considers four motivational dimensions (motivation; cohesion; sponging; and withdrawing) and two dimensions based on cognitive theories (interaction and elaboration). This instrument consists of 13 statements on a five-point Likert scale. The students filled out the questionnaire after all tutorial group meetings were finished.

**Focus group interview.** A focus group interview for each tutorial group separately was organised to further explore students' experience and uncover issues that were overlooked in the questionnaires.

**Interview tutor.** The tutor was interviewed twice: (1) before starting of the module; and (2) after finishing the module. A semi-structured interview was executed based on a prepared list of issues to be addressed. The first interview concerned the tutor’s background and expectations (drawing also from the student questionnaire T1). The second interview concerned the tutor’s experiences and opinions regarding the module, the PBL process and the discussions in both face-to-face and online groups (also drawing from the student questionnaire T5).

**Results**

In this section the results of the student questionnaires have been used as a basis. Data obtained from focus groups with students and interviews with the tutor have been added where relevant.

**Response rates of the students**

Three groups were recruited for the study: two traditional face-to-face tutorial groups (group 1: n = 7, and group 2: n = 7) and one blended learning group (n = 8). In group 1, one student stopped with the module and one student switched to another master. Because this happened after the second tutorial group meeting, these two students were not replaced. In the beginning of the study one student of group 2 indicated that she had problems with recording the tutorial group meetings. She was immediately replaced by a student from another group.

In Table 2, the response rates of students for the different measurements are presented. All students participated in the focus group interview.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>f2f (group 1: n = 5)</th>
<th>f2f (group 2: n = 7)</th>
<th>BL group (n = 8)</th>
<th>Total (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire T1</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>20 (100)</td>
</tr>
<tr>
<td>Questionnaire T2</td>
<td>5</td>
<td>7</td>
<td>8*</td>
<td>20 (100)</td>
</tr>
</tbody>
</table>

* one student filled in the questionnaire at a distance

**Sample characteristics of the students and tutor**

*Students.* Most students (70%) were female. In group 1 only females were involved. The mean age of all students was 25.6 years (SD = 5.9). Group 1 and 2 were younger than the blended learning group. All students in group 1 and 2 had a bachelor degree, either from a college of higher education or a university. All students in group 1 finished their bachelor at Maastricht University. In the blended learning group five students (63%) finished a master degree.

The blended learning group differed from the face-to-face group in three aspects: they were older, had experience in health care and had a different motivation. Two of the eight blended learners had chosen the master because he was blended. Blended learners typically mentioned motivations relating to improving their own work practice and/or their career opportunities. In the face-to-face groups most students had just finished their bachelor. They often mentioned more general motivations like: studying another year, getting a master degree; and staying in Maastricht.
During the study all students in the blended learning did have a job related to health care (n = 7 (one student is on pregnancy leave); mean = 29 hours a week; SD = 8.9 hours). The average years the students in this group have worked in health care was 7.4 years (SD = 4.4 years; minimum = 3 years; maximum = 15 years). In group 1 and 2 was this respectively 1.5 years (n = 2; SD = 0.7 years; minimum = 1 years; maximum = 2 years) and 2.2 years (n = 3; SD = 2.5 years; minimum = 0.5 years; maximum = 5 years). Not all students in group 1 (n = 1) and 2 (n = 3) had a job related to health care during the study. Students in group 1 and 2 worked averaged respectively 7.0 (n = 2; SD = 1.4) and 10.0 (n = 5; SD = 4.0) hours a week. English language seems not to be a problem.

Tutor. The tutor (male) is 47 years old and is a English native speaker. He is full-time assistant professor at Maastricht University.

Experiences of students and (expectations of the) tutor with PBL at the start

Students. Seventeen students knew PBL before: sixteen students worked with PBL in Maastricht and one student worked with it somewhere else. Three students in group 6 were not familiar with PBL. The students rated their discussion skills as average or good.

Tutor. The tutor had experiencing in tutoring PBL courses in similar fields in the UK, but had not conducted online PBL sessions before. He expected that the PBL concept would work online, but had some worries about possibly failing technology. He thought that preventing distractions might be difficult, but that managing discussions might be easier, because students have better turn taking. He expected no major changes in the role of the tutor.

Content of the module assessed by all students (n = 20)

On a scale of 1 (fully disagree) to 5 (fully agree), the average score of the item ‘the content of the module was interesting’ was 3.7 (SD = 0.9). Relevance of the problems in the task scored 3.5 (SD = 0.8). During the focus group interview students in one face-to-face group said the problems were not clear and they were not stimulating. The average scores of the items ‘the literature was interesting’ and ‘the quality of the module was good’ were assessed as 3.2 (SD = 1.2) and 3.3 (SD = 0.9) respectively. Students mentioned in the focus group interview that the scope of the literature references was too big.

Technique in the blended learning group

Five students have already followed one year of the master programme in the same set-up. Surfgroepen and web-conferencing were not known by the newcomers (n = 3). Seven students had experience with e-learning. Students rated their own computer skills as average to excellent.

Students were reasonably very satisfied about the quality of the sound of Skype, the quality of the pictures and the pods within Surfgroepen. The technical support was assessed as good. The mean scores were 3.5 or higher (range 1-5).

The students mentioned in the focus group interview that non-verbal expressions are not well visible. Making a spontaneous remark is practically impossible due to the interference of the discussion. Nevertheless, the students think that the discussions in one face-to-face tutorial group meeting was not different from blended learning tutorial group meetings.

The tutor was able to execute the online tutorial groups using the provided equipment, even though he was new to the concept. Some students frequently had technical problems, but in his opinion the discussions did not seem to suffer much. Students seemed to behave normally, and would often stay online long after the tutorial group sessions. They also used the same technical equipment to organize (unsupervised) group sessions to do their group work. For him as a tutor, the main difference was that he had a double task: tutoring and managing the technical equipment. When technical problems occurred he would often be chatting or e-mailing about those and, thus, have less attention for listening to the discussion. Observing, analyzing and stimulating students was more difficult at first, because it was difficult to see on the webcam images who was speaking and it took time to recognize the voices of the students.

Motivational and cognitive dimensions

The motivational and cognitive dimensions measured by the instrument of Dolmans, Wolfhagen and Van der Vleuten (1998) are described below.
Motivational dimensions. The first motivational dimension concerns whether the tutorial group stimulated self-study activities and had a positive effect on my commitment/effort. All groups scored high, although the group 2 scored less high (average 3.4) than group 1 (average 3.8) and the blended learning group (average 3.9). The tutor said that students in the blended learning group were more active and motivated.

All groups scored relatively high on cohesion, i.e. the students felt they were member of the group with certain responsibilities. The only exception is the score of group 2 on sponging (2.8). Apparently, students were of the opinion that some group members had a negative effect on the commitment/efforts of other group members. The tutor confirmed that there were problems in group dynamics in this group. He also commented that he actually felt that he knew the blended learning group better and that there was more unity in this group.

The dimension ‘withdrawing’ consists of two items: (1) During the flow of the course, some group members contributed less to the tutorial group discussion; and (2) Some group members intentionally withheld information they had acquired during self-study. The blended learning group has the lowest score, indicating more equality between group members.

Table 3: Motivational and cognitive processes per group.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>f2f (group 1)</th>
<th>f2f (group 2)</th>
<th>BL group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean*</td>
<td>sd</td>
<td>n</td>
<td>mean*</td>
</tr>
<tr>
<td>Motivational</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>3.8</td>
<td>0.3</td>
<td>5</td>
<td>3.4</td>
</tr>
<tr>
<td>Cohesion</td>
<td>3.9</td>
<td>0.2</td>
<td>5</td>
<td>3.3</td>
</tr>
<tr>
<td>Sponging</td>
<td>1.8</td>
<td>0.3</td>
<td>5</td>
<td>2.8</td>
</tr>
<tr>
<td>Withdrawing</td>
<td>2.7</td>
<td>0.4</td>
<td>5</td>
<td>2.9</td>
</tr>
<tr>
<td>Cognitive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction</td>
<td>3.6</td>
<td>0.4</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td>Elaboration</td>
<td>3.8</td>
<td>0.3</td>
<td>5</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* range is 1-5

Cognitive dimensions. A similar tendency is seen for the dimensions ‘interaction’ and ‘elaboration’. The interaction and elaboration rate is higher in group 1 and the blended learning group than in group 2. It means for the interaction dimension that students learned much more from the contribution of others, encouraged each other more to critically discuss the subject matter and misconceptions were more corrected. Students in the face-to-face group said that some speak more than others. This is not experienced as disturbing. Elaboration was translated in items with respect to explanations to each other and explanations in own words. In group 2 less explanations seemed to be given.

The tutor felt that he had to stimulate the students in the face-to-face groups more and had to give a lot of examples from his own experience to stimulate the discussion. His impression was that the online discussions were at least as good as the discussions in the face-to-face groups. He commented that all students, but especially those in the face-to-face groups, did not seem to be very good at challenging each other. When they were chairing a session they were not very good at eliciting contributions from all group members. Learning remained at a more superficial level than he would have liked. Students seemed to have a preference for a very directive tutor. During the focus group interview, one face-to-face group (group 2) mentioned that more guidance of the tutor was necessary. The tutor mentioned that in all groups some students were more verbal and dominant than others. In one of the face-to-face groups (group 2) interpersonal conflicts disturbed the discussion. In the blended learning group one person made very little contributions vocally but used to upload information in the pod. For the tutor this was an unexpected advantage of the online set-up: it accommodates for students that are less vocal and allows them to participate in different ways. Using the different pods is mentioned as an advantage in the blended learning group. Literature references or text in a note pod can be copied immediately. The use of a computer during the tutorial group meeting is anyhow very practical. Notes can easily be consulted. A search on the web is quickly made.
Discussion

This study represents the first examination at Maastricht University in which a comparison is made between traditional face-to-face problem-based learning (PBL) and online PBL tutorial groups. Experiences of students and tutor are the essential points in the present study. Two face-to-face groups were compared with a blended learning group.

The results of this research show that online tutorial group meetings acceptable to both students and tutor as replacement for face-to-face tutorial group meetings. The discussions in online tutorial group meetings are experienced as at least equally effective as the discussions in the face-to-face settings. Turn taking has to be more explicit, however, and students found it hard to make spontaneous remarks (and thus, to interrupt each other) because of interfering the discussion. The interaction is different because non-verbal expressions are hard to see. There are differences in participation in online PBL discussions, but the same is true for face-to-face discussions. The tutor reported that it was also hard to see who was speaking. This made it hard for him to intervene on equal participation until he had learned to recognize the voices. A possible advantage of online discussions is that less verbal students can contribute in other ways, i.e. in chat or in uploading information. There was no difference in perceived tutor role, except that the tutor as the extra task of managing the session. When technical problems occur this can distract the tutor’s attention from the discussion.

The results of this research show that one of the face-to-face groups scored lower on cohesion, withdrawal and some other measures regarding interaction. The tutor reported interpersonal conflicts in this group. Probably the relatively low scores in this group are a reflection of the group situation. The scores of the other face-to-face group on these dimensions are similar.

A limitation of this study concerns the small number of participants. No statistical analysis were executed, which limits the strength of the study. Moreover, the size of the groups is very small which influences the results. A possible confounding factor are the differences in age, work experience and motivation between the face-to-face groups and the blended learning group. The blended learning group attracted older students that combined working with (part-time) study. This will often be true for blended learning programs, however, and attracting this target group is one of the main reasons for Maastricht University to work on blended learning concepts.

The study has brought forward some issues that need further attention. The first is the lack of non-verbal expression. Van Til and Van der Heijden (2009) reported that the way in which things are said, what is being said, and how other react to this – both verbally and nonverbally – affects the way in which new knowledge and information is acquired and understood (Van Til & Van der Heijden, 2009). In the development of future blended learning programmes a focus on nonverbal expression must be made. A short sound message of each student on the intranet, for example, could at least help the tutor to see who is talking.

The second concerns the students’ statements that they could not make spontaneous remarks were not able to make because of interfering the discussion. This is worrying because it affects the creativity of students and possibly the PBL process, for which questioning each other and elaborating on each other’s input is important.

The third concerns the double task of the tutor. Even though the tutor did not report this as a major problem, it may be recommendable that somebody else than the tutor is responsible for managing the equipment and solving technical problems.

During this study the PBL sessions of both face-to-face groups and the blended learning group have been videotaped. These tapes will be analyzed in order to get a more objective view on the amount of the discussion, the quality of the PBL process and the role of the tutor. Furthermore, a similar study will be executed with another technical environment in another course within the same master.

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Embedding e-Assessment into Curriculum

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Abstract: The paper focuses on the role of e-Assessment and its potential for exploitation in full-time studies. The emphasis is placed on identifying the challenges, perceived organizational barriers and remaining technical obstacles faced by the learner as well as the teacher. The observations made in this article are largely based on series of diagnostic assessment in mathematics administered to students at Defence Academy. Based on our observations, the paper proposes several points which are ideal for a round-table discussion.

Introduction

The recent e-Assessment in Practice (eAIP) 2009 event held at the Defence Academy of the United Kingdom reflected Crisp’s (2007) comment on how conferences and the literature of e-Assessment provide a channel for discussion about the critical success factors behind the widespread adoption of e-assessment. Presentations from the Defence, Academic and Commercial sectors highlighted issues of quality, validity and purpose which are faced by all organisations implementing assessment approaches which rely upon the use of technology. It is not uncommon for many roles including academics, technologists, programmers, administrators and staff developers to contribute to discussions from their different perspectives. These perspectives draw attention to the various tensions that are encountered in efforts to embed formative and summative e-assessment in teaching and learning. In the following paragraphs we will examine them more closely within the context of higher education before presenting our discussion subject.

Sources of tension

Trends within e-assessment include the reluctance of some educational institutions to provide adequate resources to support assessment practice in general let alone implement e-assessment (Crisp, 2007) which requires decisions about the institution, its staff, learners and technology. In broad terms, these are common themes within the literature. For example, Whitelock & Watt (2008) in their editorial for a special issue of Learning Media and Technology introduce topics which can be categorised under the same themes i.e., staff, institution, technology and learners.

In her account of the implementation of a centralised e-assessment system McCann (2009) focuses, within an institutional context, on two of the above themes; teachers (staff) and technology. She concludes that a ‘culture clash between assessment mandates and faculty autonomy’ prevented the adoption of an assessment system. This clash is indicative of one of the potential major tensions between categories; in this case those of staff and institution.

Sastry (2009) points out that integration of e-assessment within an instructional or educational context involves sets of key players (see Figure 1). Not all of the key players are found within educational institutions but, like qualifications authorities and examinations boards, they influence what goes on. For the purpose of this paper, we have adapted Figure 1 to reflect the categories noted previously. Thus, Figure 2 shows the groups which have to work together if e-assessment is to be successfully embedded within curriculum. When tensions between these groups are not attended to, integration of e-assessment becomes more unlikely. We will, therefore, briefly explore some of the factors within these groups from which they might arise.
Staff

In terms of staff, we find that there are distinct types; support and academic or what have been typified as the ‘Central Team’ and the ‘Faculty Team’ supported by a ‘Department Champion’ (Ruedel, Whitelock, & Mackenzie, 2007). Alternatively (Walker, 2009) identifies combinations of institution staff grouped in ‘hidden’ and ‘front of house’ teams. The reason for typifying the various groups and teams found among staff is to draw attention to the relationship between them as stakeholders in e-assessment. It is one of mutual dependency.

Many of the factors which contribute towards the stresses which might occur between these teams and potentially act as a barrier to the successful embedding of e-assessment are mitigated when support staff and academics cooperate to achieve their aims. For example, technical staff are required to implement, maintain and develop systems and academic networks which, including the Internet, may be used by teaching staff to support the development of e-assessment activities. By coordinating their activities, they result of their efforts is improved.

Irrespective of role, staff need to be given time to develop relevant skills whether for supporting e-assessment or designing suitable e-assessment activities (Sangi, 2008). Time is, however, a resource which not all educational institutions are willing to provide.

Institution

Without institutional support and ‘buy-in’ backed by policy and the availability of adequate resources, the adoption of technology enhanced learning and, by extension, e-assessment is unlikely. Certainly, there are examples in the UK and elsewhere of successful university-wide implementation of e-assessment policies but it is not as widespread as it might be (Warburton, 2009). In many institutions the
extent of adoption is limited and activities remain sporadic and fragmented. Often they are led by enthusiasts within academic departments without central support from the institution.

Successful integration and appropriate use of e-Assessment can bring a number of benefits including reduced marking time, consistency of tests, and more effective monitoring and feedback through higher frequency of assessments (Bull & McKenna, 2004). Bull and McKenna also list the disadvantages of using computer aided assessment (CAA). In doing this they draw attention to reasons why adoption is slow. CAA/e-Assessment is costly to implement; it requires considerable investment in ICT infrastructure and staff training. All this is also time consuming and requires, as we have previously noted, a ‘high-level of coordination’ among all involved parties (ibid 2004, p. 9). Adoption of text books such as WileyPLUS (1) improves this situation at a financial cost to the institution.

Technology

Where e-assessment activities remain peripheral and without centralised financial or technical support, the technological options open to staff remain limited. Also, it is possible that staff are developing their own software and running assessments using IT infrastructure which was not intended for assessment purposes. In these situations there are risks to reliability, security and accessibility which are unacceptable for medium or high-stakes assessment. Such rudimentary and high-risk systems, which might also be difficult to use, are unlikely to attract interest from colleagues and thus fail to become more widely adopted. In contrast, if the necessary resources are made available at an institutional level, wider options are opened up. Decisions about which are the most appropriate within any particular learning and teaching context should become dependent upon the professional judgement of those staff (academic and technical) who possess the relevant skills and knowledge.

Institutions can invest in e-assessment solutions across a spectrum of technologies from computer-based assessment to e-portfolios. When successfully integrated in the business of an educational institution these technologies can yield benefits to learning including flexibility in time and place of assessments, immediate and rich feedback and improved motivation (especially for learners in non-conventional learning contexts) (SQA, 2008). But, vital as it is in modern educational institutions, technology must remain an ‘enabler’ and not the ‘driver’ for change in learning, teaching and assessment (Crisp, 2007, p. 235).

Emerging trends in terms of technology can assist in the creation of items. Questionmark Perception and Pearson Vue are typical of commercial organisations offering tools and services which enable educators to design, develop and deliver and report on online tests. Some also provide secure facilities where remote learners might go to undertake assessments. Publishers are beginning to provide complete solutions which include course management tools and online versions of core texts from which test items can be generated (e.g., WileyPLUS mentioned above).

Question and Test Interoperability (QTI) is a learning standard which can be deployed to enable interoperability between assessment tools. When complied with, QTI allows wider sharing and exchange of assessments and assessment items. Unfortunately, most available tools do not conform to QTI having only implemented a limited part of the learning standard (Lazarinis, Green, & Pearson, 2009). Moreover, there is evidence that another standard, the CAA code of practice, BS7988 (currently being replaced by BS ISO/IEC 23988:2006) is not being integrated into institutional policy and procedure documents as much as it might (Warburton, 2009). This situation is a further reflection of the tensions which exist between the institution, technology and, to some extent, staff who might not be aware of the potential benefits of or demanding the implementation of standards-based policy.

Learners

Together with selecting, controlling and motivating students Biggs (2003, p. 141) gives us two ‘outstandingly important’ reasons for why students should be assessed; i) formative assessment gives feedback during learning and tells students and teachers about how learning is proceeding and ii) summative assessment is used to grade and accredit students. It is worth noting that Both Biggs and Crisp (2007) emphasise that not only can assessment tasks be used by the learners to understand how they are doing but also by teachers to learn about and understand their practice.

The quality, tone, type of and speed with which feedback is given has a significant impact on learning (Rowntree, 1982). It has to be meaningful and learners need to be able to use it (Laurillard, 2002). Recent research into student experiences of e-assessment found that most of the students surveyed wanted to understand why their responses in e-assessment tests were right or wrong and that lack of detailed feedback was a cause for concern for many of them (Walker, Topping, & Rodrigues, 2008). The same
study also identified aspects of assessment design, poor instructions, question wording and question weighting as having an impact on the ways in which students engage with e-assessment. How feedback is designed for and used by learners raises questions about how well prepared staff are to design and support effective e-assessment activities which will be valued by their learners.

Significantly, the research found that the majority of the students were using formative assessments to identify strengths and weaknesses and plan their studies accordingly (Walker et al., 2008). In a study of the use of online assessments to improve mathematics skills among first year students (Brouwer, Ekimova, Jasinska, van Gastel, & Virgailaitė-Mečkauskaite, 2009) found that students were using formative assessments to diagnose their knowledge and skills. In a proportion of cases, engaging with the tests stimulated the students to study. These findings suggest that both learners and teachers can benefit from the use of e-assessment. To do so they need to understand how to exploit it. In the case of teachers, they must know how to write good assessment tasks (Boyle & Hutchison, 2009). In the case of the learners, they will embrace it if it is well designed and, moreover, if they have been taught how to make the most of feedback in their studies, they will reap real benefits.

**Discussion topic**

A five-week technology module sitting within a larger programme is presented as a topic for group discussion against a number of issues including the factors described above under their category headings. The basic structure of the module is shown in Figure 3. The curved arrows indicate where e-assessment is used and feedback given on activities.

![Figure 3: Model of a five week technology module showing e-assessment activities and feedback loops.](image)

A maths diagnostic test has been introduced for the students to take on arrival. Data about the test which were collected during 2004-2006 (shown in Figure 4) highlight some of the generic issues and this is representative of the maths background knowledge of the students attending the module represented in Figure 3. For example, recognition of units for acceleration, (Q6, Figure 4) combining probabilities of mutually independent events (Q4, Figure 4) and simple application of trigonometric ratios (Q17, Figure 1) remain a challenge for a significant proportion of the cohort.
All the students receive the same question paper year on year. Whereas in 2008 onwards we started using MapleTA where the questions are algorithmically generated. Some of the concerns and observations using this mechanism are:

- **Fairness of the question item** (see Table 4, ID 1481 Q1 and ID 1483 Q1). For example, the student at ID 1483 needed to manipulate integers of the orders of hundreds whereas the student with ID 1481 has only integers of the order of tens.

- **Use of suffixes.** In Q9 the students are expected to evaluate a numerical expression.

- **Q11 is specifically designed to avoid any suffixes.**

- **It is anticipated that a larger proportion of the students will get Q9 correct while only a few will answer Q11 correctly. However, the student with ID 1481, while able to complete Q9 in full detail, failed to submit any response to Q11.**

- **Opportunities for feedback.** Student 1489 has solved the problem more or less correctly but failed to take the reciprocal in the last step. Here is an opportunity to provide an in-depth level of feedback identifying the student’s mistake at an additional cost of further algebraic processing. A similar situation is also shown in ID 1493 Q1.

- **Questions with free text or numerical input offer many opportunities to deduce precise causal links and thus enable accurate feedback to individual students.** For example, Table 2 illustrates some of these opportunities from a recent online examination.

- **Mathematical input/entering fractions.** With reference to Q1, Table 4, a conscious decision was made to provide a single input box for entering fractions. This raises further issues of entering vulgar fractions. As an example, we have Student 1483 Q1. Students from certain backgrounds have not only been encouraged but strongly urged not to write vulgar fractions but express them as mixed fractions. For example, 4/3 needs to be entered as 1 1/3. This, in a single input box will appear either as 11/3 or 1+ 1/3. Entry of the latter expression is forbidden in the Maple TA system.

- **Another variation is entering algebraic fractions.** For example, the expression $\frac{R1R2}{R1 + R2}$ is often entered as R1R2/R1+R2.
Although Maple TA provides sophisticated interface for entering mathematical expressions students still find it daunting and more difficult than answering the questions. Also, if we provide helpful instructions for entering expressions we end up giving away the answer.

Some of the errors frequently encountered are listed in the Table 1 below:

**Table 1:** Generic concerns when entering mathematical expressions on-screen.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Examples</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering fractions</td>
<td>4/3, 1+1/3, 1 1/3</td>
<td>Mathematical operators on calculator for multiplication (×) and division (÷) differ from those on a computer keyboard (*, for multiplication and / for division)</td>
</tr>
<tr>
<td>Entering algebraic fractions</td>
<td>t = (v-u)/a</td>
<td>Many students do not fully appreciate the role of parantheses, and frequently enter it as v-u/a</td>
</tr>
<tr>
<td>Entering square root symbol</td>
<td>√3</td>
<td>No pre-defined key on the computer key board. Scientific calculators do provide a key.</td>
</tr>
<tr>
<td>Entering multiplication sign</td>
<td>a (b + c)</td>
<td>Maple TA accepts a single space or * for multiplication</td>
</tr>
<tr>
<td>Entering exponents</td>
<td>x^(1/4)</td>
<td>The character ^ is unfamiliar to most of the students. Often the parantheses are left out</td>
</tr>
<tr>
<td>Entering intermediate steps</td>
<td></td>
<td>Some students prefer working the problem out, before they enter their final answer. See additional calculations in Table 3, ID 1481_q1</td>
</tr>
</tbody>
</table>

**Table 2:** User responses for the question: *A pulsed radar receives a target echo 200 micro-seconds after the transmission of each pulse. Calculate the range to the target in Km. The key concepts in working out the solution involve appreciation of units, accounting the for the distance travelled by the echo, and possibly manipulation of powers of 10. This test is administered to a cohort of 150 students.*

<table>
<thead>
<tr>
<th>Ser.</th>
<th>User response (Count, percentage)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 (67, 44.67%)</td>
<td>Correct answer</td>
</tr>
<tr>
<td>2</td>
<td>60 (11, 7.33%)</td>
<td>Did not account for the distance travelled by echo</td>
</tr>
<tr>
<td>3</td>
<td>30000 (1, 0.67%)</td>
<td>Problem with units</td>
</tr>
<tr>
<td>4</td>
<td>6 (4, 2.67%)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>750 (2, 1.33%)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3.3 (1, 0.67%)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1.5 (9, 6.00%)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1500 (4, 2.67%)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>600 (1, 0.67%)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>6.6 (2, 1.33%)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>15 (10, 6.67%)</td>
<td>Double counting for distance</td>
</tr>
<tr>
<td>12</td>
<td>3 (5, 3.33%)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>7500 (1, 0.67%)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>3000 (4, 2.67%)</td>
<td></td>
</tr>
</tbody>
</table>
Results from another recent test (8 Sep 2009) are shown in Figure 5. The question paper was designed using Maple TA. (The question paper is available from the authors.) The topics covered in the diagnostic test are shown in Table 3, and the performance of the students on each question is shown in Figure 5. Data from this test is used to stimulate discussion as it illustrates some of the challenges faced by the learner and the teacher. We specifically focus on Q1, Q9 and Q11 as their underlying concepts are related. See Table 4 for the text of these questions.

![Figure 5: Diagnostic test results and performance of students – 8 Sep 2009.](image)

It is normally expected that a majority of the students will be able to answer Q9, and only a subset of these will answer Q11 correctly. These questions also highlight the problems with algebraic input.

Table 3: Diagnostic test topics and results. The topics where the scores are less than 50% are highlighted.

<table>
<thead>
<tr>
<th>Question</th>
<th>Skills required</th>
<th>Percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arithmetic; fractions</td>
<td>79.75</td>
</tr>
<tr>
<td>2</td>
<td>Arithmetic; percentages; worded</td>
<td>93.25</td>
</tr>
<tr>
<td>3</td>
<td>Arithmetic; unit conversion; worded</td>
<td>95.71</td>
</tr>
<tr>
<td>4</td>
<td>Algebra; expansion of brackets; up to quadratic terms</td>
<td>61.35</td>
</tr>
<tr>
<td>5</td>
<td>Algebra; indices; integral powers</td>
<td>41.10</td>
</tr>
<tr>
<td>6</td>
<td>Algebra; indices; fractional powers; square root sign</td>
<td>17.79</td>
</tr>
</tbody>
</table>
Table 4: Text of diagnostic test questions Q1, Q9 and Q11

<table>
<thead>
<tr>
<th>ID</th>
<th>Images from hand-written responses with remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1481</td>
<td>Q1. first part correct; Problem reciprocating in the last step.</td>
</tr>
<tr>
<td></td>
<td>Q9. Intermediate steps show the details of manipulating algebraic fractions and then numerically evaluating the result.</td>
</tr>
<tr>
<td></td>
<td>Q11. Surprisingly, no answer supplied.</td>
</tr>
</tbody>
</table>
Q1. Adding numerators and denominators; failed to reciprocate

\[
\begin{align*}
\text{\underline{Question 1:} (2 points)} \\
&\text{Express the following as a single fraction. Decimal numbers are not accepted.} \\
&\frac{1}{8} + \frac{1}{3} = \frac{1}{8} \times \\
&\text{2. Hence express the following fraction as a single fraction.} \\
&\frac{1}{\left(\frac{1}{8} + \frac{1}{3}\right) + \frac{1}{8}} = \frac{1}{8} \times \\
\end{align*}
\]

Q9. Adding numerators and denominators; applied reciprocation; Note the cancellation of '1'.

\[
\begin{align*}
\text{\underline{Question 9:} (2 points)} \\
&\text{Combined resistance of two resistors with resistance } R_1 \text{ and } R_2 \text{ is given by the formula} \\
&\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \\
&\text{If } R_1 = 4.9 \Omega \text{ and } R_2 = 3.7 \Omega, \text{ find } R. \text{ Enter your answer to two decimal places.} \\
&\frac{1}{R} = \frac{1}{4.9} + \frac{1}{3.7} = \frac{2}{8.6} \\
&\therefore R = \frac{8.6}{2} \approx 4.3 \Omega \\
\end{align*}
\]

Q11. Numerators and denominators are multiplied and reciprocated. In the crossed-out calculations, there are hints that the student is thinking along the right lines.
ID | Images from hand-written responses with remarks
--- | ---
1483 | Q1. This student has drawn the short straw, and confronted with a ‘an unfair’ run of numbers. Automatic generation of problems need to account for fairness.

<table>
<thead>
<tr>
<th>Question 1: (2 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Express the following as a single fraction. Decimal numbers are not accepted.</td>
</tr>
</tbody>
</table>
| \[
\frac{1}{9} + \frac{1}{7} = \frac{16}{63}
\] |
| 2. Hence express the following fraction as a single fraction. |
| \[
\frac{1}{\left(\frac{1}{9} + \frac{1}{7}\right) + \frac{1}{8}} = \frac{504}{191}
\] |

1483_q1

Q9. Calculations neatly laid out and correct except the last step; did not apply reciprocal. What does the student want to show or imply with the use arrow (top right of the image)?

<table>
<thead>
<tr>
<th>Question 6: (2 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined resistance of two resistors with resistance (R_1) and (R_2) is given by the formula</td>
</tr>
</tbody>
</table>
| \[
\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}
\] |
| If \(R_1 = 4.9\ \Omega\) and \(R_2 = 3.7\ \Omega\), find \(R\). Enter your answer to two decimal places. |
| \[
\begin{align*}
\frac{1}{R_1} &= 0.20408 \quad \frac{1}{R_2} = 0.27027 \\
\therefore \frac{1}{R} &= 0.20408 + 0.27027 \\
\therefore \frac{1}{R} &= 0.47435 \\
\therefore R &= 0.47 \\
\end{align*}
\] |

1483_q9

Q11. Reciprocating both sides without writing over a common denominator. “Flip both sides”
Q1. Incomplete; potential problems with reciprocation

Q9. Intermediate calculations indicate that the student has performed the correct calculations, expressing as ratios of integers, but failed to take the reciprocal in the last step. Note also the removal of decimal points by multiplying them by 100 and cancelling the common factor of two.

Q11. Adding numerators and denominators and reciprocating the terms.
Q1. Adding numerators and denominators; Missing application of reciprocals.

Q9. Note the mixed use of superscripts and subscripts; Supplied more than what is asked for. However, turning to Q11, we get a different picture.

Q11. It appears that the student has multiplied the sub-expressions instead of adding them.
Points for round table discussion

Here we summarise some of the salient questions to stimulate further discussion.

1. Authors/teachers
When using algorithmically generated question items authors need to be aware of how fair the question item is and the complexity of intermediate steps. Regarding the authors themselves, they should also exploit opportunities for feedback by analyzing the user’s response as fully as possible. For example, try and determine if the student has input the numerator or denominator correctly.

2. Learners
Learners expect clear instruction on the processes involved and the systems being used in a fully described context i.e., why they are performing the task. While students do not shy away from meeting higher expectations from their teachers, they resent lack of clear direction and reasons for why they have been asked to use a specific system or approach for their task. In order to fully engage the learners, it is important that the teachers strive to make the processes transparent and aligned with the broader curriculum.

3. Organisational support
While the early adopters are more than happy to give their time to experiment with state-of-the-art tools or develop their own, it is important to engage with your colleagues to disseminate good practice. Often this would involve specialist training and support from senior management. It is important to present a unified front to the learner in order to realize the full potential of technology-enhanced interventions and, by implication, e-assessment.

4. Publishers and standards
In general the task of designing assessment items is time-consuming. The publishers have been increasingly augmenting their printed text books with extensive self-assessment questions. These provide a very high degree of sophistication but it comes at a cost. However, there are currently issues of interoperability of question items between texts from the same publisher. There are promising developments such as QTI 2.1 that aspire to provide a standards-based solution to address this issue.

Endnotes

(1) WileyPLUS is an suite of online learning and teaching tools which integrates digital textbooks and other learning resources. For more information see the WileyPlus website available from: http://edugen.wiley.com/edugen/secure/index.uni?protocol=http.

References


**Acknowledgments**

The authors wish to acknowledge the students on Intermediate Command Staff Course (Land) and Battlespace Technology Course for their participation in various diagnostic assessments.
Choosing the right tool for the job; how Maastricht University is selecting its new plagiarism detection tool

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Abstract: Plagiarism is a major concern in the academic environment. Research has pointed out plagiarism detection software outperforms the teachers intuition. There is, however, a difference in source and algorithm used by different plagiarism detection tools; therefore there can be a difference in performance. In 2009 an experiment was conducted at Maastricht University to see which of three new tools would be most suitable to use next to or replace Safe Assign. To this end a large amount of student papers from different faculties and all levels of education were uploaded to the three new tools and to Safe Assign.

Introduction

Plagiarism in literature has been a concern at least since Roman times (see for instance Green (2002) on the Roman poets Martial and Findetius). While during the Middle-Ages and Renaissance the lending of text was seen as a homage to the masters, the commercialization of publishing in the 18th century turned plagiarism into a taboo (Green, 2002).

In the academic environment specifically, plagiarism is a major concern. Some not only call plagiarism by students theft of intellectual property, but accuse them of something far worse; “the plagiarist compromises her own education and so steals from the larger society that has devoted its resources to training her to do reliable work later” (Booth, Colomb, & Williams, 2003, p. 288)

Plagiarism amongst students is, at least perceived, to be rising, while specific detection software plays an increasing role in detecting the act of plagiarism (Howard, 2007). Plagiarism detection software outperforms the teachers intuition (Rientes & Arts, 2002). However, after plagiarism detection software has found a possible act of plagiarism, the teacher still has to judge if it actually is plagiarism.

At present, Maastricht University (UM) uses Safe Assign to support teachers in the detection of plagiarism in students’ papers. Because of recent functionality issues and some doubts about this tool’s coverage, during the first half of 2009 an experiment was conducted to compare different plagiarism tools.

Since Safe Assign comes for free with the Blackboard Learning System chances are high the new tool will be used next to Safe Assign, instead of replacing it.

Whilst this paper will only focus on the detection of plagiarism in student papers, the tools were also tested for usability by teachers and on manageability (by conducting interviews at other educational institutes in the Netherlands and Belgium).

Plagiarism defined

Maastricht University uses the definition: “Onder plagiaat wordt verstaan de presentatie van ideeën of woorden uit eigen of andermans bronnen zonder correcte bronvermelding.” (Werkgroep antiplagiaat, 2008), meaning: “Plagiarism means the presentation of ideas or words from their own or others sources without proper acknowledgment”. This poses a problem, at the moment the plagiarism detection tools available in education only detects words, not ideas.

Research question

We are in fact trying to answer two questions;

1) Is there a suitable product to use next to Safe Assign
2) Is there a suitable product to replace Safe Assign with

A product suitable to use next to Safe Assign, in other words enhance the chance of detecting plagiarism, should find plagiarism in papers in which Safe Assign finds none, or less, plagiarism. As the
A product is used to enhance the results of Safe Assign, it does not matter whether or not it finds plagiarism in the papers in which Safe Assign already found it.

A product suitable to replace Safe Assign should find a significant portion of plagiarism in at least as many papers from a random pool as Safe Assign does. It should, however, not necessarily find plagiarism in the same papers.

**Why results differ**

There are two reasons why the results of plagiarism detection tools differ;

1. Difference in algorithm
2. Difference in sources

The difference in algorithm consist of a wide range of possible differences, for instance how are sentences cut up, what difference is made between a common word and a rare word in the scoring process, how does it search in the sources etc. All these differences can contribute to the vastly different scores for the same document compared with the same source in different programs.

Next to the difference in algorithm, the difference in sources plays an important role. A student only plagiarizing the original paper X will only be found if paper X is included in the sources that the plagiarism detection tools checks.

Unfortunately for us as researchers both the algorithm and the sources used by different tools is kept secret by the manufacturers.

**Underlying assumption**

We conduct our research under the assumption that there are no false positive results detected by the software tested. Meaning that for every found possibly plagiarized sentence a matching sentence will exist, although the level on which they match can be very low. There are however false negatives, sentences that are possibly plagiarized, or that are in fact plagiarized, which do not generate a hit.

Derived from these assumptions is our most important assumption; plagiarism detection software that gives a significant higher score to papers does a better job.

**Pre-selection Plagiarism detection software**

Before starting the project a pre-selection of tools had to be made; tools were selected on one merit only; integration with the blackboard based electronic learning environment of Maastricht University (eleUM).

This resulted in a short list of three products;
- Ephorus
- Turn-it-In
- Urkund

For these three products sales representatives were approached to offer Maastricht University a trial. After explaining the purpose all sales representatives were more then willing to offer their products and support.

**Method**

A total of 3,341 papers were offered to all four preselected programs. These papers span different courses, given in different years on both Bachelor and Master level. Both English and Dutch language papers were submitted.

While a total of 3,341 papers were uploaded to the various programs, due to file format problems and some technical difficulties resulting in data loss we do not have the results for all papers in all tested programs. We will only analyze the papers processed by all programs.
Table 2 Papers per program

<table>
<thead>
<tr>
<th>Program name</th>
<th>Number of Papers</th>
<th>Mean Score</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe Assign</td>
<td>3341</td>
<td>11.20</td>
<td>10.22</td>
</tr>
<tr>
<td>Turn-it-in</td>
<td>3092</td>
<td>31.57</td>
<td>22.89</td>
</tr>
<tr>
<td>Ephorus</td>
<td>2697</td>
<td>13.83</td>
<td>24.02</td>
</tr>
<tr>
<td>Urkund</td>
<td>2537</td>
<td>16.81</td>
<td>28.14</td>
</tr>
<tr>
<td>All programs</td>
<td>1779</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 Papers per faculty

<table>
<thead>
<tr>
<th>Faculties</th>
<th>Total</th>
<th>After cleanup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty of Arts and Social Sciences</td>
<td>247 (7.4%)</td>
<td>153 (8.5%)</td>
</tr>
<tr>
<td>Faculty of Law</td>
<td>437 (13.0%)</td>
<td>386 (21.5%)</td>
</tr>
<tr>
<td>School of Business and Economics</td>
<td>1330 (39.7%)</td>
<td>882 (49.1%)</td>
</tr>
<tr>
<td>Faculty of Health, Medicine and Life Sciences</td>
<td>30 (0.9%)</td>
<td>19 (1.1%)</td>
</tr>
<tr>
<td>Faculty of Psychology and Neuroscience</td>
<td>1306 (39.0%)</td>
<td>357 (19.9%)</td>
</tr>
</tbody>
</table>

For the three new programs all papers were compared against each other. Unfortunately for Safe Assign papers had to be handed in as a draft, which means they were not compared against each other. This was done to avoid the possibility that papers handed in in the future would have matches with these papers. As a result of this Safe Assign’s results are slightly lower than would be expected if all papers would have been compared against each other. Also for this reason we will only base our results on the scores of papers processed by all four programs.

**Answering the research questions**

To answer our first research question, “Is there a suitable product to use next to Safe Assign”, we have to look at the difference between the Safe Assign score and the score in the other programs for each paper. To do this we have simply subtracted the Safe Assign score from the score generated by the other program for each and every paper. We can then compare the results, graphically and using the paired sample t-test.

Answering the second question, “Is there a suitable product to replace Safe Assign with”, is harder to answer given our measuring error. Rather we will answer the question “which product is most suitable to replace Safe Assign”. To answer this question we will compare the number of papers found in the three threat categories used by Safe Assign, we will use the non-parametric Sign Test, being the most appropriate test for such a problem (Svensson, 2001).

Safe Assign uses the following threat levels:

1. “Scores below 15 percent: These papers typically include some quotes and few common phrases or blocks of text that match other documents. These papers typically do not require further analysis, as there is no evidence of the possibility of plagiarism in these papers.” (Blackboard Inc., 2007, p. 4)

2. “Scores between 15 percent and 40 percent: These papers include extensive quoted or paraphrased material or they may include plagiarism. These papers should be reviewed to determine if the matching content is properly attributed.” (Blackboard Inc., 2007, p. 4)

3. “Scores over 40 percent: There is a very high probability that text in this paper was copied from other sources. These papers include quoted or paraphrased text in excess and should be reviewed for plagiarism.” (Blackboard Inc., 2007, p. 4)
Results

Is there a suitable product to use next to Safe Assign?

After subtracting the Safe Assign score for each paper from the Score found by the three other programs for the same paper we end up with three extra variables per paper:

- Turnitin-SA
- Ephorus-SA
- Urkund-SA

These variables have a range from -100 % to 100 %, respectively meaning the program found a zero score and SA found a 100 % score and the program found a 100 % score and SA found a 0 %. These variables can be displayed in a histogram as is shown in figures 1, 2, and 3; each histogram contains a normal curve and a 0 % line.

![Figure 2: Histogram Turnitin-SA](image1)

![Figure 3: Histogram Ephorus-SA](image2)

![Figure 4: Histogram Urkund-SA](image3)

While both Ephorus-SA and Urkund-SA have a mean slightly left of 0, Turnitin-SA has a mean around 25. A paired samples t-test indicated that scores were significantly higher for Turnitin-SA (M = 24.7, SD = 21.7) then for Ephorus-SA (M = 3.5, SD = 21.8), t (1796) = 50.2, p = .000. Using the same test Turnitin-SA also scored significantly higher then Urkund-SA (M = 6.6, SD = 25.3), t (1796) = 39.3, p = .000.
Which product is most suitable to replace Safe Assign?

To answer the derived second research question we will turn the score of each paper per program into the three threat categories used by Safe Assign and compare them in the Cross-tables 3, 4, and 5.

Table 4 Cross-Table Turn-it-in and Urkund

<table>
<thead>
<tr>
<th>Turnitin on SA Scale</th>
<th>Urkund on Sa Scale</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>284</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>808</td>
<td>98</td>
</tr>
<tr>
<td>3</td>
<td>198</td>
<td>105</td>
</tr>
<tr>
<td>Total</td>
<td>1290</td>
<td>204</td>
</tr>
</tbody>
</table>

Table 5 Cross-Table Ephorus and Urkund

<table>
<thead>
<tr>
<th>Ephorus on SA scale</th>
<th>Urkund on Sa Scale</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1174</td>
<td>115</td>
</tr>
<tr>
<td>2</td>
<td>109</td>
<td>84</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>1290</td>
<td>204</td>
</tr>
</tbody>
</table>

Table 6 Cross-Table Ephorus and Turn-it-in

<table>
<thead>
<tr>
<th>Ephorus on SA scale</th>
<th>Turnitin on SA Scale</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>291</td>
<td>877</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>295</td>
<td>925</td>
</tr>
</tbody>
</table>

In table 3 we observe that Turn-it-in scores more papers in the higher category of the SA scale and the middle category compared to Urkund. The Sign test finds this difference to be significant ($z = -34.9$, $p = .000$). In table 4 we see Urkund scores slightly more papers in the higher category than Ephorus does and this difference is also found to be significant ($z = -5.8$, $p = .000$). In table 5 we observe Turn-it-in scoring more papers in the highest and the middle category than Ephorus does, this difference is also found to be significant ($z = -32.0$, $p = .000$).

Conclusion

We set out to answer two research questions “Is there a suitable product to use next to Safe Assign” and “Is there a suitable product to replace Safe Assign with”. Due to the handing in of SA papers as Drafts, which means not checking them against each other, the second question had to be replaced by “which product is most suitable to replace Safe Assign”.

Looking at the results of both tests we have to conclude that Turn-it-in is most suitable to use next to Safe Assign and Turn-it-in is most suitable to replace Safe Assign.

However this advice is not without limitations. First of all, there are other aspects to consider when selecting a tool to use. First of all usability, even if a product performs better under test condition the users have to be able to make use of the tool and all its features to reach its maximal performance. Another important aspect is manageability, can the ICT department support the product, what is the uptime etc.
These factors were not taken into account for this advice, they will, however, be taken in to account in the final review.

Another limitation to the advice is that we have only compared the product using papers drawn from different faculties in both Dutch and English. It could well be that there is a difference in performance based on the language and the field, as products use different resources to check papers against. This might be reviewed in future research.

References


Acknowledgements

Many thanks go out to the salles representatives and support staf of Ephors, Urkund and Turn-it-in, without whose help we could not have undertaken this research. Also thanks to Lucy Habets and Irene van Wesel-Habets for many linguistic corrections.
The University of Warsaw students’ readiness for lifelong learning

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Abstract: A few years ago the University of Warsaw initiated a project IBIZA. The aim of the project was to make university-wide lectures more available for University of Warsaw students and to prepare students for life-long learning, which nowadays is (and certainly will be) based on e-learning. IBIZA lectures are model Internet courses that should convince students that this type of learning is suitable for them. Every semester students, who have taken part in IBIZA lectures, are asked to fill in the evaluation questionnaires due to the importance of evaluation process in the IBIZA project. In this article the authors would like to present the results of questionnaires analysis (about 5500 questionnaires have been analysed). The creators of IBIZA project assumed that life-long (e-) learning abilities gained while studying at university will help graduates to improve their skills in the future. The goal of the conducted research was to verify this hypothesis.

Introduction

European Commission notes that

…barriers to participation by individuals may be policy-related; informational (level of access to good and timely information), provider-related (entry requirements, cost, level of learning support, nature of learning outcomes, etc); situational (the cultural value attached to education; the extent to which the life situation or the family and social environment of the adult supports participation) and dispositional (the self-esteem and self-confidence of the adult as a learner, often linked to failure in previous educational experiences). Demand-side reasons are often the most serious barriers: lack of time, due to work or family reasons; lack of awareness and motivation, as people do not see learning valued or rewarded enough and hence fail to perceive its benefits; lack of information on the supply and lack of financing. (1)

In addition, The European Economic and Social Committee is convinced that the use of electronic media in teaching and training (e-Learning) should help the European Union to carry out activities aimed at increasing the effectiveness and quality of education, including job-based education and training (2). There is no doubt that one of the main means of implementing lifelong learning is distance learning, especially e-learning.

Conditions of introducing lifelong learning in Poland

Final report from research conducted in 2008 (3) shows that every third adult Pole declares willingness to broaden his/her knowledge. Unfortunately, further analysis reveals that those declarations do not match respondents’ actual educational activities. Only 23% of them took part in a course or training, in most cases on behalf of the employer. Almost every training in which respondents had participated was run as a stationary course. Only a few people had taken part in e-learning courses, which means that this way of learning is still not widespread. The main obstacles to popularisation of e-learning in Poland are:

1) Lack of reliable information about possibilities offered by this form of learning and about particular courses in which one could take part in. Research clearly indicates the need to inform the public about what e-learning is and what its advantages are.

2) Lack of funds that could be spent on training. Breaking this barrier is relatively simple, because it requires eliminating or lowering fees for participation in postgraduate studies or training courses. This currently is taking place in connection with the inflow of EU funds. The development of efficient funding system is essential for making lifelong learning possible for people with the lowest income.
3) **Distrust in and lack of acceptance of this form of training.** This problem is the most difficult one to overcome. Overcoming it requires changing attitudes, which evolve much more slowly than technological progress is taking place.

It seems that the popularisation of distance learning combined with lowering the costs of getting additional training may break some of the barriers listed above and thus make the access to knowledge for less prosperous social groups easier. The most difficult barrier to remove is the mistrust towards this form of teaching, mostly associated with foreign languages CD-ROM self-study tutorials available in the shops.

**IBIZA Project – preparing students for lifelong learning**

In order to prepare its graduates for lifelong learning, since 2005 the University of Warsaw puts into practice IBIZA project (Interdisciplinary Internet-provided Academic Lectures). The aim of the project is to increase students' awareness about studying via the Internet, to inform them about what e-learning is and to show that this form of gaining knowledge is effective and accessible. Students also learn that duties connected with professional career and family life or living far away from educational centres do not preclude further learning. Initiators of the project assume that spreading this information should result in constructing a group of potential lifelong learning participants, who will be able and willing to use e-learning courses and training. The University's goal is to give every student a possibility to take part in an e-learning lecture. IBIZA project offers the University of Warsaw students a selection of facultative on-line lectures. In accordance with projects’ assumption that IBIZA should provide model e-learning courses, authors decided to focus more on the quality of the lectures rather than on their quantity.

The level of advancement necessary for taking part in the lectures is on a high school level, so that each student from every faculty can participate in IBIZA course without additional training. Didactic model (see Wieczorkowska & Madey, 2007) applied to IBIZA lectures was built upon the premise that the essence of e-learning consists of using means of communication different from traditional learning. Therefore the emphasis is put on supporting interaction between the lecturer and students (as much as among students) and constructing a social group out of participating individuals. Communication in all of the courses is asynchronous – it enables students to plan their learning schedule individually, according to their needs, in predetermined by the lecturers time limit (for example a week). Each course is conducted by at least one academic lecturer, who initiates discussions, gives and evaluates assignments and is available for consultations. On an asynchronous e-learning course the lecturer is more accessible for the students than during stationary classes where time limit is much stricter.

An on-line non-obligatory evaluation questionnaire is offered after every semester of running IBIZA. The survey helps verifying whether the project goals have been achieved. Collected data not only provide information concerning the organisation and conducting of e-lectures, but also indicate students' level of satisfaction and their willingness to continue this form of learning. It is also essential for improving the quality of IBIZA courses.

**Survey**

For four years of running the project data has been collected from 5569 students who had taken part in IBIZA courses. The age of the e-students was enclosed in a range from 18 to 65 years. However, the subject of the analysis was the data collected from people not older than 35 years. This limit has been enforced due to a few circumstances. In the first place, 35 is the age when an average PhD student graduates from studies and defends doctoral thesis (candidates for doctor's degree are encouraged to take part in IBIZA lectures). Secondly, it can be supposed that people younger than 35 years are only at the beginning of their professional career and they are still gaining experience and knowledge. This group is also more likely to change job or profession, therefore it needs supplementing and widening its knowledge. In contrast, people over 35 usually have a stable professional status, so they don’t feel as much pressure on gaining new skills as younger workers. What is more, only 2,1% of respondents were over 35 years old. From 5435 students which surveys were qualified for analysis (age: 18-35) 1445 (26,6%) were male and 3990 (73,4%) female.

Taking into consideration the analysis of answers to three selected questions:
1) What is your general rating of the course?
   (Range: 1 – very poor, 2 – poor, 3 – average, 4 – good, 5 – very good)
2) Would you like to take part in another Internet course?
   (Range: 1 – certainly not, 2 – rather not, 3 - it's hard to say, 4 – rather yes, 5 – certainly yes)
3) Would you recommend this course to other students?
   (Range: 1 – certainly not, 2 – no, 3 – rather not, 4 – rather yes, 5 – yes, 6 – certainly yes)

Authors made an attempt to verify whether taking part in IBIZA courses prepares the participants to use e-learning training in the future.

Authors present a different approach to e-courses students' satisfaction research than shown for example in (Yukseltruk, 2009), (Mourtos & McMullin, 2001) and (Isik, 2008). In these works the goal is to identify factors that influence students' level of satisfaction determined by learning effectiveness (examination results). In this paper satisfaction level (interpreted as a sense of internal contentment related to participation in an e-course) is a starting point for estimating attitudes (on declarative basis) and predicting graduates' future activities. The main issue is (declarative, probable) "readiness" for taking e-learning courses in the future among IBIZA lectures graduates.

Enrolling to an e-lecture is voluntary, which allows to presume that students who decide to participate in them are convinced that their ICT abilities are sufficient for taking part in e-learning courses. Therefore it is plausible to expect that for IBIZA students a computer connected to the Internet is an invisible technology and that they are competent enough to attend e-learning courses without major difficulties. 80,81% of male respondents have rated the course as good or very good (see Figure 1). Parallel answers were given by 82,03% women (see Figure 2). However both female and male students who have taken part in IBIZA project value their e-lectures, it turns out that female grading is significantly higher (M=4,21) than male (M=4,11) [t(2509) =-3,55; p≤0,001].

![Figure 1: Answers' distribution for question what is your general rating of the course? in the group of men.](image1)

![Figure 2: Answers' distribution for question what is your general rating of the course? in the group of women.](image2)

Authors stated that among questioned men 44,98% declared that they will certainly enrol to another Internet course (see Figure 3). Among a group of women 50,41% declared the same (see Figure 4). The difference of means between male and female students connected with "willingness to enrol to another
Internet course is statistically significant – women (M=4.28) significantly more often than men (M=4.17) would like to participate in a next on-line course [t(5428) = -4.07; p ≤ 0.001].

Male and female respondents do not significantly differ when considering recommending e-learning courses to other students. Therefore the authors decided to present answers’ distribution regardless of respondents’ sex. Students who have taken part in IBIZA courses recommend this form of learning to others, including 35.56% recommending them strongly (see Figure 5).

**Figure 3:** Answer’s distribution for question *would you like to take part in another Internet course?* in a group of men.

**Figure 4:** Answer’s distribution for question *would you like to take part in another Internet course?* in a group of women.

**Figure 5:** Answers’ distribution for question *would you recommend this course to other students?*
E-lectures are graded very well by most of the students. High satisfaction level is induced by easy to use technology (all of the e-lectures are conducted on Moodle e-learning platform) and by didactic model applied in the IBIZA project, in which lecturers presence and well-developed interactions between participants of the didactic process are strongly accentuated. Influence of these factors were revealed in several works (e.g. Hermans, Haytko & Mott-Stenerson, 2009).

Conclusions

High grades are connected with the acceptance of e-learning as a new form of gaining knowledge, which is shown in positive answers to the other two questions. Students who graded their lectures well declare willingness to take part in other e-learning courses and would recommend them to their colleagues. Basing on this fact, the authors conclude that students consider this form of learning comfortable, effective and well-fitted to their needs. Therefore, participation in these kind of lectures can help overcoming mistrust towards e-learning. It can be assumed that students (especially those who are satisfied by taking part in an IBIZA lecture) will be using e-learning more willingly after they graduate from their studies and therefore they will be getting more involved in undertaking additional training in their professional life when necessary.

The advantages of e-learning are appreciated especially by women in their last years of studies. This can be caused by fact that in Poland a large number of women start their full-time professional careers and set up homes while they are still studying which has a great impact on the amount of time they can spend on educational activities. E-learning is their chance to complete their education without devoting their career or family life.

Endnotes


(2) Opinion of the European Economic and Social Committee on The contribution of IT-supported lifelong learning to European competitiveness, industrial change and social capital development (Own-initiative opinion) http://www.eden-online.org/papers/ccmi.pdf


References


Social media are slowly becoming a symbol of the 21st Century Internet. More and more people are getting involved in different social activities, but mostly because of fun or personal interest. There is a growing need for studies on how to utilize this huge energy in learning activities. In our presentation we want to systemize the most important aspects of social media and provide participants with the most important recommendations on how to initiate their own projects. We start our presentation with a “market” overview of social media phenomena. We show the most popular Web 2.0 portals and their growth dynamics, presenting them not only in the Internet context. A simple fact that nowadays more people use internal communication tools of social portals than e-mail as their main communication channel may lead to a “new world order”.

Next we present the main mechanisms of communities-on-line creation process. Firstly – the choice of the main issue (problem/need) the portal addresses as a key success factor of the project. Secondly – social object choice (like video, photo, product, idea…) – with many examples from different web 2.0 portals. And finally activities: all the interactions users may perform with social object as the essence of social media idea. Then we shortly present the best practices of three crucial processes present in social media: publishing the social object, displaying (different strategies of statistics, views and etc.) and define sharing options. We illustrate those processes with the best practices taken from not only the most famous web 2.0 portals (Wikipedia, facebook.com, last.fm, amazon.com, flickr.com, youtube.com etc.), but also less known, but very interesting “niche” initiatives, especially concentrating on e-learning (projects such as STEP, Comble, Einstein 2-nd edition, Google groups etc).

Finally, we try to forecast the future: how our reality may look like in let’s say 20 years from now? How our children will play/work/learn? We end our presentation with a brief summary of best practices of social media and recommendations for those who plan to initiate their own communities of practice. We hope that our simple web 2.0 “tutorial” will help participants understand social aspects of the web and encourage them to start their own projects.
Homogeneous Catalysis Portal for International Collaboration on Course Development

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Abstract: The flexibility in individual learning paths makes it more difficult for the students to have the expected pre-knowledge needed to follow a course or a course topic. The number of students who apply for an optional course in natural sciences is relatively small. On the other hand, a lot of time is invested by the teaching staff to update courses. Existing international research collaboration can stimulate the collaboration and sharing of teaching materials in education. In this paper the development of the online portal to support international collaboration on development of the Homogeneous Catalysis master course is described and the use of online diagnostic tests to stimulate the learning process and activate students in this course is discussed.

Introduction

Due to the Bologna process the mobility of students in Europe and also between the universities within one country has become easier and also more common. This gives new opportunities to students to broaden their knowledge, research skills and enhance their cultural experiences. Nevertheless, the transition from secondary school to university or starting a Master programme at a different university or even in another country can cause serious transition problems. Gaps in the expected pre-knowledge are the most common transition problems. Especially at the bachelor level universities are confronted with high drop outs and organize preparatory courses to help their students on transition (Onderwijsraad, 2008; Saparniene et al., 2008). Bachelor and master higher education programmes tend to be flexible and research-oriented. The students can follow optional courses to fulfill their interests in specific fields. This flexibility in individual learning paths makes it often difficult for the students to have the expected pre-knowledge needed to follow a specific topic in a course in a Master programme.

Online diagnostic tests can be used to show the incoming students which knowledge gaps they have. Legg and Legg (2001) showed how diagnostic tests can be used to measure the probability of success of the students in chemistry courses. Multiple choice diagnostic tests can address the misconceptions that students encounter. To do this clickers can be used successfully (MacArtur and Jones 2008). In order to diagnose the gaps in knowledge needed to understand the lectures, online tests can be organized before the start of a new topic. This can help students to recognize the personal knowledge problem and prepare for lectures (Koopman 2008). In most courses which use diagnostic testing they are not strictly obligatory. Nevertheless, the alignment of diagnostic tests with the regular teaching process within a course is of great importance to achieve that the students use the diagnostic tests. The lecturer needs to give feedback on the results of students and reflect on it. He or she can recognize the common knowledge gaps of the whole group and pay attention to it during teaching.

The number of students who apply for an optional course in natural sciences is often relatively small. On the other hand a lot of time is invested by the teaching staff to update the course material each year and to prepare online tests. The lecturers can use online educational resources where they can find quality teaching and testing material such as EChemTest (www.echemtest.com), Open Educational Resources (www.oercommons.org/) and Higher Education Academy (www.heacademy.ac.uk/physsci/home). However, for courses on the master level especially when knowledge is related to recent research, finding the appropriate material can become more difficult or even impossible. Existing international research networks such as IDECAT stimulate the researchers to collaborate in education and develop teaching material together, share it and give peer-feedback on it and so create together more quality and save some time.
The Homogeneous Catalysis course

The course in Homogeneous catalysis is a part of a Chemistry master programme at many European universities. In most cases this is an optional course. Very often the number of students who apply for the course in different terms at different universities is low, sometimes not exceeding 10 students. At the University of Amsterdam (UvA) this course was developed in collaboration with the researchers and PhD students in this field at different universities in Europe and with the support on the e-learning part from the AMSTEL institute at the University of Amsterdam. This collaboration was made possible thanks to international and Dutch funding such as Marie Curie Chair of Excellence with the emphasis on eLearning at the ICIQ in Tarragona (2005-2009) and ICT in Education project at University of Amsterdam “International Classroom for vision catalysis” (2007-2008). Beside this the involvement of the IDECAT in this process was very important (IDECAT is a European scientific network of excellence on Catalysis). The development of the course materials for Homogeneous catalysis will remain work in progress in order to follow the development of knowledge in the field. Nevertheless, many different online teaching materials were already produced up to now in this collaboration and were published for students on the digital learning platform which was used by courses locally (Blackboard). All teaching material was developed in a way that it is suitable for use in interactive teaching settings such as studio course (Wilson 2000, Brouwer and Engelbarts 2004) but it can also be used in other settings. Lecture slides, videos and video lectures, a huge collection of test items for digital diagnostic tests were produced, and recent literature on research and industrial applications in the field which aims to stimulate students to work further and go beyond the textbook was collected. The diagnostic tests were developed per course topic. There are two types of tests. The pre-tests give the students information about the expected pre-knowledge which is necessary to be able to follow the lectures and tutorials about one topic. Using post tests students can recognize the most important concepts discussed in the topic, such as chemical reactions, and catalytic processes. In the Homogeneous catalysis course at the UvA the students are advised to do the digital tests but the tests are not compulsory. They are only an additional tool for students to cope with studying and to get activated to read a book and prepare for tutorial sessions. The questions which are given in the final exam are open questions and most of them are complex (see experiences of the lecturers further in this paper).

Blackboard digital learning environment of the University of Amsterdam was used as a digital learning platform for the course Homogeneous catalysis. A copy of the last version of a complete course with all material was in principle made to be used by the following course at the same or at a different university and the new users were added. However, after some time many versions of the course arose on the list and more than one of them contained new material. It also happened that a lecturer preferred to have a different set of material in his or her Blackboard course than present in the last used Blackboard course or that he or she just wanted to use a small set of existing digital teaching material. For administrative reasons concerning Blackboard this approach would not be appropriate when the number of collaborating institutions or the number of students would largely increase. An independent portal could be a solution for these problems, a portal on which new teaching material would be collected and shared and where it would be possible to make a selection which parts of the course material to download. This approach could also be a solution when the collaborating institution uses another electronic learning platform than Blackboard.

Portal development methodology

The Homogeneous Catalysis Portal was developed in SURFgroepen (www.surfgroepen.nl). SURFgroepen is for Dutch universities and their partners a free online collaborative tool based on Microsoft Sharepoint. On this portal the teaching material for the course Homogeneous catalysis is shared. It can be used directly in the class or put in the local digital learning platform. The lecturers can use this portal also to support their collaboration on development of teaching materials. The portal has two parts, the Courseware part for ready to use documents and the part for Materials in development. All teaching material on the portal is organized in learning objects. At this moment more than hundred learning objects which were all exclusively developed for the course Homogeneous catalysis are available on the portal. The learning objects are individual documents (PowerPoint presentations or tests about one topic) or packages of more documents, for example packages of all existing documents about one course topic or package of all available tests on the portal. A complete Blackboard course package with all the course materials and e-learning settings can be downloaded from the portal as well.
To visit all the parts of the portal and to be able to upload or download the material identification is necessary. However, there is an information site of the Homogeneous catalysis portal which is freely accessible on https://www.surfgroepen.nl/sites/HomCat/info. Here the information can be found how to join the community of portal users. To give an impression about the portal there is a demo version of Courseware available with learning objects for two course topics, Hydrogenation and Rhodium catalysed hydroformylation. Several short instruction videos about how to use the portal are available. On the portal information page there is a log in for the members.

**Design principles**

The portal was developed according to several design principles. The aim was to build an easy accessible online collection of learning objects for one course. SURFgroepen, an online collaborative learning environment based on Microsoft SharePoint was chosen to also facilitate the collaboration between developers.

On the portal there is only one storage space for learning objects and there are two different views to present them: Courseware and Materials in development. The learning objects which are ready to use are listed in the Courseware view and the ones which are in development are listed in Materials in development. Figure 1 presents a fragment of the Courseware on the portal.

![Figure 1: Screen shot of the Courseware (Materials for download)](image)

The metadata describe the learning objects on the portal in a structured manner so that:

1. the learning objects can quickly be found according to their functionality or course topic,
2. the information about the learning objects is given in the form of a list of metadata. This can facilitate the exchangeability of the material on the portal.

A selected list of metadata is displayed in several columns in the Courseware or Materials in development view.

The learning objects metadata were assigned following the IEEE LOM standard (IEEE LOM 2002 and 2004, Bedaux 2008). We have designed a specific Homogeneous catalysis learning objects metadata profile with the following fields:

- Title
- Topic (at this moment 20 Homogeneous catalysis topics)
- Resource type
- Learning unit
- Lecture slides
- Literature (general)
- Literature (industrial applications)
- Pre-test
- Test
- Video lecture
- Video material

- File format (list of common formats)
- Status
  - Ready
  - To be revised
  - To be developed
- Contributor
- Year delivered
- Date shared
- Recommended as
  - Core content
  - Optional content
- Details / Comments
- Assigned to
- Due date

Figure 2 shows an example of the record of a learning object on the portal.

![Figure 2](image.png)

**Courseware: Pre-test Alkene Metathesis**

<table>
<thead>
<tr>
<th>Title</th>
<th>Pre-test Alkene Metathesis</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Alkene metathesis (Chapter 16)</td>
</tr>
<tr>
<td>Resource type</td>
<td>Pre-test</td>
</tr>
<tr>
<td>File format</td>
<td>DOC; Blackboard package; Respondus</td>
</tr>
<tr>
<td>Status</td>
<td>Ready</td>
</tr>
<tr>
<td>Assigned To</td>
<td>The Lyon group</td>
</tr>
<tr>
<td>Due Date</td>
<td></td>
</tr>
<tr>
<td>Contributor</td>
<td></td>
</tr>
<tr>
<td>Year delivered</td>
<td>2007/2008</td>
</tr>
<tr>
<td>Date shared</td>
<td>27/02/2009</td>
</tr>
<tr>
<td>Details/Comments</td>
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<tr>
<td>Recommended as</td>
<td>Not yet checked</td>
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<tr>
<td>Attachments</td>
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</tr>
<tr>
<td></td>
<td>PreT_AlkeneMetathesis.Zip</td>
</tr>
<tr>
<td></td>
<td>PreT_AlkeneMetathesis_respondus.doc</td>
</tr>
</tbody>
</table>

**Figure 2.** Screen shot of the record of the Pre-test learning object in the topic Alkene Metathesis. The pre-test can be downloaded in three different formats: as word document, Blackboard package and Respondus package.

For each learning object which is uploaded the metadata need to be provided. Among the rest the status of the document (ready or in progress) needs to be given. This defines in which view the learning object will appear. If it is ready it will appear in Courseware, if not than the learning object will appear in Material in development. In the metadata profile there is a field which defines the recommended use of the
learning object: core material or optional material. The coordinator of the topic decides about the recommended use of the learning objects in his/her topic. At the end of the record the learning object is attached as a downloadable file. In the case of complex learning objects it is a zip file.

Several fields in the Homogeneous catalysis learning objects metadata profile support the collaboration workflow of the revising or developing of the material. In particular these are the fields “Comments”, “Assign to” and “Due date”. The contributor can assign a task to a particular member of the portal, set the due date to finish it and give comments. The view Materials in development gives this way a transparent overview what and by whom it needs to be done.

**Finding learning objects**

The learning objects are listed in the Courseware or in Materials in development and are presented with descriptors (a selection of metadata), which are given in several columns: Topic, Resource type, Title, Year developed, Recommended as and File format (see Figure 1). A list of options is given in each column, for example in the case of Topic there are 20 different topics listed. Selecting one of the options the learning objects are filtered and only the learning objects which fit this option will be displayed on the screen (see Figure 3).

![Figure 3](image.png)

Figure 3. Screen shot of the filtering process. In the case presented only all the learning objects about the topic Hydrogenation will be selected and displayed on the screen.

**Results and discussion**

**Status of the portal**

The Portal Homogeneous Catalysis is still in development. Besides adding new learning objects, old learning objects can be revised or updated. This means that several learning objects can be about the same subject or learning objects can be added as improved versions. The metadata are there to assign this. At the moment there are more than hundred different learning objects available. In 95% of the topics there are lecture slides available as PowerPoint presentations or pdf files. There is only one topic which still does
not have lecture slides. In total, there are 29 lecture slides presentations, 18 of them represent core material and 11 optional material. Twelve lecture slides presentations which are recommended as core material have been added very recently. On the portal there are 12 literature review articles (about recent developments and industrial applications). Further on video material is available. There are links to 5 streamed video lectures available. These video lectures have been recorded during interactive videoconference sessions between several collaborating universities. The lectures were given by invited lecturers. By the end of December 2009 three new interactive video lectures will be added to the portal. Beside this one instructional video about working with HP-IR autoclave and several short comprehensive PowerPoint presentations about this technique are available on the portal.

A very important part of the portal are the digital tests. On the portal there is no testing tool available and the digital tests are only there as downloadable files. To be used by students the lecturers can put them in their own course digital learning environment or use them in some other manner. On the portal there are 21 tests available now. In the case of 9 topics there are both a pre-test and a test about the topic (post test). In the case of 2 topics only the test about the topic is available. On the other hand, for 1 topic there is only a pre-test available. Two topics use the same pre-test for content wise reasons. The tests for 3 topics are at the moment in development and will be available soon. The tests are shared on the portal as text documents and as Blackboard zip files or as Respondus zip files. The downloaded Blackboard zip files can be uploaded to the local Blackboard learning platform of the Homogeneous Catalysis course and can be directly used for testing or can be adapted if necessary.

Finally, on the Portal Homogeneous Catalysis at this moment there are also 17 learning units available. The learning units are packages (zip files and Blackboard packages) with the latest available core content in one topic. The learning objects about the topic which are assigned as optional content are not packed in the learning unit.

**Collaboration on the portal**

The Portal Homogeneous Catalysis has 10 active members now who contribute the materials from four different countries: 1 from France, 4 from Spain, 2 from the Netherlands, 3 from United Kingdom. Most of them are also the coordinators of one or more of the course topics. A coordinator of a topic takes care that the teaching material of the topic is up to date and decides which learning objects on the portal are core material and which are optional for his or her topic. About one subject within a topic more learning objects can be available from different authors and from different years. Special care is needed in the case of the tests. We are expecting to get some feedback from the portal members and coordinators about their appreciation of the portal in the coming period.

**Experiences with the diagnostic tests**

At the University of Amsterdam (UvA) for the last four years digital tests which are now shared on the portal were offered to the students in Homogeneous catalysis Blackboard environment to enhance the individual learning process of each student. In Table 1 results of the digital tests and final exam results of the students who followed the course in 2007/2008 and in 2008/2009 are presented.

**Table 1. Students’ performance on practice tests and final exam. The last 4 students on the list didn’t yet apply for the exam**

<table>
<thead>
<tr>
<th>St. ID</th>
<th>Number of digital tests completed</th>
<th>% of tests completed</th>
<th>Total Score: digital tests (max. score: 277)</th>
<th>Final Exam (max. score 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-tests (Total: 8)</td>
<td>Tests (Total: 13)</td>
<td>Score (points)</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>14%</td>
<td>21.0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>10</td>
<td>71%</td>
<td>156.6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>8</td>
<td>62%</td>
<td>122.1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2</td>
<td>14%</td>
<td>31.0</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>8</td>
<td>43%</td>
<td>66.6</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0.0</td>
</tr>
</tbody>
</table>

2008/2009
In 2007/2008 five out of 6 students passed their final exam. The student who failed finished in total 3 digital tests in Blackboard. For the rest of the students who passed the final exam, they did at most 15 out of 21 tests, except one student, who did not use the digital tests at all. The two students, who scored 6/10, completed more digital tests than other 3 students who scored higher on the final exam, 7/10 and 8/10 respectively.

In 2008/2009, 12 students applied for the course at the UvA. Four of them did not apply for the exam. However, two of them did all the possible practice tests with an average positive score (57%, and 81%, resp.). All four students who didn’t apply for the final exam follow the master programme at a university different from that of the rest of the students in this course. The master programme, to which the course Homogeneous catalysis belongs, is organized by two Dutch universities. 5 of the 8 students who applied for the final exam have passed the course within the academic year. From table 1 it can be seen that the students who had scored high on the practice tests, also performed well in the final exam. A significant correlation of 0.69 was found. In most cases the students did the tests once per week in accordance with the taught topic. Students who failed on the first exam term used the tests also afterwards to practice. An interesting case is a student who was enrolled for two subsequent years. S/he used the digital tests to practice all the period and succeeded in the second year.

The lecturers find that it is important for this course that the students practice. In Tarragona (Spain) the tests in the year 2009/2010 became mandatory in order to force the students to practice. This way the lecturer will also get more insight in their pre-knowledge. The results are at this moment not yet available. However, some of the lecturers also have doubts about the effect of the diagnostic tests (see Figure 4).

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>7</td>
<td>6</td>
<td>13</td>
<td>90%</td>
<td>130.8</td>
<td>47%</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>6</td>
<td>38%</td>
<td>69.5</td>
<td>25%</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>7</td>
<td>67%</td>
<td>98.7</td>
<td>36%</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>12</td>
<td>90%</td>
<td>127.5</td>
<td>46%</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
<td>11</td>
<td>86%</td>
<td>131.6</td>
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<tr>
<td>12</td>
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<td>81%</td>
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<td>61%</td>
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<td>0%</td>
<td>0.0</td>
<td>0%</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
<td>13</td>
<td>100%</td>
<td>156.6</td>
<td>57%</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>13</td>
<td>100%</td>
<td>197.6</td>
<td>71%</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>1</td>
<td>5%</td>
<td>13.0</td>
<td>5%</td>
</tr>
</tbody>
</table>

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Our personal experience with the online tests is that only a small part of the students seem to seriously look into the questions. From student evaluations and own experience we know that students need more practice. Maybe the questions on Blackboard help them to understand the book to some extent, but do not provide any experience with solving questions at the level of the exam. This is something to think about. For next year we will introduce more tutorial sessions so the students will get hands-on experience with exam-level questions. In addition to these observations, we noticed that the students who finished their bachelor at a different university generally score in the exam 1-2 points lower than those from our university. The Blackboard tests and pre-test should be especially good for these students to bridge their gap in background knowledge, but somehow this doesn’t work yet as we would like to.

Figure 4: Experience of one of the UvA lecturers
Conclusions

A large number of learning objects is available on the Portal Homogeneous catalysis. According to plan the number of contributing members on the portal will increase soon. The activity of the portal members however is not linear through the year. They are busy with the portal only in the period which corresponds to the schedule of the course in which they teach. The differences in the course time schedules in different countries influence the collaboration between the lecturers on the portal. For this reason it is very important that the number of participating members will increase.

Promising results are obtained with electronic diagnostic tests which are available on the portal. We expect that using this portal will stimulate the lecturers to combine forces to develop new test items and still improve the quality of digital tests which are already available. We also expect that the working community will stimulate lecturers to exchange good educational practices.

References


Acknowledgments

We acknowledge all the participating authors on the Portal Homogeneous Catalysis https://www.surfgroepen.nl/sites/HomCat/info/Lists/Contact/Contacts%20all.aspx.

Many thanks to Jasper Bedaux (UvA) for his help to assign learning objects metadata according to international standards.

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Learning in virtual teams and the role of (a) synchronous communication

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Abstract: The potential of information technology to facilitate collaboration in education has grown considerably in recent years. The use of Web videoconferencing, whereby learners in an online classroom can simultaneously collaborate using audiovisual communication tools, increases the learner’s ability in social and emotional expression, thus improving communication. This paper presents a follow-up to a study where two cohorts (N1 = 82, N2 = 69) that participated in an online preparatory course for prospective students and differing in the use of synchronous and a synchronous communication means were compared with respect to learning satisfaction. Adding a third cohort (N3 = 71) further supports the initial finding that using synchronous communication not necessarily improves student perceived usefulness of an online course.

Introduction

A large body of literature in CSCL has highlighted that synchronous communication (like chat and (web)videoconferencing) is superior to asynchronous communication (like discussion forums) in establishing discourse due to the ability to express immediate feedback (chat) and to show body language (videoconferencing) (Beers, Boshuijzen, Kirschner, & Gijselaers, 2007; Derks, Bos, & Grumbkow, 2007; Haythornthwaite, 2000; Tu, 2002; Tu & Melsaas, 2002). Synchronous communication might reduce meaning barriers, the obstruction of mutual construction of meaning from sender to receiver, when learners are working and learning together in an online classroom (Bromme, Hesse, & Spada, 2005; Rummel & Spada, 2005). For example, Haythornthwaite (2000) found that people who have frequent and strong ties to others are using more synchronous communication tools, or use asynchronous tools as if they were synchronous. In addition, Beers et al. (2007) argued that for the effective sharing and construction of knowledge in online teams, these teams had to be able to understand one another, which is more difficult in asynchronous communication.

Often, a lack of shared context, body language or writing style leads to an interpretation of written text (such as a post on a discussion board) not intended by the writer (Bromme et al, 2005). Due to miscommunication, a learner’s connectivity and sense of belonging to an online team may be reduced, as may perceived competences which in turn can reduce social interaction. A recent development in collaborative working and learning has been the use of synchronous tools such as web-videoconferences, whereby learners meet online at a fixed time (synchronous) in an online classroom. While Web videoconferencing is not a new phenomenon, tools like Skype, MSN Web Messenger and Acrobat Connect allow learners and teachers to communicate efficiently using free or low-cost technology, such as a simple desktop computer. Until recently, such basic technology would allow only for asynchronous communication, as in discussion groups. The ability to interact with others and express emotion in an online tool is commonly referred to as social presence. Garrison, Anderson & Archer (2000) define social presence as “the ability of participants […] to project their personal characteristics into the community, thereby presenting themselves to the other participants as ‘real people’” (p. 89). It was therefore assumed by Giesbers, Rienties, Gijselaers, Segers and Tempelaar (2009) that synchronous tools facilitate social presence more than asynchronous tools.

In our previous study, we compared a cohort of students using asynchronous discussion fora to a cohort of students using discussion fora but with added web-videoconferencing. It was expected that the increase in social presence for the second cohort would lead to an increase in perceived usefulness of the course, and more specifically on the perception of course design, learning goals and tasks, group collaboration and instruction. Contrary to their expectations, results indicated only an increase in perceived usefulness on instruction while the expected increase on other aspects did not occur. One of the limitations of the study was founded on an argument made by Rogers and Lea (2005) who state that the richness of an offered learning environment may distract students from the actual tasks performed. A number of technical
difficulties that occurred in the cohort using web-videoconference may also have led to a more negative perception of the course. To see whether the previously found results were a coincidence or may point toward profound features of online learning the following presents a follow-up of the initial study. Here, a third cohort is introduced consisting of groups of students who also use asynchronous discussion boards in combination with web-videoconferences.

**Method**

**Setting**

The present study took place during an online preparatory course for prospective Bachelor students in International Business in the Netherlands. The aim of the preparatory course was to bridge the gap in the students’ prior knowledge of economics before they began their degree studies (Rienties, Tempelaar, Waterval, Rehm & Gijselaers, 2006). The online course took place over a period of six weeks, with a total study load of 60-80 hours. Participants never met face-to-face before or during the course and had to learn to use the virtual learning environment ‘on the fly’. The course applied the principles of problem-based learning (PBL), which focuses student learning on complex authentic tasks and a variety of realistic information (Dochy, Segers, Van den Bossche & Gijbels, 2003; Van den Bossche, Gijselaers, Segers & Kirschner, 2006). A key element in PBL is that students actively construct knowledge in collaborative groups (Hmelo-Silver, 2004).

Findings from literature (c.f. Lou, Bernard & Abrami, 2006; Rummel & Spada, 2005) on the use of (web)videoconference indicated the set-up of the course was appropriate and no redesign with respect to the use of web-videoconference was necessary. Because the use of an external e-book system that provided all tests and (additional) study material in the first study posed problems to students in the second cohort using Apple™ computers it was decided that this system would be replaced by offering the e-book to the third cohort through the same teamwork environment and all tests through the Maastricht University native system which is based on Blackboard™. Because the e-book system contained a lot of videos, (interactive) graphs etc., abandoning it comes forward to the claim by Rogers and Lea (2005) that richer learning environments can lead to distraction from learning rather than being a constructive addition.

By taking an online preknowledge test, students could assess their knowledge level in economics and thereby decide whether it would be useful for them to participate in the course. If they chose to participate, they could indicate this at the end of the online test after which they were contacted by the course team for enrollment. Since participation in both the preknowledge test and the course were voluntary, selection effects may be present. Individual differences in learning motivation, ranging from being intrinsically motivated to being extrinsically motivated to not being motivated to learn, were expected to be a potential source of selection bias (Rienties, Tempelaar, Van den Bossche, Gijselaers & Segers, 2009). Measurements of learning motivation were therefore included in the preknowledge test allowing to check that the cohorts were comparable with regard to relevant individual characteristics.

In all three cohorts, students had to collaborate to solve six authentic tasks that are relevant to the domain of economics. An e-book was available in the course environment as well as additional resources. Students were free to search for additional material. The tutorial group, together with their tutor, could decide on the pace within a maximum runtime of six weeks. At the end of each week, the tutor suggested how to proceed with the next task, thus focusing on process rather than on content. The results of three intermediate tests and a final summative test combined with graded participation by two tutors of the activity in the discussion forums were used to make a pass–fail decision. A non-recognized certificate and a graduation ceremony were offered as external reward to all students who passed.

**Participants**

Cohort 1 consisted of participants in 2005 and 2006. In total, 100 participants were randomly assigned to six groups. Students who posted at least once in the discussion forum were included in the analysis leading to a total of 82 participants. The six groups had an average of 13.66 members (SD=2.16, range=11–17) per group. Cohort 2 consisted of the students participating in 2008. Here, 69 participants were randomly assigned to five groups, of which 62 actually posted at least once in the discussion forum or attended a web-videoconference. The five groups had an average of 13.80 members (SD=2.59, range=11–18) per group. Participants from the 2009 course formed the third cohort which consisted of 106 students divided into seven groups. The average number of members for each group was 15.29 (SD= 3.9, range 11-
As the numbers of participants in the three cohorts was unequal, we removed one rather atypical group from the first and third cohort: they differed from the other groups in its type of learning motivation and underperformed in discourse. This left a total of 71 participants in cohort 1, 62 in cohort 2 and 93 in cohort 3. All cohorts were comparable with respect to age and gender.

**Instruments**

**Expectations prior to the course.**

Before the start of the course, participants were asked to score their perceptions of the online course by completing a questionnaire developed at Maastricht University. The questionnaire comprised 18 questions on a seven-point Likert scale, ranging from 1 (totally disagree) to 7 (totally agree). The questionnaire was divided into four categories: (a) the usefulness of the prior knowledge test (four items); (b) reasons for joining the course (five items); (c) group collaboration (four items); and (d) the appropriateness of the course design (five items). Aside from these categories, participants could indicate their level of ICT expertise, whether ‘beginning’ (19.7%), ‘experienced’ (69.4%) or ‘expert’ (10.9%). In total, 13% of the students had taken an online course before.

According to Rienties et al. (2009), academic motivation can have a strong influence on learning and learning outcomes. To see if there are any significant differences on motivation between the three cohorts, the Academic Motivation Scale (Vallerand et al., 1992) was included in the prior expectations questionnaire. The AMS measures motivation as a stable trait via 28 items divided over seven subscales of which three of the subscales refer to intrinsic motivation, three to extrinsic motivation and one to amotivation. Motivation is here seen as a continuum where complete self-determined behavior lies on one extreme and the absence of regulation (either extrinsically or intrinsically directed) on the other. The response rates were 93%, 73%, and 87% for cohorts one, two and three respectively.

**Perceived usefulness of the course.**

After the course, its perceived usefulness was measured by an instrument developed specifically for online remedial education (Rienties et al, 2006). This measure has been used in a variety of online courses for prospective Bachelor’s and Master’s students in The Netherlands as well as for international professionals working together in virtual teams (Rehm, 2009). The questionnaire consists of 33 questions on a five-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree), and spans seven categories: assessment (four items); course design (six items); course materials (three items); goals and tasks (four items); group collaboration (five items); instruction by teacher (five items); and learning satisfaction (five items). For cohorts two and three, a category was added to measure the perceived usefulness of the web-videoconference relative to the discussion forum (five items). Finally, the participants’ age and the number of hours worked were measured and a textbox for open comments was included. The response rates for cohorts one through three were 83%, 77% and 78% respectively.

**Assessment results**

During the course, three interim tests were made available covering a part of the material. It was known to the students in advance which test covered which part. At the end of the course, a final exam was made available covering the complete material. The final grade was calculated from the average results on the interim tests (30%), the final exam (60%) and a mean participation grade derived from participation grades from two tutors (10%).

**Results**

An ANOVA showed no significant differences between the three cohorts with respect to age, gender, computer connection and previously acquired computer skills. With respect to academic motivation, no profound differences were found. As found in the previous study, cohort 1 appeared to be slightly more extrinsically motivated than cohort 2. The only difference found after including cohort 3 is that cohort 1 scored slightly lower on ‘intrinsic motivation to know’ ($M = 5.42, SD = 1.07$) compared to cohort 2 ($M = 5.99, SD = 0.598$) ($F (2, 173) = 5.819, p < .005, \omega^2 = 0.051$). Effect sizes are small for all differences in academic motivation. Furthermore, Rienties et al. (2009) found that extrinsically motivated students did not differ significantly from average students in virtual teams with respect to their contribution to discourse.
Comparison of the three cohorts with respect to the expectations prior to the course showed a significant difference only on the question ‘I will learn more by working individually’ where cohort 3 shows a mean score (M = 4.09, SD = 1.32) that is significantly higher than that reported by cohort 1 (M = 3.45, SD = 1.05) and cohort 2 (M = 3.58, SD = 1.54) (F(2,188) = 4.969, p < .01, $\omega^2 = 0.03$). However, since the effect size estimate is very small and other questions referring to working individually versus working in groups were not answered significantly different there is reasonable doubt that this difference will be accountable for any other differences found between the cohorts.

**Effect of the redesign**

Table 1 displays the mean and SD scores of all three cohorts on the perceived usefulness categories. Since the use of videoconference was introduced in cohort 2, the first cohort lacks a score in this category.

<table>
<thead>
<tr>
<th></th>
<th>Cohort 1 (N = 59)</th>
<th>Cohort 2 (N = 48)</th>
<th>Cohort 3 (N = 43)</th>
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</thead>
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<tr>
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<td>14.80 2.41</td>
<td>14.23 2.60</td>
<td>14.77 2.64</td>
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<tr>
<td><strong>Course Material</strong></td>
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<td>10.65 1.80</td>
<td>10.21 1.95</td>
</tr>
<tr>
<td><strong>Course Design</strong></td>
<td>24.69 2.59</td>
<td>23.76 2.48</td>
<td>28.09 2.92</td>
</tr>
<tr>
<td><strong>Goals and Tasks</strong></td>
<td>15.15 2.51</td>
<td>15.40 1.82</td>
<td>15.93 2.02</td>
</tr>
<tr>
<td><strong>Group Collaboration</strong></td>
<td>18.24 3.34</td>
<td>17.42 3.28</td>
<td>18.52 3.20</td>
</tr>
<tr>
<td><strong>Instruction</strong></td>
<td>19.53 2.13</td>
<td>20.57 2.09</td>
<td>24.70 2.65</td>
</tr>
<tr>
<td><strong>Learning Satisfaction</strong></td>
<td>19.83 2.50</td>
<td>19.27 2.73</td>
<td>20.16 2.58</td>
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<td><strong>Videoconference</strong></td>
<td>- -</td>
<td>17.10 3.10</td>
<td>17.88 1.94</td>
</tr>
</tbody>
</table>

An independent sample t-test shows the difference in mean scores between cohort 1 and Cohort 3 on Course Material to be significant (t(81) = 2.937, p < .005, d = 0.59). Also, the difference between both cohorts on Instruction proved to be significant (t(100) = -10.907, p < .001, d = -2.15). Both are in line with the previous result found between Cohort 1 and Cohort 2 (see Giesbers et al., 2009). The then unexpected lower score on Course Material thus is replicated here. However, the previously (and also unexpectedly) found higher score of Cohort 1 on Course Design is not replicated but reversed since Cohort 3 scores significantly higher on Course Design than Cohort 1 (t(100) = -6.216, p < .001, d = -1.23).

Cohort 3 scores significantly higher than Cohort 2 with respect to Course Design (t(89) = -7.649, p < .001, d = -1.60) and Instruction (t(89) = -8.287, p < .001, d = -1.73). The score on Course Design may indicate that the previously found difference between Cohort 1 and Cohort 2 was a coincidence where the increasingly higher score on Instruction over the three cohorts strengthens the idea that offering videoconference is accountable for this increase.

When looking at the assessment results, a striking difference between the cohorts is the passing rate. From Cohort 1, 64.4% of the students passed the course where for cohort 2 this is 53.2% and for Cohort 3 a staggering 29%. When looking at the progression of the percentage of students who take a certain test during the course for each cohort (see Figure 1) it becomes visible that in cohort 3, the number of students starting even the first weekly test is much lower. The decrease in students taking a certain test during the runtime of the course shows more or less the same progression over each cohort: the number drops until the third weekly test and then remains largely stable. The observation that the percentages of students taking a test in Cohort 3 is so low and the drop of students between Weekly test 1 and Weekly test 3 in Cohort 2 is so large indicates passing or failing the course may have a profound influence on the perceived usefulness scores.
Table 2. shows the scores on perceived usefulness categories for each cohort divided into those who passed and those who failed the course. The total number of participants is given for each cohort and for each subgroup separately. As was to be expected, within cohorts students who pass the course score higher on all categories compared to students who didn’t pass the course. Remarkably, the previous found significantly higher score on Instruction between Cohort 2 compared to Cohort 1 seemed mostly to be due to the higher score by failed students in Cohort 2 (t(72) = -2.085, p < .05, d = -0.72) because the score of passed students proved not to be significantly different. The previously found difference with respect to Course Material can be replicated only with respect to passed students (t(71) = -6193, p < .05, d = 0.60). With respect to Course Design both passed (t(75) = 2.555, p < .001, d = -1.48) and failed (t(27) = -2.756, p < .010, d = -1.02) students in Cohort 3 report significantly higher scores than Cohort 1. The same holds for Instruction, where Cohort 3 reports significantly higher scores than Cohort 1, both by passed (t(71) = -9.908, p < .001, d = -2.30) and failed (t(27) = -5.318, p < .001, d = -1.97) students.

A comparison between the two cohorts that were offered web-videoconferences (Cohort 2 and Cohort 3) shows the higher scores for Cohort 3 measured on Course Design are significant both for passed (t(57) = -7.540, p < .001, d = -1.96) as for failed (t(30) = 0.166, p < .05, d = -1.22) students. Also, the increase in score with respect to Instruction proved significant for both passed (t(57) = -7.28, p < .001, d = -1.89) as well as failed (t(30) = -4.014, p < .001, d = -1.41) students. Finally, the difference in score by passed students on Group collaboration between Cohort 2 and Cohort 3 proved to be significant (t(57) = -2.18, p < .05, D = -0.57). No difference on Group collaboration was found between Cohort 1 and Cohort 3.

Discussion

This study presented a follow-up to a previous study where two cohorts that participated in an online preparatory course for prospective students were compared with respect to the use of (a)synchronous communication means and the result on self reported perceived usefulness of the course. The expectation that groups working together using synchronous web-videoconferences in combination with asynchronous discussion forums would be more positive about the course usefulness than groups who worked together using only discussion forums was not confirmed. In the current study, a third cohort was introduced consisting of groups of students that were also communicating via web-videoconference in combination with asynchronous discussion groups. In line with the previous findings, a comparison between cohorts indicated that students using video conferencing are equally positive about the online course on many of the categories. However, the higher score on teacher instruction and course design were consolidated when comparing cohort 3 to cohort 1. Moreover, scores in cohort 3 tend to be higher than scores in cohort 2 which appears to be the outlier.
Table 2. Perceived usefulness scores per category and cohort for passed and failed students.

<table>
<thead>
<tr>
<th>Category</th>
<th>Cohort 1 (N=59)</th>
<th>Cohort 2 (N=48)</th>
<th>Cohort 3 (N=43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>44</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>M</td>
<td>(74.58%)</td>
<td>(62.5%)</td>
<td>(67.44%)</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>15.59 (1.50)</td>
<td>15.43 (2.11)</td>
<td>15.76 (2.12)</td>
</tr>
<tr>
<td>Course Material</td>
<td>11.45 (1.63)</td>
<td>10.90 (1.42)</td>
<td>10.41 (1.80)</td>
</tr>
<tr>
<td>Course Design</td>
<td>25.03 (2.52)</td>
<td>24.27 (2.11)</td>
<td>28.69 (2.39)</td>
</tr>
<tr>
<td>Goals and Tasks</td>
<td>15.61 (2.30)</td>
<td>16.03 (1.73)</td>
<td>16.37 (2.04)</td>
</tr>
<tr>
<td>Group Collaboration</td>
<td>19.16 (2.80)</td>
<td>18.23 (2.91)</td>
<td>19.70 (2.18)</td>
</tr>
<tr>
<td>Instruction</td>
<td>19.77 (1.98)</td>
<td>20.63 (2.09)</td>
<td>25.06 (2.58)</td>
</tr>
<tr>
<td>Learning Satisfaction</td>
<td>20.52 (1.98)</td>
<td>20.40 (1.77)</td>
<td>21.03 (2.13)</td>
</tr>
<tr>
<td>Videoconference</td>
<td>-</td>
<td>17.67 (2.89)</td>
<td>18.10 (1.72)</td>
</tr>
<tr>
<td>Failed</td>
<td></td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>M</td>
<td>(25.42%)</td>
<td>(37.5%)</td>
<td>(32.56%)</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>12.47 (3.04)</td>
<td>12.22 (2.07)</td>
<td>12.71 (2.46)</td>
</tr>
<tr>
<td>Course Material</td>
<td>10.80 (1.70)</td>
<td>10.22 (2.29)</td>
<td>9.79 (2.23)</td>
</tr>
<tr>
<td>Course Design</td>
<td>23.67 (2.62)</td>
<td>22.92 (2.88)</td>
<td>26.86 (3.57)</td>
</tr>
<tr>
<td>Goals and Tasks</td>
<td>13.80 (2.68)</td>
<td>14.33 (1.46)</td>
<td>15.00 (1.66)</td>
</tr>
<tr>
<td>Group Collaboration</td>
<td>15.53 (3.42)</td>
<td>16.06 (3.49)</td>
<td>16.07 (3.63)</td>
</tr>
<tr>
<td>Instruction</td>
<td>18.80 (2.46)</td>
<td>20.47 (2.15)</td>
<td>23.92 (2.73)</td>
</tr>
<tr>
<td>Learning Satisfaction</td>
<td>17.80 (2.81)</td>
<td>17.39 (3.05)</td>
<td>18.36 (2.56)</td>
</tr>
<tr>
<td>Videoconference</td>
<td>-</td>
<td>16.17 (3.29)</td>
<td>17.43 (2.34)</td>
</tr>
</tbody>
</table>

Mean and SD values for passed and failed students over all cohorts

Working in a real-life setting offers advantages like authenticity but also drawbacks like an impossibility to control all variables that may be of influence. Because of this, and because the effect sizes (d-scores) of the results are moderate at best, caution is necessary when interpreting the results.

In the initial study, technical problems in Cohort 2 were thought to have an influence on the lower evaluation scores of the web-videoconference cohort. This explanation now is not applicable since the compatibility problems have been solved by abandoning the e-book system in cohort 3. Furthermore, abandoning the e-book system led to the fact that a lot of possibly distracting material was not available in Cohort 3. Both occurrences did not lead to an increase in the perceived usefulness of Course Material. However, the significantly higher score on Course Design and Group Collaboration of Cohort 3 compared to Cohort 2 may be due to this change in the course.

The follow-up strengthens the idea that flexibility is an important factor for online courses. Several authors have argued that using asynchronous communication allows for freedom of time and place in studying. Students can study when they want but also have more time to think about effective responses and arguments before posting (Schellens and Valcke, 2006; Weinberger and Fischer, 2006). Even though Cohort 2 and 3 also used asynchronous discussion boards, their flexibility was impaired by offering videoconferences that require a at least a fixed time to be online and a minimum in bandwidth which may also put constraints on the place a student chooses to be for participation. This lack of flexibility may have influenced the scores on the perceived usefulness of the course. Including passing rates further confirm the results from the previous study by indicating the difference in scores are not only due to the fact that a student simply is more happy or sad because s/he passed or failed the course.

The higher evaluation of the instructors’ role in Cohort 2 was replicated in Cohort 3. As has been found before by Vonderwell (2003), active teacher participation in distance learning is highly appreciated by students. The increase in perceived usefulness of Instruction may be due to the fact that by using videoconference the teacher also is presented as a real person.
Limitations and future research

The limitations posed by working in a real-life setting mentioned in the previous is the first limitation of this study. The fact that a number of results have been replicated in the follow-up may point toward profound features of online remedial teaching but further research is still needed. Further, using self-reports in one particular setting limits the generalizability of results. In addition, the measurement of participants’ perceptions of learning characteristics and learning processes is difficult as is shown by the effect sizes. However, given the reliability figures of the seven categories, high response rates and the fact that we controlled for differences in motivation prior expectations, we deem that the results remain valid.

Content analysis and social network analysis may provide further insight in a number of findings. Factors like the formation and perception of group identity and possible frustration occurring because of a lack of flexibility in the cohorts using videoconference may have had an influence on the perceived usefulness scores and were not measured and may be present in the discussion forums. The striking observation that even though the number of participants in Cohort 3 almost doubled the number of Cohort 2, the same number of students pass the course may be further enlightened via social network analysis. A further question that remains and may be answered by either one technique is how much the behaviour of participants (students and teachers) differ when using Web videoconferences and discussion forums.

Finally, the role and learning of the teacher must be taken into account. Until now, the online preparatory courses have been offered five years in a row of which two years by offering videoconferences. It is to be expected that the approach of teachers changed over this period which may have had a profound influence on the way the course is run. Making teacher knowledge and experience visible will help in understanding the development of effective online courses.

References


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Increasing Intrinsic Motivation in CSCL: 
a Monitoring Instrument for Motivational Co-regulation

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Abstract: Research has shown that Computer Supported Collaborative Learning (CSCL) 
may suffer strongly from suboptimal group processes such as the free rider effect, in 
which team members feel that some group members do less than others (Strijbos, 
Kirschner, & Martens, 2004). In most studies, the quality of the implementation of 
collaborative learning techniques - both the tools used and the organizational set up - is 
considered as crucial. In this study a complementary intervention was applied: to provide 
students with specific information on the motivational group process in order to evoke 
motivational co-regulation and thus improve intrinsic motivation. Therefore the "Quality 
of Working in Groups Instrument (QWIGI)" from Boekaerts & Minnaert (2003) was 
used. Each member of a learning group has to answer eight questions on a weekly base 
measuring Interest and the three psychological needs proposed by Deci & Ryan: Perceived Autonomy, Perceived Competency and Perceived Social Relatedness. The used 
online version provided an additional feedback modus, so that students got a tailored 
visual feedback of their scores compared to the group scores. With this feedback, the 
group members can discuss the current learning situation, identify lacking motivation and 
can therefore start to self- and co-regulate their motivation. The effects of this evoked 
group processes was tested in a study with randomized control groups at Bremen 
University in Germany (n=120) within the domain of learning statistics. Significant group 
differences for the intrinsic motivation at the end of the course prove that QWIGI can 
compensate negative motivational effects in a collaborative learning situation. From 
additional interview data (N=11) guidelines for the proper implementation of the QWIGI 
were extracted. These insights were used to create a QWIGI module for the open source 
e-learning software platform Moodle. A seamless integration in Moodle, freed from 
constraints of a randomized trial, seems to offer a fruitful base for amplifying the proven 
effects on intrinsic motivation.

Introduction

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proceedings. Time between submission of the final camera ready copy and submitting them to the publisher 
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One way of influencing the quality of student learning concerns the use of collaborative learning. To 
date, this is often achieved by applying ICT, often referred to as CSCL, computer supported collaborative 
learning. It is believed to foster intrinsic motivation by improving students’ perception of relatedness and 
probably also autonomy and competence, but this is not easily accomplished. Research has shown that 
when collaborative learning techniques are employed, a good procedural organization is required. 
Otherwise (CS)CL may suffer strongly from suboptimal group processes such as the free rider effect, in 
which team members feel that some group members do less than others (Strijbos et al., 2004). In other 
words, the quality of the implementation of collaborative learning techniques (both the tools used and the 
organizational set up) is a difficult but crucial factor, as is often the case in educational innovation 
(McKenney, Nieveen, & Van den Akker, 2006).
Sansone & Thoman (2005) state that many personal techniques exist for increasing students' interest, which is a crucial constituent of intrinsic motivation. They argue that some evidence has built up that interest can be regulated interpersonally (cf. Salonen, Vauras, & Efklides, 2005; Wentzel, 1999).

In order to enhance motivational processes in group learning an online tool was developed based on an existing instrument, the QWIGI (Quality of Working in Groups Instrument) questionnaire (M. Boekaerts & Minnaert, 2003). QWIGI enables the automatic measurement of average group perception and personal perceptions as a tool to stimulate interpersonal regulation. Following the Self Determination Theory (SDT) (Ryan & Deci, 2000) the QWIGI measures group based feelings of relatedness, autonomy and competence as well as intrinsic motivation.

The central research question (study 1) is if it is possible to provide students with specific information on the motivational group process in order to improve intrinsic motivation and thus study outcomes. The hypothesis is that the use of the QWIGI and related feedback mechanisms will increase the groups' co-regulation or interpersonal regulation processes, resulting in a better perceived group effectiveness, relatedness and thus intrinsic motivation. A second research question (study 2) is related to the implementation conditions of the online version.

**QWIGI**

In order to answer the research question, a computer-based version of QWIGI was implemented, which has been developed by the working group headed by Monique Boekaerts at Leiden University (M. Boekaerts & Minnaert, 2003; Monique Boekaerts & Minnaert, 2006; Minnaert, Boekaerts, & Brabander, 2007). This instrument, which was originally used as a pen-and-paper version, assesses the perceived competence, autonomy, social relatedness and interest in group learning by two questions each, which are answered on bipolar rating scales with seven radio buttons in between (see table 1).

<table>
<thead>
<tr>
<th>Left Side</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>At present, I am interested in our project.</td>
<td>interest</td>
</tr>
<tr>
<td>I feel capable of contributing well to our project.</td>
<td>competency</td>
</tr>
<tr>
<td>I think our group is good at teamwork.</td>
<td>social relatedness</td>
</tr>
<tr>
<td>We can make sufficient independent decisions while working in the project.</td>
<td>autonomy</td>
</tr>
<tr>
<td>Right now, I am enjoying the work in our project.</td>
<td>interest</td>
</tr>
<tr>
<td>I have adequate knowledge and skills for working in the project.</td>
<td>competency</td>
</tr>
<tr>
<td>I enjoy working in this group.</td>
<td>social relatedness</td>
</tr>
<tr>
<td>I think we get enough freedom for our own work.</td>
<td>autonomy</td>
</tr>
</tbody>
</table>

This short questionnaire is assessed in regular intervals (in this study, after completing a week of learning) and the members of a group are accordingly provided with feedback. Each member of a team can compare his or her individual scores with the group mean. This serves as a basis for initiating communication about motivation amongst the group members. The QWIGI enables the group to improve the prerequisites for intrinsic motivation either by self regulation or by interpersonal regulation (co-regulation) processes. The computer-based version provided tabular and graphic feedback. Figure 1 illustrates tailored feedback showing mean scores for experience of autonomy for one group in comparison with individual scores across time. Each of the four constructs (competence, autonomy, social relatedness and interest) is illustrated in such a graphical chart. Additionally, the system generates an overall view displaying group mean scores for all of the four constructs which is used for (guided) group discussions.
Study 1

In the first study the QWIGI was applied to four parallel introductory courses teaching psychological methods and research. The courses took place in the third term after students had completed two courses in statistics in the first two semesters. The curriculum of these courses was commonly defined by the involved university lecturers. The course contexts were not strictly organized in parallel, apart from the agreement on the underlying curriculum. The course content was arranged according to problem orientation in small cooperative working groups. Since the motivation of the students would have been spoiled if they had been ordered to fill out the QWIGI and this would have contradicted the assumption of free choice, which is a core element of SDT, the students were free to choose whether they wished to take part in a so-called feedback study (on a weekly basis).

The students who volunteered to participate in this study were randomly assigned to the treatment or control condition by chance. The intervention group received the QWIGI instrument, the control group was asked to give a weekly feedback based on eight questions. This feedback of the control group referred to very common aspects of the seminar – motivational aspects were explicitly excluded.

The students in the group assigned to control conditions were also able to assess graphical feedback – very similar to the graphical feedback provided by the QWIGI online instrument. Within the control condition the 8 curves were presented simultaneously (instead of 4 in the intervention) and it was not possible to assess a mean curve for all group members (this feature was exclusively available in the intervention group). In both conditions, the participants were asked to fill out the corresponding online questionnaire once a week. Moreover, two guided group discussions were conducted by independent advisers (elderly students who had special instructions for conducting these discussions). In the treatment condition these discussions were supposed to stimulate motivational self- and co-regulation.
Table 2: Items for the control group.

<table>
<thead>
<tr>
<th>Left Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teaching unit was sufficiently well prepared.</td>
</tr>
<tr>
<td>Little prior knowledge was necessary to understand the teaching subject.</td>
</tr>
<tr>
<td>Work load for this seminar is currently low.</td>
</tr>
<tr>
<td>The lecturer is easy to understand.</td>
</tr>
<tr>
<td>The lecturer seems to be competent in the discipline.</td>
</tr>
<tr>
<td>We have sufficient opportunities to ask further questions.</td>
</tr>
<tr>
<td>Exercise materials for this teaching unit were well structured.</td>
</tr>
<tr>
<td>The amount of time spent on this seminar is currently low.</td>
</tr>
</tbody>
</table>

Sample
From 120 students in the addressed courses, 53 students volunteered to participate in this study. Eight of these 53 participants failed to use the QWIGI regularly and were therefore assigned to the "no Treatment" group. Of the remaining 45 participants, 21 were assigned to the intervention condition with the QWIGI and 24 to the control condition with the simple feedback. Most of the students participating in the study were female (2 males in the QWIGI and 3 males in the feedback condition) with an average age of 24.75 years in the QWIGI (standard deviation = 6.74) and 25.95 (standard deviation = 8.22) in the feedback group.

Procedure and measurement
An online questionnaire was implemented following an intervention period of ten weeks, which assessed motivation at the end of a semester according to Ryan and Deci (2000). We therefore adapted a existing questionnaire from Prenzel(2001). Reliabilities of the seven subscales reported in table 2 and range from 0.7 to 0.85.

Table 3. Scales and reliabilities

<table>
<thead>
<tr>
<th>Scale</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amotivation</td>
<td>$\alpha = .71$</td>
</tr>
<tr>
<td>External motivation</td>
<td>$\alpha = .71$</td>
</tr>
<tr>
<td>Introjected motivation</td>
<td>$\alpha = .67$</td>
</tr>
<tr>
<td>Identified motivation</td>
<td>$\alpha = .7$</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>$\alpha = .76$</td>
</tr>
<tr>
<td>Interest</td>
<td>$\alpha = .85$</td>
</tr>
</tbody>
</table>

Results
Multivariate variance analysis and T-Tests were used to assess whether the two conditions differed from each other. Since the size of the sample was small a multi-level model to the different courses and learning groups was not applicable. According to the multivariate variance analysis the two test conditions differ significantly (homogeneity and normal dispersion are insignificant, Pillais = 0.32577, $F = 2.65746$, $DF = 6$, Error $DF = 33$, $P = 0.032$, Post-Hoc Power = 0.87) with regard to the six types of motivation (Amotivation, External Motivation, Introjected Motivation, Identified Motivation, Interest).

According to the specified hypotheses, we calculated a T-test for the intrinsic motivation. This revealed a significantly better result for the QWIGI application (Homogeneity and normal dispersion insignificant, $T = 2.324$, df = 39, $P = 0.0125$ unilateral). The resulting effect size of $d = 0.72$ with Power = 0.74 (Post-Hoc-Berechnung mit $p <= 0.05$ nach Faul, 2006) can be regarded as “big” following the general convention.

We can assume this effect to be due to social co-regulation. For the first time, the students are handed an instrument that allows them to exchange views on the requirements to intrinsic motivation. The group members can motivationally support one another if the group is adequately cohesive.
Study 2

The setting of the qualitative study was nearly identical with study 1. The only difference was that no experimental variation took place, so all participants in the study got the QWIGI. Farhoumand (2007) conducted 11 qualitative interviews and extracted the following hypotheses from the derived data, and provides appropriate confirmation:

- It is important to embed the QWIGI.
- Working with QWIGI is conditional to a shared working culture.
- Dealing with the QWIGI is subject to learning or cultivation in order to use it in a positive way.
- The QWIGI contributes to group communication.
- The QWIGI supports reflection among participants.
- The QWIGI strengthens the group’s sense of belonging together.
- Group size is a determining factor.
- The QWIGI is accepted as a type of feedback given to the learner.
- The QWIGI and its graphs were discussed too rarely and too scarcely.
- The QWIGI does not contribute to team cooperation.

Conditions to a successful use of the QWIGI are formulated in the first two hypotheses, that is an embedding and a shared working culture. Owing to the necessities of the underlying conditions, it was – especially in study 1 - not possible to fully integrate the QWIGI into the context of the seminar. We might assume that a lecturer who refers to the QWIGI directly during instruction, or even coordinates it with his or her own teaching, will increase intrinsic motivation much more effectively than already demonstrated in this study.

The social learning arrangements for cooperative learning applied in this study were probably not optimal in all seminars and at all times. Hence, sub-optimal group processes regarding cooperative learning were observed for some of the groups, correlating with a decrease in motivation. The resulting lack of working culture cannot be compensated for by the QWIGI (hypothesis 2).

Even though dealing with the QWIGI is largely self-explanatory, it requires a brief introduction and its functionalities need to be briefly demonstrated and tested if necessary (see hypothesis 3).

Finally, the hypotheses 4 and 5 support the idea that the QWIGI contributes to group communication and promotes reflection upon the prerequisites to intrinsic motivation. These interviews indicate that the QWIGI promotes motivational co-regulation and thus strengthens a group’s feeling of relatedness (hypothesis 6).

The hypotheses 7, 8 and 9 are related to conditions of organization. In groups with fewer than four students there was no satisfying way of assuring that answers will remain anonymous. This may lead to a lack of honesty when the questionnaire is filled out.

If QWIGI is implemented for purely self-regulating purposes this needs to be clearly communicated to the students at the beginning of a semester. Otherwise, expectations that the QWIGI also provides feedback to the lecturers will be disappointed (hypothesis 8).

If an institutional setting is lacking (see hypothesis 1), the students might not familiarize themselves sufficiently with the QWIGI and dealing with it does not become a matter of the course (thesis 9). Furthermore, some of the students wished for more cooperation with other working groups (hypothesis 10) – the QWIGI cannot meet this demand in its present form.

Conclusions for research and application

In (higher) education low students’ (intrinsic) motivation or sometimes even amotivation is a widespread problem (Green-Demers, Legault, Pelletier, & Pelletier, 2008; Legault, Green-Demers, & Pelletier, 2006; Manalo, Koyasu, Hashimoto, & Miyauchi, 2006; Ntoumanis, Barkoukis, & Thøgersen-Ntoumani, 2009). Very often this is the case in statistics education for social sciences students (Friedman, Friedman, & Amoo, 2002; Schuyten & Thas, 2007). In this article we describe three studies in which we used ICT in an attempt to increase students’ motivation for statics education. More specifically we investigated a tool, QWIGI, that was designed to enhance students’ intrinsic motivation by providing automated feedback with an online motivational questionnaire. It was expected that this stimulates group processes, perceived group
efficiency and thus intrinsic motivation and study results. These processes will be described in terms of co-regulation (Lajoie, 2008).

The first study shows a significant result regarding the motivational effects of the QWIGI. The qualitative results of the second study imply that the embedding of the QWIGI within the existing course framework plays an important role. Especially the assumption that motivational co-regulation within the group might be responsible for the effects of the QWIGI (cf. Järvelä, Järvenoja, & Veermans, 2008) has some implications that must be considered. At first, time and space for these co-regulation processes have to be allocated. It cannot be expected that undergraduate students are able to organize their work process in a way that they dedicate time for explicit group regulation processes by themselves. Therefore the guided group concerning the actual motivational status within the group could be one key factor. The reported motivational effect of the first study was achieved even despite a suboptimal embedding into the seminar context: due to the randomized control design the teachers could not refer to the results of the QWIGI. Nevertheless supportive measures were supplied in terms of mediators who facilitated the group discussions and probably motivational co-regulation. Therefore we conclude that ICT based tools for improving group work in order to enhance co-regulation might be a fruitful way to enhance students’ intrinsic motivation and thus learning results and persistence in statics education.

However, the findings of the first study certainly need to be replicated in other educational settings and by means of other control conditions. A random sample size would be desirable, which would allow for an application of more complex data models. Future studies should investigate the motivational co-regulation processes in a more detailed way. This could be realized in a twofold way: interventions aiming directly at the modulation of groups’ co-regulation processes and supplemental methods for observing group processes on micro level. One intervention aiming at the modulation of co-regulation might be the experimental variation of the moderated group discussion: one test condition with moderated group discussions, one control condition with group discussions about a non-motivational topic and a second control condition with no planned or externally initialized group discussion. As in the second study this quantitative approach could be combined with qualitative methods, for example video taping the group discussion to get a more detailed impression about co-regulation processes (Järvelä et al., 2008). The mixture of quantitative and qualitative methods seems to be fruitful way for integrating supplemental methods without loosing mutual benefits (cf. Onwuegbuzie & Teddlie, 2003). For example, Rienties et al. (2009) use an integrated multi-method approach of content analysis, social network analysis and motivation in order to assess how virtual teams develop (cf. Veermans & Lallimo, 2007).

Finally: as far as a practical application of instruments such as QWIGI is concerned, we recommend a diligently embedding of the instrument into the learning context, especially by paying attention to:

- announcing and promoting it by the teacher,
- providing a proper technical and functional introduction,
- assigning not more than 4 students to a learning group,
- regular reminding to fill out the online questionnaire,
- arranging and facilitating group discussions,
- referring to the general results of the it and
- adapting content or course organization to questionnaire results.

Set up in this way we expect that online questionnaires aimed at co-regulation of group work can be a valuable attribution to (statistics) education especially in the field of CSCL, especially with a seamless integration into Moodle which will be presented at the conference.

References


Using WIMBA Classroom and Blackboard to prepare students for entry into the international classrooms of The Hague University of Applied Sciences

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Abstract
This paper analyses how foreign students who want to prepare at home for enrolment in the international classrooms of Dutch universities of applied sciences can be supported by an online learning environment that meets their needs. The basis for this are the outcomes of a pilot programme that involved European and Chinese students in the context of the Acculturation Project, a joint initiative of nine universities in cooperation with the platforms for innovations in ICT and international cooperation in Dutch Higher Education, SURF and NUFFIC. It was found that when learners’ expectations formed in the educational setting of their home country do not match the pedagogical design of the online environment offered, learning will be limited. Changes to the design and content of the courses and attempts to incorporate often used pedagogical principles from China in the online learning environment are discussed (http://www.acculturation.nl)

Introduction
The number of international students entering Dutch Higher Education is rising steadily. With an increase of 28% in visa applications compared to the same period in 2008, according to Neso China, and over 5000 students currently enrolled, students from the People’s Republic of China (PRC) have become the second largest single nationality group in Dutch HE after Germany (Nuffic, 2009). While unfamiliar Dutch pedagogical approaches already cause problems for students from a closely related cultural and language background, Chinese students may be expected to experience more serious difficulties in integrating in the international classroom in Dutch HE. (Roeters, 2008). As more than 400 Chinese students are currently enrolled in the Hague University of Applied Sciences it was decided to address these in the context of the Acculturation project. This initiative of a number of Dutch universities aims to provide foreign students with remedial content intervention in an online learning environment that also helps them to become acquainted with Dutch academic culture and provides them with a basis for setting up a social network (NAP acculturationproject).

Departing from the premise that learning in the international classroom requires mutual adaptation from both the receiving dominant culture and the newly arrived group (Kottak, 2005), an online pilot programme was set up involving sophomores from the international classrooms of the Hague and prospective Chinese students to explore the possibilities of an ICT mediated acculturation process in the context of a distance learning English as a Foreign Language (EFL) course. From September to December 2008, nine secondary school graduates from mainland China and two Dutch, three German, one Norwegian, one Bulgarian and two British sophomores collaborated in a series of online classes delivered through WIMBA Classroom that addressed a variety of aspects of Dutch society with an emphasis on educational practices and university life in combination with a 14 week course of English at intermediate to advanced level, delivered through Blackboard 8.

In the course of the pilot programme a number of problems occurred. The WIMBA class sessions proved popular, but were plagued by technical problems. The Blackboard course worked well from an IT perspective but none of the students completed it. This paper describes and analyses these issues both from an IT and a cross-cultural perspective. It discusses the finding that if Chinese learners are to be facilitated in successfully preparing at home for their study in truly international classrooms of the Universities of Applied Sciences in the Netherlands, an ICT mediated preparation programme is required that allows learners to shift between different educational paradigms. It further investigates how ICT applications designed within an American/European educational context can be used by or adapted for learners from The People’s Republic of China (PCP) when they cooperate online with their European counterparts.
The design of the course in relation to the delivery platforms

E-learning is a relatively new phenomenon in China and students’ perceptions of a collaborative e-learning environment are generally less favourable than those of a class learning environment (Zhu, Valcke, Schellens & Li, 2009). So it was decided to combine a teacher centred approach with a self-access course. As a video conferencing tool with an electronic whiteboard as its main feature, WIMBA Classroom can emulate the conventional physical classroom. The teacher is the default presenter who imports and displays a Powerpoint presentation in the e-board, the application’s main window. If the teacher chooses to employ video, his image will be presented to all users by default. The students log in as participants and their video will only be broadcast to the others when they click the TALK button. This arrangement makes it natural for the teacher/default presenter to take a leading role as s/he would in a regular class. From the first session on students responded to the teacher’s prompts with little hesitation. In 14 weekly sessions in which both the European and Chinese students participated, the teacher presented information on various topics of Dutch culture and academic practice. Each session ended with an assignment the Chinese and European students were to carry out together. At the start of the ‘class’ they would present their results and engage in a video conference discussion mediated by the teacher. To facilitate synchronous communication WIMBA Classroom offers two tools, namely: chat and break out rooms. The latter option where the teacher can schedule students for group work in separate ‘rooms’ was not used as it was deemed to depart too much from the what students would be used to in the Chinese classroom. The synchronous text chat however was used frequently as it similar to the popular Chinese instant messenger service QQ. At the end of the ‘class’, the ‘room’ was left open and the text chat would become very busy with students making arrangement for further contact or clarifying points made in the lecture and some social talk.

The English language learning course was delivered through Blackboard that, in spite of its name, is based on the more recent paradigm of self-access learning that has become familiar in Dutch Higher education. The course was piloted in an earlier project involving Dutch students preparing for English medium Masters courses. The fourteen week course involved some 150 hours of self study with assignments estimated to require about 4 hours per week of collaboration and communication with the Dutch based students. It made use of the Blackboard English Language Tool Box (LTB), developed in the educational innovation project INTUIT (Jager, 2009). The LTB comes with ample instructions for use and European students taking part in its pilot phase never indicated that they were at a loss what to do. It came therefore as a surprise to see how difficult our Chinese target group found working with this concept. Many E-mails with requests for explanations were received such as the following: “I have entered this page (you can see it in the page that I have sent in the accessory.) But, what should I do next? Should I click the button programme and go to the lessons? Or do something else?” Many more comments from the Chinese participants made it clear that teacher guidance is regarded as very important. By contrast in the Netherlands innovation initiatives such as INTUIT have helped to shape the technology enhanced learning environment available for language learning in HE (Jager, 2009). In designing courses within this paradigm, the different expectations of users from predominantly class based learning environments need to be taken into account as much as Internet connectivity which tends to be taken for granted when providing education in a densely networked country such as the Netherlands. We found this is not guaranteed in China and although WIMBA provides options for low bandwidth use, in practice a number of students would at times not be able to use video or even audio.

The relation between the students involved and their use of ICT tools

Apart from the technology Zhu argues that the perception of the e-learning environment is critical for successful learning (Zhu et al, 2009). More than half of the Chinese students who apply for study visa for the Netherlands enrol in Bachelor courses of the Universities of Applied Sciences are 18-19 year old secondary school graduates (Nuffic, 2009). The European sophomores were aged 19-21. They can be expected to have sufficient experience in coping with culture shock to share their experiences with their Chinese peers. Even if the age gap seems small, there were significant differences in what can be perceived as maturity from a Dutch educational perspective. On the whole the Chinese students tended to approach their European peers as teachers, expecting them to take the lead in telling them what to do and how to go about it. In turn two European students reported that after their relationship had reached a more equal footing, their Chinese peers seemed to resent the frequent advice and assistance provided. As the course progressed this became noticeable in the joint essay assignments when the Chinese students began to refuse further involvement of the European student after the first draft. The reason for this may be found in differences in cultural-educational aspects or even the nature of the ELE used.
The ease with which the European students used Blackboard beguiled us into assuming the Chinese students would find its use equally self-explanatory. As none of the Chinese students had any experience with e-learning, they indicated finding the three or four level deep structure of the course puzzling. Consequently information was not seen and assignments were not completed. Students also reported that the loading of the pages hyperlinked through the LTB was so slow they gave up on them, whereas the Dutch based students reported no problems. A more serious issue was the Chinese students’ unwillingness to take the self-assessment tests that form the basis of the pedagogy of the INTUIT Language Tool Box. This reluctance may be attributed to a mismatch of expectations. Whereas western educators and students have now embraced the concept of self-assessment as vital to deep learning, Chinese students expect summative assessments by teachers or experts as secondary education in China is deeply exam driven (Lan & Suen, 2005).

The Chinese educational background and ICT supported learning

Although the Chinese students were well motivated to take part in the pilot, their Chinese secondary school career has left them ill-equipped for e-learning. Jinn & Cortazzi (2006) observe that in Chinese secondary education the teacher is regarded as the content expert and the moral model. The student is to learn by observation, repetition and imitation. One of the Chinese students who had participated in the pilot programme when asked one month after starting his bachelor programme what he had experienced in terms of culture shock wrote: I knew from the preparation course that students could disagree with their teacher. But when I first saw this in reality I was really shocked.

The predominant pedagogical approach in the English curriculum seems to be drill and practice, leaving students ill-prepared for the emphasis on self-access in Dutch HE. During a visit to the International department of the 6,600 student Zhuji Hailiang secondary school, a private institution with state of the art facilities and an international foundation programme together with Greenwich University, we came across the Jihong innovative English class. With a nice touch of irony Head teacher Zheng Jihong (‘Ji’ means chicken) showed us her recipe for ‘English Chicken Soup for the Soul’ that combines English teaching and moral education, to guide students through. During teaching it also uses case studies and real-life stories, together to improve students listening, speaking, reading and writing abilities, which also gives them a correct view on life, values and world view so that they will grow up happily and healthily. (http://www.hailiangschool.cn/teaching.html)

On attending a class, we were surprised by the loud volume of speaking. The reason given was that it would help students overcome their shyness. Teachers spoke very loudly and even sound files were played at such high volume that distortion made it difficult to make out what was being said. ‘Repeat after me’ were the teachers’ most frequently used words, but unfortunately their English was far from perfect and the constant chorusing of the students further camouflaged individual mistakes. A visit to two more schools showed that pedagogical reality still is a far cry from the Chinese Ministry of Education’s devout wish of ‘developing English teaching through communicative or student-centred approaches’ (Jinn & Cortazzi, 2006).

Gaokao, the national university entrance exam determines life in Chinese upper middle schools. Final year students undergo a relentless regime of memorizing and dedicated exam training. The exam is of particular importance as last year it was taken by some 10,000,000 students competing for around 5.7, 000,000 places in Chinese universities. This may explain the popularity of studying abroad. Yet many students have surprisingly little knowledge of western education. One student on being interviewed for participating in the pilot said: “After studying for gaokao anything I have to learn after that can only be easier.” There is a real danger of stereotyping the hierarchical nature of Chinese education with strong state control to result in mere rote learning and memorising which leaves little scope for questioning and critical thinking. But in Britain educational institutions seem to be aware of the problems involved for Chinese students entering their courses (Gil, 2007). Further research in the Netherlands might lead to the same conclusion. The student’s lack of self doubt may be caused by a system which seems designed to protect students from the dangers of society.

Internet use is considered a potential danger to society. The government has initiated the Golden Shield project, a series of national internet filters ostensibly aimed at protecting society from cyber crime. In the pilot we met internet control when during a WIMBA lecture on Dutch politics, the system went down when the Powerpoint slide on democracy was reached. A second try, after everybody had been phoned to come online, resulted in the same black out and only after skipping the democracy slide were we able to continue the WIMBA session. For secondary school students Internet access is often strictly
regulated. The pilot students reported that their parents used to call them away from the computer in the home as they feared it would interfere with their studies. In schools free access is often only allowed during supervised study periods or in the library. With intensive exam training secondary school pupils’ lives are highly regulated leaving them little scope to become self-reliant and responsible. No wonder these students experience a major culture shock on entering Dutch HE where, according to NUFFIC (2009), teaching is interactive and student-centred, providing students with the attention and freedom they need to develop their own opinions and creativity in applying their newly acquired knowledge. And then there is our problem-based learning where self-study and self-discipline are essential if students are to analyze and solve practical problems independently.

The impact of requirements for entry into Dutch HE on Chinese students’ English learning and use of ICT.

The code of conduct for the admission of non-EU students in Dutch higher education stipulates minimum requirements for proficiency in English, mentioning by name the Cambridge IELTS test (Code of conduct, 2009). As this test is used world-wide with over 260,000 students in China taking the exam in 2008 (IELTS, 2009), it has given rise to a true IELTS industry. Numerous schools provide dedicated IELTS exam training encouraging students to practise prior exams endlessly. Multiple Choice answering techniques are trained resulting in students being able to correctly answer the typical IELTS questions with minimal understanding of the texts the questions are based on. For the oral part of the exam interview scripts are learnt by heart enabling the student to answer virtually any question in seemingly fluent English. Another consequence of the IELTS requirement has been the rise of IELTS web logs where questions and answers from previously taken exams are published (http://www.ielts-blog.com/). True to form, Chinese students learn these answers by heart expecting to come across the same or similar questions in their exam in the expectations that the IELTS item bank is not unlimited.

Although all Chinese students in the pilot programme had obtained an IELTS score of 5.5 in speaking, as was our initial requirement, communication was in some cases so restricted that it resulted in less work being done and strong feelings of disappointment for both European and Chinese students. For the second pilot round all Chinese students were personally interviewed and only those were selected whose spoken English was deemed to pose no problem for their European peers. A day later a report of the questions that had been asked appeared on GoGoDutch, the popular Chinese Internet forum on studying in the Netherlands (http://gogodutch.com/).

Adaptations made in the second pilot round

An Australian study of the behaviour of Chinese learners in computer mediated communication found that ‘the greatest motivational factor for all the students was being assessed.’ (Gerbic, 2005) As assessment in the pilot was formative by nature and limited in scope, other incentives for serious participation in the online learning programmes were required. Immediate feedback features high on the incentives list (Rienties, Rehm & Dijkstra, 2005). This seems corroborated by the popularity of Instant Messaging Services amongst the participants. Although the number of participants in the first pilot is too small to carry out a reliable quantitative analysis, the fact that all participants completed the WIMBA series and commented positively on its synchronous communication component has led to the continuation of WIMBA Classroom for use in the second pilot.

However, the accompanying Blackboard course has been modified significantly. It is now used as a repository for materials used in the WIMBA Classroom sessions. WIMBA’s Share Application facility is used to show and explain how Blackboard works and what the materials it contains are intended for. Recorded WIMBA sessions are stored there as well and students are asked to upload contributions to the digital drop box by certain deadlines, to receive teacher feedback the next day. To circumvent low bandwidth and the blocking of public Internet sites containing open educational resources, video materials have been cut into small chunks and are now made available for download through Blackboard. Moreover the remedial English course has been trimmed down significantly. Although the course expected a mere half point higher IELTS score, this is still calibrated to require more than a 150 hours of practice and study. Most students in the pilot were taking courses in China and reported lack of time. However, another reason may be that they found the way of learning presupposed in the Blackboard course too much at odds with the learning practices required by their Chinese teachers. Consequently the emphasis has been shifted to academic skills and intercultural communication leaving learning English an implicit goal rather than a structured activity.
Conclusion and discussion

A major limitation of this study is the small number of participants in the first pilot round. However the finding that all of the Chinese participants were anxious about abandoning their tried and tested learning techniques and the phenomenon of avoiding the challenges posed by unfamiliar pedagogical practices can also be observed in the on-site preparation programme of the Hague University. These on-site programmes in Dutch universities of Applied sciences last at least half a year and the different pedagogical climate students meet in class is supported by their 24/7 exposure to Dutch culture. In an online setting with far less time and exposure shifting from a familiar educational setting to the Dutch educational paradigm will be much harder. However, the transition can be easier if the online learning environment emulates more of the pedagogical practices Chinese students are familiar with. Careful monitoring of student behaviour in the second pilot can provide data supporting the above assumption.

The true Achilles’ heel of the acculturation pilot programme however is the absence of a final exam. Any self-access preparation programme that does not meet students’ expectations formed by a teacher led pedagogical setting of high stakes, extremely competitive exams will fail in helping these students prepare for an environment that expects them to analyze and solve practical problems independently through emphasis on self-study and self-discipline. To equip such students for the international classroom in a Dutch pedagogical setting the option of a compulsory nationally validated acculturation exam for entry into Dutch HE should be considered. Such an exam should test academic skills and involve online team work with European students and be the culmination of an online learning programme that empowers non-EU and in particular Chinese students for successful participation in the international classrooms of Dutch HE.

References


Students’ perceptions of and attitudes towards competition across two internationally oriented universities in Hong Kong and the Netherlands

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Abstract: Globalization and internationalization of education means increasing competition among students for higher education and their future employment. The purpose of this study was to investigate students’ attitudes towards competition in their home universities, as well as to explore their perceptions of competition on the labor market and own prospects within this context. Students from two internationally oriented universities in Hong Kong (N=89) and the Netherlands (N=90) were surveyed. A questionnaire assessing students’ perceptions and attitudes was developed and administered to both groups in English. The data collection was completed between December 2008 and February 2009. The results of the independent-sample t-test revealed relevant and significant differences between the two groups. As it was hypothesized, HK students scored higher on the filial piety, constructive conformity, value achievement and perceived labor competition scales. These results have implications for further directions in research and educational planning.

Introduction

In the age of globalization, students from around the world enroll in universities overseas. According to the World Bank (2000) the number of tertiary students worldwide doubled in size from 40 million in 1975 to more than 80 million in 1995 (2000). This number is expected to increase to more than 150 million tertiary students by 2025 (West, 1997). These students’ diasporas has diversified students’ demographics and fostered international employment, since many of these students will stay in the countries of their host institutions and find their employment there. This leads to a great re-allocation of human talent resulting from international student migration (King & Ruiz-Gelizes, 2003). This trend of increasing global students migration is visible not only in developed, but also in many developing countries, and in particular, in transition countries such as China (West, 1997).

Globalization as characterized above by the internationalization of higher education- implies that students from the United Kingdom are now competing with students from Hong Kong and the Netherlands for a place at Oxford, where previously the competition was from within national borders. Similarly graduates from different countries will compete with each other for a job at an international company. Consequently globalization means that students from around the globe will compete with each other for higher education and their future employment.

The aim of this research is to investigate how students from two well-established and internationally-oriented universities perceive this competition and how competitive they are in the educational settings of their home institutions. Two international universities were surveyed, the Chinese University of Hong Kong (HK) and the Maastricht University, the Netherlands. Both universities that were surveyed have strong international focus and provide quality education. Though, they differ in respect of teaching method and culture. In terms of cultural differences, as described by Hofstede’s Cultural Dimensions (2001), HK students are known to be highly collectivistic and Dutch students are known to be highly individualistic. Taken into consideration the cultural differences, the two universities have a common denominator, the strong international focus and orientation towards global education and internationalization. Thus they are well suitable for conducting cross-national comparison.
Academic Competition in global Context

From an educational perspective competition is a kind of motivation that can be a significant driving force in learning. In turn, motivation to learn is one of the preconditions to accomplish certain goals related to different educational subjects and to make students acquire a certain amount of new knowledge (Fülöp, 2002). Consequently, the phenomenon of competition in educational settings and its relation to competition for employment are of a great importance. For the purpose of this study, competition is defined, as proposed by Johnson and Algren (1976), as liking to perform better than the others. It is measured by the value achievement relative to others scale, which assesses how important it is for students to achieve higher than their counterparts.

Educational researchers Harakievicz, Barron & Elliot (1998) and Pintrich (2000) have proposed that students have multiple motivators for engaging in academic learning. These are satisfying one’s need for achievement, enhancing one’s confidence, obtaining recognition and approval, avoiding flunking out, obtaining knowledge and skills necessary for a job, confirming that one has studied appropriately, showing that one excels in comparison with other students, avoiding criticism from parents or negative reactions form peers, and many more (Harakievicz et al., 1998; Pintrich, 2000). We hypothesize that the same personal motivators influence students’ engagement in educational competition, striving to outperform others. Three of these incentives are measured in the presented study: filial piety – as avoiding criticism from parents and wanting to make them proud, constructive peer pressure – as avoiding negative reactions from peers, labor market competition – as feeling pressure to achieve high in order to be competitive on the future labor market. According to the model, these motivators will influence the levels of students’ competitiveness - the stronger the motivators, the stronger the striving to outperform others.

There is evidence that the way people perceive and value competition differs across cultures (M. Fülöp, 1999, 2001; M. Fülöp, 2002). Hong Kong shares Confucian heritage culture. Competition is highly present in this region, at least in business. Confucianism refers to the Chinese ethical and philosophical systems that focus on human morality and wrong action. It is a very complex system of moral, social, political, and philosophical thought that has had tremendous influence on the culture and history of East Asian countries. Confucianism emphasizes the importance of relations between humans, as members of a group. The basic teachings stress the importance of education as the means for moral development of the individual. The emphasis is put on competition in education, which is supposed to bring about upward social mobility (Lee, 1996).

One of the most important virtues in Confucian thoughts is filial piety – wanting to make one’s parents proud. Salili and colleagues (2001) found that filial piety was one of the most important motivator for achievement in Asian students. Thus, we hypothesize that the variable of filial piety is related to competitiveness of Asian students, since it does offer solid motivation for achievement. Filial piety is not known to be a strong motivator for individualistic, Western students, thus only weak relationship between these two variables is hypothesized. Conformity with the group members is also seen as one of the Confucian values and tends to play role in achieving patterns (Lee, 1996). These two variables, filial piety and conformity, are hypothesized to be influential for Asian achievement values, and are therefore included in the model.

As previously stated, competition plays an important role as a motivating factor. While being culturally affected, on one hand, attitudes and perceptions of competition are fostered by the countries’ economies (M. Fülöp, 1999). Competition is highly present in most developed and many developing, including transitional countries (M. Fülöp, 2002). Especially in the fields of education and employment, competition has a vivid form. Rising unemployment rates have encouraged competition on the labor market and within the education in Hong Kong (Watkins, 2006). The unemployment rate in Hong Kong averaged 5.3%, compared to 3.3% in the Netherlands in 2009 (CIAFactbook, 2009). Considering trends of unemployment rates and rising competition in the labor market and education, it is very interesting to examine how students reflect upon these trends in terms of their competitiveness in universities and their future employment prospects.

Goals of the study and Research Questions

This paper first examines how competitive university students are across the two chosen regions, Hong Kong and the Netherlands. The competitiveness is defined in terms of how students value achievement and how important for them it is to score high grades and outperform others. Second, the two
possible motivators for engaging in academic competition, constructive peer conformity and filial piety are assessed for the two groups and their results are compared. In addition, students’ perceptions of labor trends and their own prospects in this context are explored.

We hypothesize that there will be relevant difference in students’ attitudes towards competition and their value of achievement across the two nations. It was also hypothesized that there would be significant differences in the motives for engaging in academic competition between the two groups. In this regards, it was hypothesized that Hon Kong students would score significantly higher on filial piety and constructive conformity scales. In addition, we explored students’ perceptions of competition on the labor market. Summarized, the hypotheses of this study look as followed.

- There is relevant difference in students’ competitiveness between the HK and UM students, namely that HK students hold higher achievement values than Maastricht students.
- There is significant difference in students’ experience of filial piety.
- There is significant difference in students’ experience of constructive peer conformity.
- There is significant difference in students’ perceptions of competition on the labor market.

**Methodology**

**Subjects and procedure**

The research data was gathered from a group of 179 university students from two well-established universities, the Chinese University of Hong Kong (N=89) and the University Maastricht in the Netherlands (N= 90). The students were aged from 17 to 25 years. A measuring was administered once, towards the end of the fall semester 2008. It was issued to both groups of students in English. Given the fact that both the groups have proficient knowledge of English, since both use English as a method of instruction, this method was considered to be reliable. Students were approached individually and instructed about the questionnaire. The response rate was 74%. Demographic information was obtained from all of the surveyed participants. The overall surveyed group was comprised of 48,6% (N= 87) male and 51,4% (N= 92) female students.

The Hong Kong group consists of 51,7% (N=46) male and 49,3% (N=43) female students. The Dutch group consists of 45,6% (N= 41) male and 54,4% (N=49) female students. The data collection was completed between December 2008 and February 2009. Students were approached individually, were given the instructions and asked to fill out the questionnaire. It took circa 3 minutes on average for each student to fill out the questionnaire.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Achievement</td>
<td>It is important for me to do better than other students in my class</td>
</tr>
<tr>
<td>Filial Piety</td>
<td>I am afraid of disappointing my family by having bad grades</td>
</tr>
<tr>
<td>Constructive Conformity</td>
<td>My peer friends expect me to be successful in my studies</td>
</tr>
<tr>
<td>Perceived Competition on the labor market</td>
<td>The competition is so high that only best students will get a good job</td>
</tr>
</tbody>
</table>

**Instruments**

A questionnaire was developed in order to assess students’ attitudes towards achievement and competition in educational settings of their origin, as well as to assess possible motivator which trigger engagement in academic competition. In addition, the questionnaire explores how university students perceive competition on the labor market. A questionnaire consisting of 16 close-ended questions assessing students’ perceptions of and attitudes towards competition in their educational settings was administered to the respondents. Prior to conducting the main survey a pilot study was conducted to pretest students’ understanding of the questionnaire items. It was administered to 20 Hong Kong students. After the pilot study, items that were difficult to understand were modified or eliminated.

The self-administered questionnaire consisted of 16 close-ended items, measuring following dimensions: (1) students’ competitiveness (assessing how competitive students’ attitudes are with regard to
their academic achievement), (2) filial piety as a source of motivation to engage in academic competition, (3) constructive conformity as a motive to engage in academic competition, and (4) students’ perceptions of competition in the labor market. The items were to be rated by respondents on a 7-point Likert scale, with 1 = strongly disagree, 7 = strongly agree, where a higher score means.

Table 2: Reliability & Mean Inter-item Correlations

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Value Achievement</th>
<th>Filial piety</th>
<th>Constructive conformity</th>
<th>Perceived Job Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr of items</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Cronbach’s alpha</td>
<td>.60</td>
<td>.38</td>
<td>.50</td>
<td>.67</td>
</tr>
<tr>
<td>Mean Correlation</td>
<td>.23</td>
<td>.23</td>
<td>.23</td>
<td>.34</td>
</tr>
</tbody>
</table>

Data analysis

The main focus of the study was to investigate the difference by comparing students’ competitiveness in educational settings within cross-cultural perspective. In addition, the study aimed at exploring and comparing students’ perceptions of competition on the labor market. For this purpose, the independent-samples t-tests were used to identify mean differences in students’ attitudes towards competition between the two groups. The descriptive statistics for the two groups are reported in Table 3. The collected data was checked for missing values and normal distribution. The normality test confirmed the normal distribution of the data.

Table 3: Descriptive Statistics Hong Kong (N=89) and Netherlands (N=90)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean</th>
<th>SD</th>
<th>T-test</th>
<th>DF</th>
<th>Cohen’s D</th>
</tr>
</thead>
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<td>Value Achievement</td>
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<td>.889</td>
<td>177</td>
<td>0.559905</td>
</tr>
<tr>
<td></td>
<td>NL</td>
<td>3.84</td>
<td>.97</td>
<td>177</td>
<td>0.702563</td>
</tr>
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<td>Filial piety</td>
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<td>3.72</td>
<td>1.275</td>
<td>177</td>
<td>0.702563</td>
</tr>
<tr>
<td></td>
<td>NL</td>
<td>2.87</td>
<td>1.141</td>
<td>174.427</td>
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</tr>
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<td>Constructive conformity</td>
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<td>0.941</td>
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<td>NL</td>
<td>3.79</td>
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<td>Perceived Job Competition</td>
<td>HK</td>
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<td>1.077</td>
<td>177</td>
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<tr>
<td></td>
<td>NL</td>
<td>2.95</td>
<td>0.8989</td>
<td>170.782</td>
<td>0.725839</td>
</tr>
</tbody>
</table>

Results

Students’ Attitudes towards achievement relative to others

On the Competitiveness scale, Hong Kong students seem to value achievement higher than their Dutch counterparts. The difference between the two groups is revealed to be significant by the independent sample t-test (p<0.05). This suggests that HK students are more competitive than Dutch students in terms of how they value achievement relative to others. The Cohen’s D (d=0.55) value suggests medium effect size, which implies strong relationship between region and competitiveness.

Students’ experience of constructive peer conformity

As it was hypothesized initially, Hong Kong students scored significantly higher (p<0.05) on competitive conformity scale than Dutch students did. This suggests that Hong Kong students are more likely to conform with their peer friends in educational achievement. The Cohen’s D (d=0.98) value is very large, which suggests significant relationship between region and conformity with peers.

Students’ experience of filial piety

Hong Kong students scored significantly higher on the filial piety scale (p<0.05). This suggests that HK students are more prone to experience filial piety, they are afraid to disappoint their parents by receiving low grades. The effect size, as reported by the Cohen’s d statistic (d=0.7) is medium. It suggests that there is relationship between region and filial piety.

Students’ Perceptions of Competition on the labor market
The Dutch students scored a little bit, but significantly lower than HK students did, suggesting that Dutch students are slightly more positive about their professional future than HK students are. The size effect statistic Cohen’s D (d=0.72) is medium, suggesting that the size of the observed relationship is quite high.

**Discussion and Conclusion**

This study investigated students’ attitudes towards competition in their corresponding educational settings across two universities from two different cultures, Hong Kong and the Netherlands. Data was gathered from both university groups, evaluated, and a cross-national comparison was conducted. The research findings showed that Hong Kong students value achievement relative to others higher than Dutch students do.

HK students scored significantly higher on constructive peer conformity scale than their Dutch counterparts. This finding corroborate with findings of research on students’ motivations conducted by Salili and colleagues (2001). Salili and colleagues proposed that students with a Confucian heritage culture are more prone to engage in peer conformity and try to score high grades to not to disappoint their peer friends and not to loose face. The finding presented in this paper coexists with the finding presented by Salili (2001) and goes along with the notion of peer conformity as one of the Confucian values that plays role in students’ achieving patterns, proposed by many educational researchers (Lee, 1996). Hong Kong students score significantly higher on the filial piety scale than their Dutch counterparts. This supports findings presented by Salili. Salili found that filial piety was a motivator to achieve for Hong Kong students (2001).

As an addition, students’ perceptions of the competition in employment and their own perspectives in this aspect were explored. Dutch students appeared to be more optimistic about their prospects within the labor competition. They scored significantly lower than Hong Kong students.

In sum, there are differences between the two regions in how students perceive competition in their educational settings, the motivators for engaging in academic competition, and students’ perceptions of competition on the labor market. The findings suggest that there are differences between groups in how university students perceive and value competition in their educational settings, as well as in the labor market. Hong Kong students value achievement relative to others higher than Dutch students do, it is more important for them to receive high grades compared to others in their classroom. Moreover the study showed that despite the globalization and high unemployment rates, students are very optimistic about their position on the labor market. Both of the groups stated that their perceptions of competition in the labor market are quite positive, implying that growing competition and rising unemployment rates are not of a big concern for students while they are in the universities.

This study provides deeper insights into students’ attitudes and might be helpful for shaping ground for future directions in the field of educational research and educational policy development. Nevertheless, the study has several limitations which need to be considered for future implementations and research. These are to be addressed in this section. The student population chosen for this study is not well defined. Due to the difficulties in finding participants, student population in both groups is not truly homogenous, which might have influenced the results. The instrument that was used to gather the data on students’ attitudes and perceptions was developed for the purpose of this study and did not undergo the formal validation procedure. Furthermore, the low number of the items representing each domain results in a low reliability rate. These limitations need to be taken into account. This study’s purpose was to gather insights into how students perceive achievement in terms of competition and which factors play role. Despite these limitations, the study presents interesting results, which should serve as a starting point for future directions in educational research and educational policy planning.

**References**


Online preparatory courses at NHTV, Breda University of Applied Sciences

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In 2008 and 2009, during summer- and autumn holiday, students could follow an online course in these subjects. The courses are constructed in an online learning environment. Students are coached via chat, forum and e-mail. If they successful finish the course, they receive a certificate. In 2009, in addition to these courses, students could prepare themselves for their stay in the Netherlands and their studies at NHTV by visiting wiki pages with information about NHTV and the Netherlands. These wiki pages focus specifically on incoming foreign students. The pages consist of information about NHTV and the educational system, information about the Dutch and Western culture and information of Breda as a student city. Besides that, it is possible to follow a short Dutch course, to communicate with fellow students via forum and, in the end, to do an are-you-ready-test. Our wiki pages can be visited at www.nhtv.nl/international. This acculturation pilot took place with funds from the SURF Foundation (National Actionplan e-learning). The goal of the project was to improve the acculturation of international students with the aim to decrease drop out from higher education. Nine Universities/Universities of Applied Sciences in The Netherlands participate in this project and share information and ideas. An additional goal of the project is to create a databank with materials that can be used by institutes to start a pilot.

To be able to start the courses and to develop the wiki pages, there needed to be commitment and input from the board of governors, teachers of the subjects economics and mathematics, head of the the international office and other involved colleagues in our organization. In order to create a successful project, much attention was paid to the question if students would enrol for an acculturation course. Our underlying assumption was that they wouldn’t. As we already had the experience with the online summer courses we knew that students are only eager to learn when they feel the necessity for it. Therefore we connected the acculturation pages to the English courses Financial Management and Mathematics.

Results project and future plans During Summer 2009, 173 students enrolled for one of the courses Financial Management or Mathematics. An increase of almost 20% compared to last year. As much as 15% of them were international students. When we leave out the enrolled students who did pay but not started the course, the figures are the following: 82% passed the Dutch course Financial Management and 65% passed the English course Financial Management. 69% Of the students passed the Mathematics course. Also, we looked at the results of last year participants on the subject Financial Management or Mathematics in the first year programme and at their overall study success in the first year. The first results are promising Our wiki pages have been visited 1210 times between July 16 and September 15, by 801 unique visitors. Most visitors come from the Netherlands (49%). The largest foreign group of visitors comes from the United States (6%) and Germany (5%). Of 21% of the visitors we do not know where they come from. A part of them could come from foreign countries as well. Students did not need to enrol themselves for the wiki pages. They were invited by postal mail, e-mail and messages on the course forums to visit the pages.

At the round table we will share the following information:
1. a presentation of the figures of the online courses (are those students who followed the summer courses doing better in the regular programme?);
2. how we set up the courses and wiki pages; - the use of facebook as a platform for international students.

Like the name already suspects, students with different nationalities and cultures enter the same class and are offered an international programme taught in English. Internationalising the curriculum and developing the international classroom is seen as the instrument to improve the international and intercultural element of the programme. Learning from each others cultures is of an essential value for the development of knowledge and skills for international as well as domestic students. The many different perspectives, values and attitudes can enrich the education and broaden the students’ and lecturers’ minds. This in return prepares the students to work professionally in an international atmosphere in the future.
Instructional Support in Argumentative Computer Supported Collaborative Learning (ACSCL)

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Abstract: This study is designed to investigate the instructional supports in argumentative computer supported collaborative learning (ACSCL) to promote the quality of learning processes and outcomes. Relevant literature has been reviewed to identify the instructional supports in ACSCL environments. We carried out our search of the literature using a two-step method. First, we searched through ERIC database. It yielded 54 publications; however, only 11 publications met our inclusion criteria. Second, we employed the “snowball method”, and reviewed references in 11 selected articles for additional works. The snowball method yielded 21 new publications. A preliminary model of the instructional supports in ACSCL is proposed by identifying factors including scaffolding, scripting, and representational tools.

Introduction

With the arrival of the knowledge-based era, with the swift growth of information and communication technology (ICT), with the rapid growth and widespread accessibility of the WorldWideWeb (WWW) and with the changing today’s worldwide and technological world, networking has become more and more vital to the public and universities. The use of new collaborative technologies as teaching and learning tools is now quickly increasing into education. Confronting students with complex issues in higher education is essential. To be able to solve authentic problems and to adjust and cope with the complex nature of reality in in higher education, students apparently need to analyze, conceptualize, synthesize and conclude by improving their own domain-specific knowledge as well as social learning and collaboration. According to many scholars in the field of learning science, collaborative and network learning provide fruitful environments to prepare students to adjust to and cope with today’s complex issues. Collaborative and network learning environments encourage students to discuss their ideas, concepts and problems from different perspectives and viewpoints in order to re-construct and co-construct knowledge while solving authentic and complex problems (cited in Veldhuis-Diermanse, Biemans, Mulder, & Mahdizadeh, 2006). The use of new collaborative technologies as teaching and learning tools is now quickly increasing in education and science. The root of argumentation dates back to theorists such as Plato and Socrates, who encouraged their students to discuss and criticize complex topics and issues. In this regard, Schwarz & Glassner (2007, p. 449) stated: “Plato’s dialogues (or Socrates’ dialogues), such as Meno or Protagoras, show how critical discussions may help participants reach eternal truths”. Toulmin (1958) is one of the best-known theorists who focused on the word of argumentation in the 19th century. From his point of view, an argument consists of six interconnected parts: claim, data, warrant, backing, rebuttal, and qualifier. The claim has to do with students’ position on an argument. Each student takes a position in favor of or against the statement by expressing a claim. Data has to do with factual information that is expressed to support the acceptance of the claim. Students, for example, may support their claims by their observations. Warrant that has to do with justifying the inference between data and claim might be expressed for, example, by definitions, theories, and rules depending on the context of the course. Backing has to do with reasonable evidence and examples such as statistics or expert ideas which is in accordance with the warrant. Qualifiers and their interrelated rebuttals have to do with qualifying the relationship between claim and warrant. They both might be used in an argumentative process to limit the validity of a claim. More explicit, qualifier has to do with expressing a potential limition and rebuttal has to do with further explanation when the claim is not valid (Stegman, Weinberger and Fisher, 2007). It might be
difficult to ask students using the whole elements of Tolmin’s model in ACSCL environments in higher education due to its complexity and appropriateness. In order to simplify Tolmin’s complex model, Stegemann, Weinberger and Fisher (2007) employed a simplified version of Tolmin’s model focusing on the elements claim, ground (data, warrant, and backing), and qualifier to explain construction of single arguments. Baker (1999), recently, revised Toulmin’s model concentrating on collaborative discourse aspect of argument. Leitao developed a model for the sequence of argument focusing on argument, counter-argument and integration (Leitao, 2000). From Baker’s point of view, “Argumentation is a form of interaction in which, minimally, speakers propose arguments in favor of views (propositions, statements, utterances, claims, conceptual viewpoints, … depending on the theoretical approach adopted), and counter-arguments in disfavor of them” (Van Amelsvoort, 2006, p 19). Moreover, changing attitude, generating explicit thoughts, co-constructing new knowledge and conceptual changes are the main characteristics of Baker’s view of argumentation in collaborative discourses (Van Amelsvoort, 2006).

Quoting from Van Amelsvoort, Andriessen, & Kanselaar (2007, p. 486), “collaborative argumentation-based learning (CABLE) is increasingly used in education because current practice values peer collaboration and construction of knowledge”. Students in CABLE can pass judgment on their own and other students’ contributions, can ask peer students for enlightenment and clarification, and can give counter-arguments to broaden and deepen their arguments (Newman, Johnson, Webb, & Cochrane, 1999). Despite the fact that implementation of CABLE in a variety of educational studies has resulted in positive learning effects (cited in Van Amelsvoort et al., 2007), it is also argued that implementing CABLE without instructional support might limit its positive effects (Baker, 1999), especially if it is used as a tool to support and facilitate learning through argumentative problem solving. An argument or the nature of argument is in fact not linear, so it is not a simple task to broaden and deepen the space of debate during sequential linear discussion (Rummel & Spada, 2005; McCutchen, 1987). To cope with the non-linearity and complex nature of argument, a variety of instructional approaches have been proposed, tested, and developed to support CABLE; for example, visualization, external representations, and computer-supported collaborative learning (CSCL).

In addition, a variety of graphical schemes have been introduced, tested, and developed to support argumentation in design-based settings. IBIS (Issue-based information systems) was introduced to support fundamental principles for the design processes of argumentative problem solving, including three main nodes, namely issue, position, and argument (Conklin & Begeman, 1988; Van Bruggen, 2003). Many applications and developments of IBIS have been introduced in different fields of interest, in which diverse viewpoints on a single problem need to be collected to cope with complex problem designs (Kim, Suh, & Whinston, 1993). gIBIS (graphical IBIS) is a hypertext-based environment aimed at supporting and facilitating interactions and arguments between participants for issue-based communication, critical thinking, and solving complex problems (Conklin & Begeman, 1988). CSCL has recently been seen as an important and achievable instructional strategy to facilitate and support CABLE and thereby help students achieve a deeper understanding and productive arguments (Koschmann, 2003). In today’s information and communication era, CSCL is gradually moving into the mainstream of educational designs, so that it is currently receiving enormous attention in universities and schools throughout the world (Claudia, Steil, & Todesco, 2004; Ellis & Calvo, 2004; Hung, Tan, & Chen, 2005; Wang & Woo, 2007). When students are expected to solve authentic and complex problems and reach a deeper understanding, argumentation computer-supported collaborative learning (ACSL) provides a fruitful environment in which to integrate different perspectives, theories and ideas with their own arguments, counter-arguments, clarifications, and discussions (Van Bruggen, 2003). However, it has also been argued that learners may have difficulty arguing in rich CSCL (Van Amelsvoort, 2006) and design-based environments (Van Bruggen, 2003). For example, Van Bruggen (2003) noted that although using design-based environments supports the argumentation process in solving complex problems, it may create an additional burden for the learner because of the complexities and demanding tasks involved. It can take a substantial amount of time for students to broaden and deepen their domain-specific knowledge extensively enough to achieve an adequate level of expertise for solving authentic problems. One could argue that these difficulties can be solved or at least minimized by instructional support. Scaffold in ACSCL environments shows students to appropriately approach a task and to choose different paths to get different solutions. Scripts provide some instructions for learners regarding how group members should collaborate and complete tasks. Variety of scripts in CSCL and ACSCL environments have been introduced, tested and explored over the last decade such as: Sentence starters (note starters), buttons with open text-boxes for particular speech acts, assigning and rotating roles, peer interactions and question prompts including procedural, elaboration
and reflection prompts, and input text fields. Representational tools such as writing argumentative texts, diagrams, and matrices aim at fostering and supporting interactive argumentation. Given the complex nature of the authentic problems to be solved by students, achieving the desired learning outcomes by students requires well designed environments. Explicit attention need to be taken into account by planners and teachers who run ACSCL environments. This review literature aims to address and conceptualize instructional supports in ACSCL environments. This article thus reports on a literature review study on ACSCL aims at identifying possible instructional support in ACSCL.

**Approach**

In order to obtain the most informative publications for this study, we employed four inclusion criteria before collecting and searching by date. First, each publication had to be relevant and related, meaning that the reported review study should have been focused at either instructional support in argumentation or CSCL. Second, each publication should have been published either as a book, peer-reviewed journals, PhD thesis or presented/published in a scientific conference, seminar or congress in field of ACSCL. Third, publications written in English were included, as the authors could read and understand this language. Finally, the time span was limited to 1980-2009 to provide a profile of the status of the most recent research in this field. All other publications reporting on individual faculty experiences, courses, hand outs, curricula or projects as well as institutional or organizational topics without scientific examination of ACSCL were excluded. After cautious consideration of the consequences of screening one search term, the terms depicted in Figure 1 were identified as the most informative. We did not use the term “CSCL” or “computer supported collaborative learning” lonely since it was too vast and broad for our literature review. The chosen search strategy focused on title, abstract, and keywords in order to obtain publications with a clear focus on ACSCL in higher education. Search terms are mentioned below.

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“Instructional support in CSCL” or “Computer Supported Collaborative Learning” or “Scaffolding CSCL”

or “Representational Tools in CSCL” or “Scripting in CSCL” or “Intervention in CSCL”
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**And:** Argumentation

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*Figure 1: The linkage between the search strategy and the scope of this review*

Research on argumentation in CSCL is vast, and similar to any other literature review, this paper is necessarily bound by the meticulous orientations of the reviewers- both our strengths and our limitations. Relevant literature has been reviewed to identify the instructional supports in ACSCL environments. Searches were carried out from June 2008 through June 2009. We carried out our search of the literature using a two-step method. First, we searched through ERIC database. It yielded 54 publications; however, only 11 publications met our inclusion criteria. Second, we employed the “snowball method”, and reviewed references in 11 selected articles for additional works. The snowball method yielded 21 publications. All publications could be categorized in five resources: 1- (ERIC) The Educational Resources Information Centre, 2- (NARCIS) The gateway to Dutch scientific information, 3- (ISI) Institute for Scientific Information, 4- Relevant books related to the ACSCL, and 5- The conferences, congresses, and seminars related to the argumentation in CSCL. The identification process was carried out twice by the first author for two reasons: first, to be sure that all relevant publications were included and second, to exclude the non-relevant publications (see Figure 2).
Results

Instructional support in this review study structured as scaffolding, scripting, and representational tools. Scaffolding students with the aim of facilitating learning has lately received a remarkable amount of attention by researchers in field of CSCLearning (Azevedo and Hadwin, 2005). Scaffolding plays a critical role in CSCL settings by providing learning environments that move ahead the learners’ activity from a current level of understanding to a point where support is no longer required (McLoughlin & Marshall, 2000). Scaffolding plays a critical role in CSCL settings by providing learning environments that further the learners’ activities to a point where support is no longer required (McLoughlin & Marshall, 2000). There are different sources of scaffold support in CSCL environments: scaffolding by learners such as questioning and asking for feedback; scaffolding through a CSCL tool such as embedding static prompts or templates in a CSCL platform; and scaffolding by an external person or artificial agent (Azevedo & Hadwin, 2005). Scaffolding shows students how to appropriately approach a task and to choose different paths to find different solutions. Scaffolding plays a critical role in the development of the students’ declarative, conceptual, procedural, and meta-cognitive knowledge in ACSCL environments (Azevedo & Hadwin, 2005). Scaffolding through scripts has usually resulted in better learning outcomes. Scripts are complex instructions that stipulate the type and sequence of collaborative learning activities in CSCL and ACSCL environments. Scripts thus provide some instructions for learners regarding how group members should collaborate and complete tasks. Collaboration scripts provide detailed and explicit guidelines for small groups of students to clarify what, when and by whom certain activities need to be executed (Weinberger, Stegmann, Fisher, & Mandl, 2007). According to Kollar, Fisher, & Hesse (2006), the common characteristics of collaboration scripts are that they (a) induce certain activities to be carried out by the learners, (b) provide specific sequences concerning when to perform each activity, and (c) provide participants with collaboration roles specifying who is supposed to engage in the activities. In our framework presented here, three types of scripts are distinguished: epistemic, argumentative, and social scripts (Weinberger & Fisher, 2006; Weinberger et al., 2007). Epistemic scripts have to do with structuring
and sequencing discourse activities in ACSCL environments with respect to the content and task strategies (Weinberger et al., 2007). Such a script provides guidelines for students to appropriately engage in task-oriented activities (Weinberger, Ertl, Fischer, & Mandl, 2005). An argumentative script has to do with structuring and formulating the construction of arguments in ACSCL environments. It provides guidelines for students to construct and formulate better-elaborated arguments in terms of warranting and qualifying claims (Weinberger & Fisher, 2006; Weinberger et al., 2007). A social script specifies and sequences the interaction of learners so that they can adopt adequate interaction strategies such as eliciting (asking critical questions to elicit information from their partners) and transactivity (responding critically to their partners’ contributions) in ACSCL environments (Weinberger et al., 2007).

During the past few years, a variety of scripts in CSCL and ACSCL environments have been introduced, tested and explored (Jermann & Dillenbourg, 2003). Sentence starters (Weinberger, 2003), note starters (Nussbaum, Hartley, Sinatra, Reynolds, & Bendixen, 2002), buttons with open text-boxes (Baker & Lund, 1997), assigning and rotating roles (Schellens, Van Keer, De Wever, & Valcke, 2007), peer interactions and question prompts including procedural, elaboration and reflection prompts (Ge & Land, 2004) and input text fields (Kollar et al., 2006) are some examples of scripts that have resulted in positive learning outcomes. In a study conducted by Li & Lim (2008), it was concluded that scaffolding with two fixed scripts (written prompts and an argumentation template) and two adaptive scripts (questioning, modeling and peer interaction) benefitted the students’ learning outcomes. The content-oriented scripts or epistemic scripts facilitate the construction of declarative and procedural knowledge as well as inducing meta-cognitive activities (Schellens et al., 2007). The communication-oriented scripts or social scripts facilitate and stimulate interaction between the participants, which in turn influences the cognitive processes indirectly. Social scripts also evoke and stimulate the students’ internal cognitive processes, which in turn influences the meta-cognitive processes (Schellens et al., 2007).

Question prompts have been one of the most useful strategies to scaffold learning in CSCL and ACSCL environments that serve cognitive and meta-cognitive learning purposes (Ge & Land, 2004; Morris, Hadwin, Gress, Miller, Fior, Church, & Winne, 2009). Prompts, which are known as sentence starters, sentence openers, or question stems, provide students with guidelines, hints, and suggestions that facilitate enacting of scripts (GE & Land, 2004). Having different cognitive and meta-cognitive purposes, prompts comprise procedural prompts, elaboration prompts, and reflection prompts. Scripting by assigning and rotating roles has been seen as one of the best-known social-specific techniques for creating structure in CSCL environments. Having determined roles compels students to focus on specific activities that they themselves are responsible for (Schellens et al., 2007). Assigning roles for students has resulted in positive learning outcomes, such as engaging effectively and smoothly in learning processes (Cohen, 1994). Having a critical role has resulted in better task performance (Zigurs & Kozar, 1994). Having a specified role has encouraged passive students to actively participate in learning processes (Cohen, 1994). Different types of roles have been used to facilitate the quality of learning processes and outcomes. Four assigning roles (helper, feedback provider, resource manager, and process reflector) were used in a study conducted by Aviv (2000) to help the students encourage and facilitate each others’ efforts to reach the learning goals. Starter (initiate discussion by asking related questions) and wrapper (summarize the discussion) were used in a different study as roles to facilitate knowledge construction (Zhu, 1996). Five roles (starter, summarizer, moderator, theoretician, and source searcher) were designed for students in a research study conducted by De Wever, Van Keer, Schellens, & Valcke (2007). The overall conclusion of this study was that students enacted the roles they were assigned without ignoring the activities related to the other roles. The researchers thus recommended scaffolding learning (through assigning roles) as a successful structuring intervention (De Wever et al., 2007). The scores of the final exam demonstrated that assigning roles improved the students’ acquisition of domain-specific knowledge; however, it did not increase their level of knowledge construction. For the theoreticians and moderators, no differences emerged compared to the non-scripted groups. Unexpectedly, source researchers achieved a lower level of knowledge construction compared to the non-scripted groups. It was argued that source researchers looked at interesting websites, articles, or books, but failed to link them to the ongoing discussion or to discuss the supplied external sources. In the end, the researchers suggested that teachers should clearly define and explain the roles to students and give sufficient attention to all dimensions (Schellens et al., 2007). In contrast, in another study on similar roles conducted by De Wever et al. (2007), it was concluded that only the summarizers achieve higher levels of knowledge construction.

There are two kinds of scripts with respect to knowledge construction in collaborative argumentation: external and internal scripts (Kollar et al., 2007). External scripts are embedded in the
external surroundings of students, not in the learners’ cognitive system. External scripts, which come in different forms (explicit or implicit; graphically embedded in a CSCL tool or a teacher’s oral presentation or in handout materials), provide students with guidelines for desired or undesired actions (Kollar et al., 2006). External tools are likely to be either gradually internalized or they fade over time (Kollar, Fischer, & Slotta, 2007). External scripts can be used in two ways: The first approach aims at the internalization of the external scripted activities. This has been termed “scaffolding approaches to scripting” (Pea, 2004) or “tools for learning” (Carmien, Kollar, Fischer, & Fischer, 2007). The second approach uses external aids for better understanding of complex domain concepts or processes. This has been termed “distributed intelligence approaches to scripting” (Pea, 2004) or “tools for living” (Carmien et al., 2007). The main characteristic of the first approach is that learners are persuaded to utilize learned skills without external support being provided through fading mechanisms. The main characteristic of the second approach is that teachers help learners accomplish their tasks by being continuously accessible in the learning environment (Carmien et al., 2007). Tools for learning can be regarded as tools for living if learners lack the capability to internalize external scripts (Carmien et al., 2007).

An internal script is a set of knowledge and strategies that determines how a person will act in and understand particular situations in ACSCL environments (Kollar et al., 2007; Carmien et al., 2007). Internal scripts are very flexible and vary between individuals (Kollar et al., 2007; Carmien et al., 2007). Some individuals, for example, may be good at giving explicit reasonable evidence and reasons in arguments (Kollar et al., 2007). Some students might know how to attack an argument by creating counter arguments (Carmien et al., 2007). Few studies have investigated the interaction between internal and external scripts in ACSCL environments (Kollar et al., 2007). This must be taken into account, however, before designing external scripts in ACSCL environments (Carmien et al., 2007). Different internal scripts brought into ACSCL environments by different individuals can be complemented only by different external scripts (Carmien et al., 2007). Scripts for collaborative learning differ according to how structured they are. While some theorists provide rather rough guidelines for specific activities, sequences and roles, others may provide rather highly structured scripts, including very detailed instructions for learners regarding what activities should be applied, when and by whom (Kollar et al., 2007). Although highly structured scripts have resulted in better learning outcomes than less-structured scripts (Weinberger et al., 2007), too-detailed scripts or “over-scripting” has been rejected (Dillenbourg, 2002) since it makes the ACSCL environments unnatural, leads to less productive collaboration processes and yields non-intended side-effects (Weinberger, Stegmann, & Fischer, 2005).

Representational tools are believed to foster and support interactive argumentation in ACSCL environments (Bell, 2004; Suthers, 1999; Veerman, 2000). Accordingly, various types of representational tools have been used in recent years. Whilst Coirier & Golder (1993) and Veerman, Andriessen, & Kanselaar (2002) have emphasized the benefits of writing argumentative texts, Suthers & Hundhausen (2003) have focused on the effects of argumentative diagrams in ACSCL environments. These authors point out the role played by different external representations (diagrams, matrices and text) in collaborative problem solving (Suthers, 2003; Suthers, & Hundhausen, 2003). In summary, representational tools in ACSCL environments help students clarify their arguments (Bell, 2004; Van Bruggen & Kirschner, 2003), keep their arguments on track (Veerman, 2000), argue more effectively, consider all aspects and perspectives of a topic (Suthers & Hundhausen, 2003), formulate statements in the space of a debate, take different opinions, perspectives and critiques into account (Kolodner & Guzdial, 1996), discover and clarify new relationships and find patterns (Suthers, 1999, 2001, 2003). The tools furthermore help illustrate the structure of argumentation, give a general overview (Larkin & Simon, 1987; Schwarz et al., 2000) and broaden and deepen topics (Van Amelsvoort, 2006). In spite of the great advantages of representational tools, however, little has been done to identify how, when and which representational tools could be more useful in ACSCL environments (Lund, Molinari, Sejourne, & Baker, 2007; Munneke, 2007; Munneke, Andriessen, Kanselaar, & Kirschner, 2007). In this regard, some educational theorists have claimed that when the purpose of ACSCL is to deepen student’s knowledge or produce productive arguments, writing tasks and argumentative texts could be the most useful (Giroud, 1999; Klein, 1999; Veerman, 2000). When the intention is to identify relations in a topic, a matrix is considered to be a good representational tool, whereas graphs are useful for elaborating on a topic while keeping students focused on the relevant aspect of the debate (Baker, Andriessen, Lund, Van Amelsvoort, & Quignard, 2007).
Conclusion

Argumentation has been one of the most important trends of collaborative learning, whereby learners express their ideas, questions, and arguments in order to convince each other through examples, evidence, logical words and reasons to get a comprehensive understanding. Collaborative argumentation-based learning (CABLE) has been used to facilitate peer collaboration and knowledge construction. Computer supported collaborative learning (CSCL) recently has been seen as an important and achievable instructional strategy to facilitate and support CABLE for deeper understanding and providing productive arguments. Despite the fact that implementing CABLE in a variety of educational studies has resulted positive learning effects; however, it is also argued that employing CABLE without instructional supports might limit its positive effects since argument or the nature of argument is not linear and thus the broadening and deepening the space of debate during sequential linear discussion does not happen simply. In order to cope with the linearity and complexity nature of argument, a variety of instructional approaches; for example, scaffolding, scripting, and representational tools have been proposed, tested, and developed to support CABLE. Scaffolding in ACSCL environments shows students to appropriately approach a task and to choose different paths to get different solutions. Scripts are complex instructional means that stipulate and sequence collaborative learning activities in CSCL and ACSCL environments. Scripts provide some instructions for learners regarding how group members should collaborate and complete tasks. Variety of scripts in CSCL and ACSCL environments have been introduced, tested and explored over the last decade such as: Sentence starters (note starters), buttons with open text-boxes for particular speech acts, assigning and rotating roles, peer interactions and question prompts including procedural, elaboration and reflection prompts, and input text fields. Representational tools such as writing argumentative texts, diagrams, and matrices aim at fostering and supporting interactive argumentation. Making argument visible, clear and explicit, increasing quality of argumentation, considering all aspects and perspectives of the topic, illustrating the structure of argumentation and giving general overview, broadening and deepening topics in different ways, discovering and clarifying new relationships and finding patterns, as well as formulating statements in the space of debate are some benefits of using representational tools in ACSCL environments.

Further studies need to be performed to find out the way in which different internal scripts interplay with different external scripts and how this interaction influences argumentative knowledge construction in ACSCL environments. It is wise to shed light on the extent to which students can internalize and stabilize scripts over time. How long, how, and under what conditions do learners need to interact to internalize external scripts? How detailed and specify external scripts should be designed to prevent frustration among students by over-scripting? Considering representational tools, it is necessary to disclose under which conditions, when, how and which tools in ACSCL can lead to the productive learning outcomes.

References


Comparing Communities of Learning for Incoming Bachelor Students & Working Professionals

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Abstract: Communities of Learning (CoL) have received an increasing amount of attention among both institutions of higher education and professional organizations. Yet, although numerous researchers have investigated the activity patterns and participants’ perceptions of CoLs, no clear comparisons have yet been conducted between different CoL target groups. Contrasting different target groups would enhance our understanding about the general relevance of research findings across CoLs and provide valuable insights on how to effectively set up cross-sectional and inter-generational communities. The current study will compare the engagement in and perception of two types of CoLs that have been provided for bachelor students (82 participants; 6 CoLs and working professionals (158 participants; 14 CoLs).

Our results indicate that, although the two cohorts differ in their activity patterns, as well as their general perception, CoLs have provided a fruitful environment for both types of groups to collaborative engage in an interactive learning process.

Communities of Learning in Training Programmes

Institutions of higher education and professional organizations alike are continuously looking for new ways and methods to teach and train their target groups. In this context, the use of ICT-tools and the development of online learning methodologies constitute a vital development that has received ever-increasing attention, both amongst institutions of higher education, as well as the research community (Brants, Struyven, Dochy, & Nickmans, 2008). From the point of view of the institutions this demand is mainly driven by the increasing diversity of learners from various educational backgrounds (Rienties, Tempelaar, Waterval, Rehm, & Gijseelaers, 2006; Salmon, 2000; Vrasidas & Zembylas, 2003). In Europe, the ratification of the Treaty of Bologna, introducing the Bachelor’s–Master’s structure, created considerable transitional challenges for incoming university students. Although international students might fulfill all applicable accreditation requirements, their secondary educational backgrounds are often so diverse that they are effectively hindered to start their studies. As a consequence, numerous types of online courses have been developed that aim at reducing the gap in participants’ prior knowledge (Bryant, Kahle, & Schafer, 2005; Rienties, et al., 2006). Among professional organizations the drive towards ICT-based training initiatives has been largely fuelled by cost-saving and efficiency-related concerns. Until recently, (global) organizational learning programs were implemented on the basis of traditional educational formats and technologies, creating both direct costs, via participants having to physically travel to the training venue, as well as indirect costs, in the form of forgone working time (Harun, 2001). Additionally, only limited evidence suggests that participants were successfully able to transfer the newly gained knowledge into their working environments (Johnson, 2001; Robey, Khoo, & Powers, 2000; Soden & Halliday, 2000). Hence, similarly to the case of higher education, more dynamic and efficient ways to train and teach participants were required (Harun, 2001).

In this context, Communities of Learning (CoL) have been suggested as a useful tool to meet this new requirement, by stimulating an interactive learning process where knowledge is collaboratively created in social networks (Levin & Calacagno, 2008; Stacey, Smith, & Barty, 2004). Being closely related to the concept of Community of Practice (CoP), it has received an increasing amount of acceptance and attention (e.g. Paavola, Lipponen, & Hakkarainen, 2004; Rehm, 2009). Numerous researchers have already identified possible success factors for CoLs (e.g. Amin & Roberts, 2006; Wenger, 1998), and determined interaction patterns, as well as cognitive processes within such environments (e.g. de Laat & Lally, 2005). However, ongoing research has mainly focused on determining the activity patterns and perceptions of CoLs for single groups of participants. To the best of our knowledge, no clear comparisons have yet been conducted between different CoL target groups. Investigating this issue would contribute to a more detailed...
view on general relevance of research findings across CoLs and provide valuable insights on how to effectively setup cross-sectional and inter-generational communities.

In order to provide new insights into this matter, this study will investigate the following research question: How do bachelor students and working professionals differ in their engagement in and perception of Communities of Learning? To answer this question, two types of CoLs will be compared. The first focuses on incoming bachelor students, whereas the second set of CoLs deals with working professionals of a large international organization. Both communities are based on asynchronous discussion forums. Moreover, both types of CoLs have similar structures and are aimed at remediating knowledge gaps in economics. The analysis will employ a two-tier approach. First, the level and type of engagement in the asynchronous discussion forums will be investigated. Second, based on instruments developed at Maastricht University (Giesbers, Rienties, Gijselaers, Segers & Tempelaar, 2009; Rehm, 2009; Rienties, et al., 2006), the expectations before and the perceptions after completion of the CoLs will be investigated.

Community of Learning – A new training methodology

Communities of Learning (CoL) are generally considered to be a derivative of Communities of Practice (CoP), which belong to the most important and popular e-Learning methodologies that have been developed in recent years (e.g. Allan & Lewis, 2006; Constant, Sproull, & Kiesler, 1996). Conceptualized by Lave and Wenger (1991), CoPs are naturally evolving networks of people “who share a concern, set of problems or passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, et al., 2002, p.4, as quoted by Gannon-Leary & Fontainha, 2007). As appealing such a framework might be, scholars have argued that it does not provide an appropriate framework for formal learning programs (Fowler & Mayes, 1999). Consequently, CoLs are defined as a group of people “engaging in collaborative learning and reflective practice involved in transformative learning” (Paloff & Pratt, 2003, p. 17). The main adjustments of this approach can be categorized along three main aspects. First, it acknowledges that organizational learning requires more structure. With no clearly defined boundaries and time limits, participants tend to lack the necessary ambition to actively participate. CoLs are therefore subject to a clearly defined, finite timeframe. Second, CoLs incorporate supporting staff that facilitate participants in their learning process. Finally, any kind of contributions within the CoLs will automatically be validated and legitimized by facilitators.

Given its growing popularity and importance, a considerable amount of research has already identified possible success factors for CoLs. Summarizing these efforts, and acknowledging the close link with CoPs, Amin & Roberts (2006) have developed a comprehensive overview of these factors. First, CoLs should encourage open dialogue. Every participant should be able to share their views without being negatively exposed to their colleagues. Additionally, by encouraging an open exchange of views, while at the same time teaching new underlying principles, the overall learning process can be positively stimulated. For regular students, this should not pose any difficulties, as the members of the community share no formal relationship with each other and are therefore less likely to be restrained by external pressures. In contrast, working professionals are likely to face different situations. Being part of a formal structure, professionals can be caught up in the hierarchical structures of their organizations (Constant, Sproull, & Kiesler, 1996; Krackhardt, 1990). Consequently, this study argues that they are more careful when contributing to discussions within a CoL. Not wanting to jump to conclusions, or to confess that they might not know the exact answer, we believe that working professionals will take more time to reflect. On the one hand, this allows them to make more well-informed contributions. On the other hand, this puts them in a situation where they can initially observe how their colleagues conduct themselves. We therefore formulate our first research hypothesis as: H1: On average, working professionals will contribute less often, but more elaborative than regular students.

Another important aspect is that the level of participation will change over the course of the CoL. This is an inherent characteristic of these types of environments (Caspi, Gorsky, & Chajut, 2003). While regular students might be hindered to participate by their motivation, or private schedules (e.g. Rienties, et al., 2006), professional participants will remain a vibrant part of their working environments, which in turn will constantly distract them from participating at a constant rate (e.g. Rehm, 2009). Consequently, CoLs need to cater for periods where participants might be absent, with neither having consequences on the overall group, nor on the performance of the individual. As a result, this research paper proposes that the beginning of a CoL is characterized by a novelty effect, where participants are curious to get to know each other and the CoL. This effect will then wane towards the end of a CoL, as participants face other
obligations, such as final exams or other subsequent activities. Hence, our second research hypothesis is formulated as: \textit{H2: The level of activity in CoLs will be positively skewed, indicating a steep activity curve at the beginning, which then ebbs off towards the end.}

Third, Amin & Roberts (2006) suggest to include \textit{spaces for informal discussions}, where participants create an \textit{electronic personality} (Woods & Ebersole, 2003), which takes the form of introducing oneself and sharing personal information. This process can substantially contribute to the success of a CoL as it creates a degree of \textit{commonality} (Hung & Der-Thanq, 2001. However, Gannon-Leary & Fontainha (2007) propose that many working professionals are \textit{strategic users of ICT}, being capable of using standard text- and data-processing packages, but encountering noticeable difficulties, or not feeling at ease, in working with more advanced, collaborative online tools. Additionally, it can be argued that working professionals face a higher opportunity costs for participating in these types of discussions. Instead of spending their scarce time on exchanging personal information, they rather invest their time in content-driven discussions. Our third research hypothesis therefore is: \textit{H3: The amount of informal communication will be higher for the bachelor cohort, as professionals might not be overly familiar with the technology to collaborate in online environments, or do not have the necessary time to engage into elaborative informal discussion with their colleagues.}

\textbf{Method}

\textbf{Setting}

\textbf{General Aspects of the Communities of Learning}

The CoLs were powered by a Blackboard™ based virtual learning environment (VLE) that enabled the organizers not only to host all required static content, such as course materials and supporting documents, but also to provide the opportunity for participants to engage into active discussions, sharing ideas and experiences. The backbone of all CoLs was made up of asynchronous discussion forums that were subdivided into two different types of forums. One forum specifically focused on group building processes, entitled Café Talk – Personal Information. By means of this forum it was possible to foster the creation of trust and a common identity (Hung & Der-Thanq, 2001; Woods & Ebersole, 2003). The other type of forum was content-driven. Each CoL was subdivided into a number of different content domains, being assigned an individual discussion forum that was based on a practical, real-life task. To facilitate the discussions two academic staff were assigned to each CoL. Their task was to monitor the discussions and to answer content related questions.

\textbf{Communities of Learning for Bachelors}

The CoLs for bachelor students were part of an online summer course for an International Business degree programme in the Netherlands. The aim was to bridge the gap in economics prior knowledge for students starting a bachelor. The CoLs were scheduled over a period of eight weeks in which students were assumed to work a total of 60 - 80 hours. The content was subdivided into six modules, each containing a real-life task. Moreover, an e-book was available and students could use additional resources. The participation in the forums was graded by two facilitators and constituted 40% of the final grade leaving the remainder to be constituted by the weighted grade on three interim tests (20%) and one final exam (40%). A non-recognised certificate and a drink at a graduation ceremony were the only external rewards.

\textbf{Communities of Learning for Working Professionals}

The CoL for working professionals was part of a broader learning programme provided for a large international organization. The ultimate objective of the programme was to secure the impact of the organization in its daily practice by enhancing the capacity and skills of its staff. The programme built on a blended learning approach and was subdivided into two main phases, namely the CoLs and a face-to-face workshop. The content of the CoLs was based on five focal areas, all covering aspects of economics. Each area constituted a content module that comprised lecture(s), readings, quizzes and a real-life task. The participation in the forums was graded and constituted 50% of the final grade. The other 50% were based on an final exam. The overall duration of the CoLs was eleven weeks and the overall workload was equivalent to an estimated 60 – 70 hours per week.
Participants

Bachelor Students

A total of 100 participants were randomly assigned to six CoLs. Of these participants a subset of 82 participants were selected for analysis. The remainder was not considered due to incomplete datasets. The six CoLs had an average of 13.66 members (SD = 2.16, range = 11 – 17) per group. The average age was 19.00 years and 50% of the learners were female.

Working Professionals

Overall, 219 participants were randomly assigned to 14 Communities of Learning. The present study analyses the data of a subset of 158 participants. The decrease in sample size is caused either by participants dropping out of the program, or by deleting participants due to incomplete datasets. The 14 Communities of Learning had an average of 11.29 members (SD = 1.90, range = 7 – 14). The average age was 44.73 (SD = 7.31, range = 27 – 59) and 53.79 % of the participants was female.

Instruments

Level and Type of Engagement in the CoLs’ discussion forums

In order to determine the validity of our hypothesis and to estimate the overall activity patterns within the CoLs, the transcripted log-files and user statistics from the asynchronous discussion forums were used. These log-files provided information on various details, such as the level and type of discussion in the forums. Furthermore, the datasets also included the amount of contributions per participant, as well as the overall statement length per participant, measured as the total amount of characters that an individual participant contributed in all forums of their assigned CoL. On the basis of this data, it was possible to determine the cumulative scores for the overall level of activity in the different types CoLs, as well as the average length of each contribution, calculated by dividing the amount of posts by the total statement length for each individual participant.

Expectations and Perceptions of the CoLs

Before the start of the CoLs, participants were asked about their expectations via an online questionnaire. This instrument was developed at Maastricht University (Giesbers, et al., 2009; Rienties et al., 2006) and used to question the incoming bachelor students. The working professionals received an adjusted version to better fit their context (Rehm, 2009). The response rate for the questionnaire among bachelor students was 47.56 % and among working professionals 88.61 %. After the completion of the applicable CoLs, participants were questioned about their perception of the CoLs. Similarly to the other questionnaires, this instrument was also developed and adjusted at Maastricht University (Giesbers et al., 2009; Rehm, 2009; Rienties et al., 2006). The response rate among bachelor students was 85.63 % and 47.30 % among the working professionals.

Results

Table 1 provides an overview on the differing level of participation between the two cohorts. As can be seen there is a significant difference between the average amount of posts contributed to the forums, with bachelor students being quantitatively more active than their professional counterparts. In contrast, the average statement length is significantly higher for working professionals. This provides positive evidence that, on average, working professionals will contribute less often, but more elaborative than bachelor students. We therefore accept hypothesis 1. Interestingly, the overall volume of contributions, measured by the total statement length, is similar.
Table 1: Level of engagement in the discussion forums of the CoLs

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<tr>
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<th>Working professionals</th>
<th>Bachelor students</th>
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<td>SD</td>
<td>N</td>
<td>M</td>
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<tr>
<td>Posts</td>
<td>158</td>
<td>12.46</td>
<td>11.03</td>
<td>82</td>
<td>27.59</td>
<td>28.07</td>
<td>238</td>
</tr>
<tr>
<td>Tot. statement length</td>
<td>158</td>
<td>15905.73</td>
<td>18591.42</td>
<td>82</td>
<td>13925.45</td>
<td>1428.34</td>
<td>238</td>
</tr>
<tr>
<td>Av. statement length</td>
<td>146</td>
<td>1229.96</td>
<td>793.13</td>
<td>81</td>
<td>507.76</td>
<td>189.64</td>
<td>238</td>
</tr>
</tbody>
</table>

Figures 1 and 2 provide a graphical representation of the level of activity in the discussion forums over the course of the CoLs.

Figure 1: Average Contributions per Week (Bachelor)

Figure 2: Average Contributions per Week (Working Professionals)

Please note that the available data for working professionals was originally grouped per content module. In order to enhance the comparability of data, we have therefore evenly distributed the actual amount of contributions per module over the weeks during which it was discussed. Taking into account this modification, this comparison provides us with a first, preliminary indication of the validity of our second hypothesis. From Figure 1 and 2, a not very pronounced trend is apparent of more contributions being made to earlier forums. Although the general direction of the trends is in line with our predictions, we can therefore only tentatively accept our second hypothesis.

The data presented in Table 2, provides evidence for our third hypothesis. More specifically, there is a clear and statistically significant difference between the amount of informal communication between working professionals and bachelor students, with the latter contributing, on average, almost three times as many informal posts than their counterparts. Interestingly, there is no considerable difference between the amount of content-related contributions.

Table 2: Type of Engagement in the Discussion Forums of the CoLs
In order to establish whether the two cohort differ in terms of their expectations and perceptions of the implemented CoLs, we also analysed the results of the applicable online questionnaires. When comparing the results of the expectations before the start of the CoLs, it appears that bachelor students were more eager to create a positive image of themselves in the discussion forums, compared to their counterparts. More specifically, for questions such as “One of my goals is to show others that I’m good at my work in the class.”, bachelor students were significantly more inclined to score high on this issue (p < .05). Judging from the perceptions of the participants, it can be generally stated that working professionals appear to be more critical about the quality of the materials (p < .001), as well as the facilitation of the academic staff (p < .05).

### Discussion

The concept of Community of Learning (CoL) has experienced growing popularity and importance amongst both institutions of higher education and professional organizations. When implementing such communities, irrespective of the factual target group, three main aspects should be considered. First, CoLs need to encourage open dialogue among participants. Second, the level of participation will change over the course of a CoL. Third, it is of importance to including spaces for informal discussions, where participants create an electronic personality (Woods & Ebersole, 2003). This research study set out to determine whether there are noticeable differences between bachelor students and working professionals in their perception and engagement in Communities of Learning.

Our findings suggest that, while bachelor students are more active, working professionals take more time to reflect and contribute more extensively to the discussions. Yet, when considering the overall quantitative output, no significant differences were observed. This suggests that the specific behavior of the two cohorts is not a determining factor in the overall amount of information being shared and the potential amount of learning taking place. When considering the general trend in participation in the CoLs, both cohorts tend to be more active in the beginning of a CoL. Our results also indicate that bachelor students spent considerable more effort in exchanging informal information with each other than working professionals. Possible explanatory reasons include that they are about to start studying at a foreign university, not knowing any of their peers. By paying specific attention to informal communication, they are able to already get connected with their peers, possibly making it easier for them to start their studies. Working professionals, on the other hand, are part of a fully established organizational community and only face a marginal chance of meeting again in their actual working environments. This somewhat decreases the importance of this type of communication and could explain why they engage less into informal communication. Additionally, it has been argued that they face higher opportunity costs of participating in informal discussion. Continuing to be a vibrant part of their working environments, they have to make a choice which activities they want to devote their scarce time on. Participating in the CoLs to update their knowledge, there seems to be an implicit consensus to rather collaboratively discuss the content, than to exchange personal information. Finally, and being rather closely related to the previous evidence, our results suggest that bachelor students are more concerned about their online image, while working professionals are more critical about the general circumstances.

Summarizing these findings, a number of interesting conclusions can be drawn. Generally, it can be stated that CoLs appear to be capable of providing a fruitful learning environment that caters for the individual characteristics of different target groups, without sacrificing its added-value to stimulate an interactive learning process where knowledge is collaboratively created. Consequently, given the results of the current study, we can propose that CoLs are a valuable framework to consider for implementing cross-sectional and inter–generational communities. Moreover, given the generally downward trend in the level of activity over the course of the CoL, the facilitation process should be set up accordingly. While
facilitators might be able to draw on the general willingness of participants to get started, potentially only having to steer the discussions in the beginning, they have to become more pro-active towards the end of the CoL, ensuring that everybody remains engaged. Furthermore, although reaching comparable quantitative outcomes, it has been established that the two target groups have somewhat different priorities and strategies in the discussion forums. Consequently, when implementing an overarching CoL, where members of both groups are combined, this should be incorporated in the design of the discussions. More specifically, one might consider to introduce a kind of (neo)apprenticeship style learning (e.g. Schlager, Fusco, & Schank, 2002), where working professionals take on the role of experts and bachelor students act as novices. While both groups would collaboratively enhance their knowledge, working professionals could share practical considerations and how a certain topic could actually apply within an organization. In return, as bachelor students tend to more openly discuss new materials, they could provide a constant influx of new ideas, thereby enriching the learning experience for all participants.

**Limitations and Future Research**

The current study exhibits three main shortcomings that should be taken into account when interpreting the data and considering the conclusions with respect to the three indicated research hypothesis. First, the two types of CoLs, although comparable in their general nature and structure, were quite different in a range of aspects that make a more detailed and thorough comparison very troublesome. For example, the underlying timeframe, during which the CoLs were implemented for the two groups, differed to quite some extend. Whereas bachelor students had eight weeks to complete the content of their CoLs, working professionals were granted eleven weeks. It should be stressed that the cumulative workload, determined by the expected amount of hours spent on the CoL per participants, for the two groups was identical. However, the current study has not specifically controlled for this difference in time available, which might have had an impact on the witnessed behavior and measured perception and satisfaction of the participants. Ideally, future research would construct CoLs for different target groups, which are identical with respect to this aspect. Additionally, the discussion forums were based on different sets of tasks. Although the content domains were the same and the structure of the underlying tasks was very similar, it is possible that the outcome of the present study have been influenced by the way with which the individual tasks have been formulated and introduced. Future research should therefore try to create an environment in which identical tasks are discussed among different groups of users, in order to improve the general replicability and validity of the results.

Second, when considering the activity patterns within the asynchronous discussion forums, only aggregated data was considered for the current study. Although this constitutes a first comprehensive overview of possible differences in the type and level of participation between groups, it only provides and incomplete and static picture of the situation. In order to better understand the differences between the two groups and how the interaction patterns within the groups develop and possibly change over time, a more dynamic analysis is required, keeping closer track of the timing with which contributions have been added to the discussions.

Finally, the current study has solely focused on quantitative data from the CoLs. By conducting content analyses of the underlying discussion forums, it would be possible to draw more refined conclusions on the actual differences between bachelor students and working professionals, and to what extend their differing activity patterns possibly had an impact on the factual amount of learning that has taken place within the CoLs.

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presented at the Student Mobility and ICT: Can E-LEARNING overcome barriers of Life-Long learning?, Maastricht, the Netherlands.


How can teachers make relevant choices in educational technology?

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In a more global and complex world, teachers meet a new generation of students who consider ICT their way of life. An increasing number of researchers have found that teachers need to adjust their teaching styles in order to facilitate the new generation of learners. (Mazzolini & Maddison, 2003). More specifically a teacher has to perform multiple roles at the same time: to be an organizer, a designer, a facilitator and an expert (Anderson, Rourke, Garrison, & Archer, 2001). In addition, teaching online requires several, and often brand new, skills for the teacher as well as a significantly diverse attitude towards teaching or being a teacher (De Laat, Lally, Lipponen, & Simons, 2007). The thoughtful design of online learning activities is critical to the attainment of educational outcomes (Kirschner, Strijbos, Kreijns, & Beers, 2004). In the process of designing and using these IT tools, teachers are forced to be learners themselves (Anderson et al., 2001).

Our main purpose is to review the state-of-the-art research and good-practices on this topic and create an overview of the subject. The following question will be addressed: How can we professionalize teachers in order to make them considered didactic choices in ICT and as a result raise study performance? At the S-ICT Conference we will share our literature findings and we will use the round table discussion to validate experiences and ideas. This discussion will be used as an input for the (Surf Foundation) MARCH-et project (Make Relevant Choices in Educational Technology).

References


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Interactive large scale lectures: from clothespins to twitter mashups

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Abstract: Ways of increasing pass rates for courses are increasing students’ time-on-task, and improving contact between lecturers and students. In this round-table session we’d like to make the link between these two, and using ICT to provide more interactivity in lectures. By using ICT, such as microblogging sms, or electronic questionnaires filled out on a laptop contact can be improved by providing a better fit of the lecture to the needs of students, and dropout of students during lectures could be decreased by engaging them more. In future, collating materials as contributed by students during a lecture could entice students to spend more time-on-task, thus increasing pass-rates. At the University of Groningen, we are developing ways to design these interactive lectures in three courses (one of them with 800 students!), intending to measure effects on dropout. In this workshop we’d like to discuss the learning approaches to follow for these courses, measurement of effects, and make decisions on technology use.

Introduction

In many universities lectures with large groups of students play an important part in the overall student experience of the first year. Keeping students engaged for the duration of a lecture is not always easy and requires specific skills, especially when lecturing for larger audiences. Furthermore, the attention span of students is limited. Students themselves report that the longest time they can endure uninterrupted lecturing is 20 to 30 minutes (MacManaway, 1970). To “reset this attention clock” several measures have been tried out, such as “structured interactive sessions” (Kumar, 2003), audience response systems (Caldwell, 2007), attention breaks in lectures (Johnstone & Percival, 1976) to using clothespins for audience paced feedback (Poulis, Massen, Robens & Gilbert, 1998). All these measures are designed to increase interaction and engagement with the audience during a lecture. Caldwell (2007) identified a number of best practices for use of these systems:

- To increase or manage interaction
- To assess student preparation before a lecture
- To survey students entry level, pacing or topic of a lecture
- For formative assessment during a lecture
- For summative tests
- To do practice problems
- To guide thinking helping students review for a test, or leading students through a series of questions
- To conduct live experiments

With new technologies for interaction such as microblogging (twitter) and sms voting becoming more widely available, new possibilities are opening up to promote interactivity during lectures. Examples are:

- enabling sending of questions to the lecturer (via sms)
- live commenting on a streaming video lecture
- sending in responses to a case-study during a lecture
- sending and integrating comments and questions

At University of Groningen, lecturers have expressed interest in the use of ways to promote interactivity during large scale lectures. From their perspective, two main questions are derived:

- Can I get accurate and timely feedback from students on my lecture?
Can more interactivity during lectures help to increase pass-rates of my course?

The feedback as indicated can be feedback on the quality of explanations in the lecture (do students understand?), the speed (speed up or slow down?), or on contents (How much time to spend on this topic, which route to take through the learning material?).

Pass rates could be improved when more students are engaged with lecturing, or when more time on task is spent as a result of more interactivity. More engagement can be reached when students are given opportunities to ask questions, or are given opportunities to become active students, for example by sending in their responses. Time on task could be increased when more students keep coming back to lectures, or when opportunities for reacting after a lecture are enhanced.

In three courses at the University of Groningen, we will try out, and measure the effects of more interactivity in lectures, the questions for these studies are described in the next section.

**Study questions**

To measure the effectiveness of more interactivity in lectures the lecturer's questions are taken as a start point. Based on the practical questions of lecturers two research questions are identified:
1. Can we get a better fit to students' needs by providing feedback to a lecturer during a lecture?
2. Can more interactivity during lectures help to increase students’ time on task, and thus increase pass-rates?

Question 1, a better fit to students' needs can have three subquestions:
- Do students understand the lecture content?
- Is the speed of the lecture right?
- Does the path through the lecture fit students’ entry knowledge?

Question 2 is mainly focused on students time during lectures. Normally, student numbers at a first lecture in a course are higher than student numbers during later lectures. When more students’ keep coming back to the lecture, their time-on-task has increased, so the pass-rate of students could increase. In future, when learners responses are gathered and spread through their (social) networks, learners (also the ones who were not present!) will be reminded of the lecture and its contents, and possibly spend more time studying.

Many side effects could be found, some of them possibly with a temporary nature, as normal when implementing new technology in a classroom. The most promising side effect would be an increase in (personal) contact between lecturers and students, or within the group of students. Increasing personal contact, and belonging to a group of students at university could further increase pass rates within a course.

**Decisions in courses**

Examples of more interactivity (Wheeler, 2009, Winnips, 2007) have been identified, but ICT technology does not necessarily have to be a solution. For example, students can react to a questions by voting with a cube, with six colors on its sides. By raising the cube with the desired color, a lecturer can quickly see the most prominent colours, and get a feel for the votes of the students. But, ICT has its advantages:
- Input can be given at any time, with very little disturbance during the lecture (such as: sending an sms with a question to the lecturer)
- Results can be collated, and stored in an electronic learning environment afterwards (such as: saving questions during the lecture in an electronic learning environment, responding to more questions after the lecture)
- Input can be provided as text, and can be displayed on screen without much delay (such as: students giving a short answer response to a case study, with the lecturer showing the most interesting answers on screen)
- High numbers of student responses can be gathered, and decisions can be made on how to process the reactions (such as: gathering the responses of a multiple choice test of many students, and directly discussing students’ misconceptions afterwards)

Thus, it seems logical to use ICT for interactivity during and after a lecture. To enable these kinds of interactivity we can see four types:
1. Using SMS
2. Clickers, or personal response systems
3. Laptops
4. Microblogging
In this round-table session we’d like to discuss the use of these (and other) tools, and their possibilities. Further, we’d like to present some small experiments that were done using SMS testing, the type of companies that we’ve identified to work with, and the use of microblogging tools to directly present questions within Powerpoint. Criteria for tool choice will also be discussed. An important factor however, is what technology students currently have available. To study this, a small survey was done, as described in the next section.

**What have they got in their pockets?**

To find out what technology students currently have available when they visit a lecture a small survey was done during lectures in geography (n=118) and international law (n=123). With no ICT at hand for interactions, questions were asked in the lecture, and students were asked to raise their hands. At the count of 3 a photo was taken of the whole group. Afterwards the raised hands were counted. Results are provided in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Urban geography</th>
<th>International law</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Who would like to use their laptop/telephone to directly respond to the lecturer during a lecture?</td>
<td>52 / 118</td>
<td>37 / 123</td>
</tr>
<tr>
<td>2. Who has got a laptop in their bag now?</td>
<td>1 / 118</td>
<td>6 /123</td>
</tr>
<tr>
<td>3. Who can bring a laptop to the lecture?</td>
<td>110 / 118</td>
<td>113 / 123</td>
</tr>
<tr>
<td>4. Who can access the wireless network with their laptop?</td>
<td>96 /118</td>
<td>102 /123</td>
</tr>
<tr>
<td>5. Who’s got a telephone with a webbrowser?</td>
<td>58 / 118</td>
<td>76 / 123</td>
</tr>
<tr>
<td>6. Who uses Twitter?</td>
<td>1 / 118</td>
<td>10 /123</td>
</tr>
<tr>
<td>7. Who can use Bluetooth on their phone?</td>
<td>118 / 118</td>
<td>110 /123</td>
</tr>
</tbody>
</table>

From this small scale survey, surprising to us is the high number of students that work with Bluetooth. Given the cost of SMS and Web access on mobile phones, Bluetooth can be a good option for interactive lectures. Further, given the small range of Bluetooth devices, using Bluetooth can make sure that the interactions stay within the lecture room, and no uninvited outsiders can join. Not surprising is the low number of students that use microblogging (Twitter). For our courses, it seems viable to work with the mobile phones of students, or using their laptops when more intricate interaction is required. Gathering responses of small groups can be a way to gather responses of all students.

**Followup: mashups in Blackboard?**

The courses, and measurements in courses will take place over the next six months. Many ways are available to gather the students responses, and we’re curious to measure the effects of these interventions. On the other side, technology will not stand still. Web 2.0 technology will at some point enter into the lecture halls. As is seen in professional conferences nowadays, participants are enabled to react on lectures, or will spread their own reactions through their (social) networks anyways. They record and publish videos to YouTube, write blog entries, and send summaries of the best presentations via Twitter. They are active learners. For lectures, we could increase time-on-task when students reactions are mashed-up, and gathered within the learning environment. By tagging reactions on a course (microblog entries/tweets, blog posts, recorded videos, comments) students can track back what happened during a lecture, and become active after the lecture. Seeing other students reactions could entice them to spend more time studying and thus increase pass rates.

**References**


Online: http://tinyurl.com/mrmvsb


Transition to University: Conceptualisation and theoretical perspectives for effective practice
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Abstract: Transition involves moving from one context and set of interpersonal relationships to another. In an educational context, transition, has been conceptualised in various ways. We will discuss some of these concepts in this paper. Further, we will explore the theoretical dimensions and areas requiring improvement in practice, with a focus on resilience, self-esteem and emotional intelligence.

Educational Transitions

Educational transition involves transition to a formal educational setting, moving across different stages of education, moving from one school to another, from educational context to employment and moving from one country to another. Many of the children and young people make this transition successfully and for some it involves adaptation and adjustment over a longer time. It is important to note that transition is satisfying and fulfilling for some, and individuals yearn for this change and the opportunity to ‘move on’ and ‘move up’ with increased choices (Jindal-Snape & Foggie, 2008; Lucey & Reay, 2000). However, some find it challenging and stressful. This period is not challenging for children and young people alone. It can cause anxiety for parents/carers and family, with some finding it equally difficult to adapt to changing systems, ‘unspoken rules’ of institutions, expectations of them as parents/carers, as well as the additional responsibility of working through this with their child at home. Similarly, professionals working with these children, young people and families have to learn to implement new strategies according to their varying needs and ways of dealing with transition.

It seems that despite the variation of educational systems, pupil's age or country, when they face these transitions the pedagogical, social and emotional challenges which pupils, parents and professionals undergo are quite similar (see for example Adeyemo, 2007; Akos, 2004; Dockett & Perry, 2001; Eccles, Wigfield, Midgley, Reuman, Mac Iver, & Feldlaufer, 1993; Jindal-Snape & Foggie, 2008). In other words, these various transitions in pupils' learning path significantly impact on their every-day life. Therefore, transitions are phases in which pupils, peer groups and teachers have to constantly re-build their learning environment in the educational context.

Schwitzer, Griffin, Ancis and Thomas (1999, cited in Adeyemo, 2010) summarized that fresh university students face four demands, namely academic adjustment; institutional adjustment, academic goals and finally career choice; personal emotional adjustment or the need to independently manage one’s own emotional and physical well-being; social adjustment to room-mate, peer, staff and other interpersonal relationship. According to Lisa, Lisa and Rosina (2004, cited in Adeyemo, 2010), academic issues, student stress, social integration issues, homesickness and alcohol use are parts of the transitional challenges encountered by first year university students.

Conceptualisation of Educational Transition

Transition involves moving from one context and set of interpersonal relationships to another. Newman and Blackburn (2002) have defined transition as any episode of potentially challenging change that a child might experience, such as progressing through developmental stages, bereavement, leaving care, etc. In today’s changing world, individuals make several transitions at home, in an educational context and at work (Jindal-Snape, 2010).

In an educational context, transition, also referred to as ‘transfer’ and ‘moving on’, has been conceptualised in various ways. Some of the literature tends to focus on the skills of the children and young people, and how they deal with any change in the context and/or setting. This is particularly the case when we are looking at transition to formal schooling and considering the child’s readiness to start school. This approach to assessing a child’s readiness to start school, or a young person's readiness to start University for that matter, is called the Maturational Approach. It focuses on the learner’s ability to perform at the norm expected at that level, being emotionally and socially ready, as well as the ability to look ‘the right
age’. On the other hand, we have an Interactionist Approach, which looks at a fit between the learner’s readiness and the educational institution’s readiness to adapt according to the learner’s need. In an Early Years context, Vernon-Feagans and colleagues (2008) provide a way to conceptualize readiness which puts the definition of readiness, not within the child but at the “interaction and fit between the child and his/her family and the ‘readiness’ of the classroom/school to teach that child” (p. 63). In the context of transitions to University, this would imply the University’s readiness to adapt its systems, curriculum and learning environment according to the needs of the individual learner. Recent research has emphasised the importance of the readiness of receiving institutions. Others have also focussed on the role of significant others such as the professionals, family and the community (e.g. Jindal-Snape & Foggie, 2008).

Pietarinen, Soini and Pyhältö (2010) have conceptualized transition as vertical (from one stage to another) and horizontal transition (within the same stage but the constant adaptation and adjustment with peers and teachers). If we look at transitions from this point of view, even though a vertical transition might happen once when moving from one educational stage to another or even yearly in the case of gradual progression of curriculum; horizontal transition is an on-going process as the pupil makes sense of his/her social environment and adjusts according to sometimes unpredictable changes. Pietarinen et al. (2010) report that educational institutions and teachers were getting good at managing vertical transition, for example through continuity in the curriculum. This has been a dimension that has been much debated and researched.

However, although some work has been done to address horizontal transitions, for example through buddy systems, meeting the teachers prior to transition, etc., this dimension needs further attention. The problem here comes due to transition being seen by some as a one off event rather than a process where children and young people have to make sense of everyday changes and relationships.

From this point of view, transition has been conceptualised as a single event which marks the completion of one stage and signals the beginning of another stage in the educational journey. In this conceptualisation, research focuses on meeting the teachers/staff prior to transition, University visits, induction days, etc. The preparation prior to the move is the focus of attention. Others look at transition as an on-going process that focuses on interactions between the learner and peers, teachers, and families. They, therefore, emphasise that the experience of transition needs to be understood from these multiple perspectives and how the stakeholders in the process make sense of on-going changes. Galton (2010) suggests the schools need to think longer term and uses the example of Nicholson’s (1987) work-role transition phases from the field of occupational psychology. These four phases, especially in a University context, are:

- **Preparation**: This is similar to the pre-transition programmes put in place by the universities, such as induction weeks, open days, etc.
- **Encounters**: This would include a post-induction program which in the context of the University of Dundee could include study and thinking skills and other activities which will help in ‘learning to be a professional learner’
- **Adjustment**: At the adjustment phase there is frequent and immediate feedback provided on both success and failure whereby learners’ reasoning is explored and strategies for identifying and correcting mistakes discussed
- **Stabilization**: This involves future goal setting and appraisal of how the learner might be developing, such as end of year reviews. This should then look at those aspects of the learner’s adjustment (whether social, personal or academic) where improvement is required as well as setting of future goals for the following year.

Bronfenbrenner (1979, cited in Hannah, Gorton, & Jindal-Snape, 2010)) conceptualized his ecological systems paradigm in terms of hierarchical systems ranging from those proximal to the individual to those most remote. These were termed the microsystem, mesosystem, exosystem and macrosystem. If we conceptualize transition from this perspective, the transition preparation and planning needs to take account of significant others and the part they play in the life of the learner in general, and in transitions in particular. It is important to understand the interplay between the learner and his/her immediate environment. Also, sufficient attention has to be paid to the interaction and interplay between home and educational institution, one educational institution and another (such as secondary school/FE and University in our context).
Another way of conceptualizing transition is in the context of clean slate or virtual backpack approach. The clean slate approach comes from a thinking that the assessment or reporting of the previous educational institution might not be accurate. It starts with the learner from the moment they enter the educational organization. This approach is beneficial in that the teacher takes the young person as they find them rather than dwelling on what they used to be, which otherwise could have coloured their view of the young person. However, this approach can ignore and devalue the first 18 years of the life of a young person. The virtual backpack approach emphasizes that the purpose of education is to open the virtual backpack a learner might bring with him or her (Peters, 2010). The idea is to build upon what the learner brings with them in terms of skills, abilities, aptitudes etc. It acknowledges the learning journey somebody has been through. In a University context, in a more concrete way this can be portfolios of work that a learner might bring from the school or further education setting. This can then be built upon during the time in the University which the learner can take with them to an employment context.

To understand what is happening to the learner during transitions and to understand what can be done to enhance their transition experience, it is imperative that Universities reflect on how they conceive the post-school transition to be.

Understanding Transitions through Theoretical Perspectives

In this paper we will explore three theoretical perspectives, namely self-esteem, resilience and emotional intelligence. Resilience has been defined as a dynamic process encompassing positive adaptation within the context of significant adversity. Research suggests that resilience during adverse situations is due to the internal attributes of the individual and protective factors in the family and the wider community (Luthar, 2006). Research has been conducted to look at risk and resilience in the context of preschool-primary school (Griebel & Niesel, 2001) and primary-secondary transition (Catterall, 1998). Resilience literature looks at the risk and protective factors, which at times might be the same (e.g., see Newman & Blackburn, 2002, the family can be both risk factor being a chaotic family, and the protective factor being a supportive family).

Rutter (1987) suggested four main protective processes which mediate risk at key life turning points. These are: to lessen the impact of risk by altering the experience of risk or exposure to the risk; to decrease the number of risk factors in order to avoid an accumulation of unmanageable risks; to increase self-esteem and self-efficacy in order to create a positive chain reaction in the young person’s life; and to provide access to opportunities such as part-time work and out of school activities (Jindal-Snape & Miller, 2010). If we look at post-school transition research there seem to be several such stressors for a learner at this time, such as discontinuity of curriculum, change in pedagogical style, new environment, friendships in a state of flux, leaving home, living independently, etc. Although a certain amount of emotional impact is inevitable, it is also central to the development of appropriate coping strategies for future. However, as educators we must ask, what happens if a young person does not have the internal attributes or a supportive environment to help develop these coping strategies?

Taking into account the factors mentioned earlier, it is hardly surprising that for many young people this is a period of considerable uncertainty and potential stress. It is also important to remember that these changes occur at a time of great physical and emotional change: the move from being a young person to an adult. It is almost self-evident that all the changes referred to above can have a significant effect on self-perceptions – specifically on an individual’s sense of worth and competence - leading to stress and in some cases, trauma (Rudolph, Lambert, Clark, & Kurlakowsky, 2001).

In terms of previous resilience and transition research, the importance of the internal protective factors (for example, self-esteem) and external protective factors (such as positive relationships at home and university) to help reduce multiple ‘risks’ or ‘stressors’ at the time of transition, is obvious. Therefore, care needs to be taken to structure a supportive environment for young people during transition.

Although there is general agreement that global self-esteem essentially involves an evaluation about the self, beyond that there are many disagreements. Blascovich and Tomaka (1991) comment on the conceptual confusion that arises because self-esteem, possibly to a greater extent than many other important psychological concepts, coexists in everyday language and academic psychology. One result of this is that often ‘common-sense’ notions of self-esteem are substituted for the more precise scientific definitions, “creating the illusion of a universally accepted, well-defined, phenomenological entity,” (p.116). The picture is complicated by the fact that the topic is studied from both sociological and psychological perspectives, includes a wide variety of acceptable research methods, and involves some special
measurement difficulties related to validity (Mruk, 1999). There is disagreement about whether self-esteem is best viewed as a generalized feeling of worth (writers in the area of self-esteem) or as a set of judgments about competence in various domains (writers in the area of self-concept). An analysis of the range of conceptual and methodological differences is beyond the scope of this paper, but see Mruk (1999) for further discussion.

In this paper we adopt a two-dimensional model of self-esteem (Miller & Moran, 2006; Mruk, 1999; Tafarodi & Milne, 2002). This model reflects the belief that how people feel about themselves is dependent not only on whether they see themselves as worthwhile people who are accepted by others and lead a good life, but, importantly, also involves judgments about competence in a set of domains considered important to them: self-esteem is defined as the integrated sum of self-worth and self-competence. In practice this means that for individuals to have high self-esteem they must feel confident both about their sense of self-worth (‘I am a good person, entitled to care and respect from others’) and their sense of self-competence (‘I am able to meet the challenges I face in life’). According to this model, if individuals have a deficiency in one or other dimension, they may behave in ways which suggest high self-esteem, but such characteristics may in fact reflect what is called pseudo or defensive self-esteem.

Our position on the importance of looking at transitions from a self-esteem perspective is related also to two other ideas which emerge from the literature on self-esteem. One is the notion of significant life events. The work of Epstein (1979) points to three major life events which can significantly affect an individual’s self-esteem: exposure to a new environment; being required to make new responses; and the establishment or loss of significant relationships. Clearly all of these are characteristic of transitions. The final idea which is central to our argument is that of challenges of living (Mruk, 1999). These are obviously consistent with the notion of significant life events, and relate to occasions when an individual’s sense of worth and competence are particularly vulnerable. If a challenge faced relates primarily to performance of some kind, self competence is at stake. If the challenges or threats relate more to relationships and conduct (‘doing the right thing’), self-worth is vulnerable. Of course, in some contexts, there may be challenges to both.

Self-esteem is likely to be able to weather the storms which accompany challenging events of difficult periods. Self-esteem effectively acts as a buffer to help individuals cope with setbacks – both in terms of perceived self-worth and beliefs about their ability to meet life’s new challenges. In essence, those with low self-esteem respond more negatively to experiences of failure while those with higher self-esteem are more likely to persist in the face of difficulties (Tafarodi & Vu, 1997).

There are many factors involved in the development and maintenance of the two dimensions of self-esteem. For example, self-worth is strongly influenced by the quality of relationships with others and the judgments we make about how we are living up to the standards expected of us. Simply stated, if we feel we are doing the ‘right thing’ in terms of behaviour, and are receiving affirming messages from family, friends and significant others, then our sense of worth is likely to be secure. During transition, we see many events which have the potential to influence an individual’s self-worth – and indeed, an important feature is that they often occur concurrently. The reassurance of old relationships is often lost. New and possibly different messages are being received from others about one’s apparent worth. What is considered acceptable conduct in a range of circumstances may have to be learned. The criteria on which such judgments should be based may be unclear – and are often unstated. Similarly, the messages (and the behaviours) of some others may not suggest to the newcomers that they are valued or welcome members of this new community. In many cases, previously close relationship with peers are replaced by multiple, as yet uncertain, relationships.

There are many challenges also to self-competence; that is, an individual’s belief that he or she can cope with the challenges which lie ahead in this new environment. Central to this is the nature of the learning situation. Among the many discontinuities are the significant changes in the nature of teaching and learning experiences. Less-able students, accustomed to work which has been matched to their ability, can be faced with tasks that highlight their lack of understanding or competence. The difference between their performance and that of their peers may become very evident, not just to them, but also to their new peer group. Marsh’s empirical studies into the ‘big-fish-little-pond’ effect (e.g. Marsh et al., 2004; Marsh & Hau, 2003) highlight the importance of social comparisons on self-judgments. Competence is demonstrated in a range of contexts, and social competence may be very much under the microscope also. It is not difficult to appreciate how some individuals might be subject to a range of negative messages in such a new and uncertain environment.
Of course, the majority of individuals experience negative messages at times, both in terms of worth and competence; most cope with them and learn from them. It is, after all, part of the process of maturing in today’s society. However, for some, the weight of such messages impacts upon an already fragile sense of esteem, giving cause for concern. This is where Emotional Intelligence may play a part.

Goleman (1995) identified five 'domains' of Emotional Intelligence, namely knowing your emotions, managing your own emotions, motivating yourself, recognising and understanding other people's emotions, and managing relationships. According to Salovey and Mayer (1990, cited in Adeyemo, 2010) emotional intelligence is the set of abilities that underlie competency in dealing with and acting upon emotion-relevant information and encompasses the ability to perceive, appraise, and express emotion accurately and adaptively; understand emotion and emotional knowledge; use feeling to facilitate cognitive activities and adaptive action; and regulate emotion in oneself and others. Research has suggested that emotional intelligence intervention can enhance college adjustment of university freshmen (Adeyemo, 2010; Porter, 2005; Vela, 2003). According to Adeyemo, this might be due to the acquisition of emotional intelligence skills which are the combination of intrapersonal and interpersonal factors which would help individuals cope with their own and others’ emotions.

We feel that the boundaries are blurred between these three theoretical perspectives. There are overlaps and sometimes cause and effect relationships seem obvious- and sometimes very elusive. This might sit uncomfortably with some. However, this is the debate we would like to generate and engage in. Conceptualizing transitions in a clear way reminds us of what we should value and put an emphasis on. The move to conceptualizing transition as an on-going process of constant change and adaptation is more real to most young people and what they experience. This then signals to us, as professionals, where the work needs to be done. We would argue that the transition support has to be provided according to the needs of the individuals. Something that we can do quite successfully at the University, for example through personal tutor system, peer groups/tutor groups, on-line forums/blogs, etc. These will provide the learners not only with more opportunities to engage and express any issues or problems they might be facing, but also to engage with and support others. Similarly the theoretical perspectives alert us to the psycho-social processes of transitions and help us in understanding what and why something might be working and something might be going wrong. That again gives us as professionals an opportunity to be mindful of this and adjust our practice accordingly. Further research needs to be carried out regarding the role of resilience and emotional intelligence in transitions.

References


Transitions to Higher Education: a case study of students in Initial Teacher Education (ITE)

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Abstract: The aim of this case study is to explore issues relating to Transition into Higher Education for Undergraduate students. The support available to students during this time in their education will also be considered.

The study reports on the process of transition for a year group of BEd (Hons) Primary Students. The transitional period in question will take into account the time before the students arrive at the University (applicant status), the time set aside for the induction of students and the time following this allotted transition period, the first four weeks of the semester. Throughout this time, the University as a whole and more specifically, the BEd Programme provide supportive mechanisms for the students. These resources include visit days, an online introduction to the course through the use of the Virtual Learning Environment and an induction programme tailored to the needs of the students.

The discussion will take into account the changes for the students during this transitional period. This will focus mainly on the changes to the academic expectations and support of the students.

Results have indicated that although the transition has worked well, the students have felt disadvantages in respect of support in academic preparedness and peer/social connections and support. The lack of support through ICT has also been apparent and this appears to be as a consequence of lack of engagement. The impact and implications for use of effective transitional models in Higher Education (HE) will be discussed and explored.

Introduction/Background

Transition issues in Education are well documented (e.g. Lowe and Cook, 2003, McInnis et al, 1995, Krause, 2005). This case study has been carried out to investigate further the issues facing students at the School of Education. The transitional period covers the time from application to the university, induction week, a week designed to facilitate transition and the first four weeks of the semester.

After application to the university, students have partial access to the University Virtual Learning environment (VLE) This allows the potential students to access information about the university, for example information on the campus, accommodation, induction week and University departments. This also has current news, ‘Frequently Asked Questions’ and links to blogs and other social online resources such as Facebook.

Induction Week takes place in the first week of the semester before the timetabled classes start. It is University wide to enable the students to orientate themselves within the university and learn about the different facilities and opportunities available to them. This year, the programme was increased to accommodate cultural information and lifestyle skills. In addition to this is the School of Education Induction Week. This runs within the same week and has specific activities and information for the BEd programme.

The first four weeks of the semester are when classes begin and following this is a ‘reading week’. On the course this year, the structure of the timetables has changed making the first semester intensive for students with most days having contact time between 9.00am-4.30pm.

The aim of this case study is to investigate the three periods of time throughout transition, consider social and academic challenges faced by students and explore the support systems for students.

Theoretical overview

When students enter HE, they will encounter a number of problems (Crabtree et al, 2007). These problems are often highlighted in respect of the issues of retention and attrition in Higher Education (Tinto,
Krause (2005) emphasised the importance for HE institutions to view transition as a holistic process which begins before enrollment and continues beyond graduation. Strategies for support should be in place before enrollment and developed thereafter.

**Before Induction**

Work is required to prepare students for HE. In a study looking at transition from Further Education (FE) to HE staff and students highlighted that lack of pre-entry information and increased expectations of studying at HE level were both major issues (SPAT, 2004). Christie et al (2008) reported loss and dislocation of learning from FE or HE and how this can be best negotiated. Transition can signal the start of a ‘new life’ possible, highlighting the importance of autonomy, not only in the type of education but in making the choice in itself (Reay 2002).

Studies (e.g. Christie et al, 2006, Barron and D’Annunzio-Green, 2009) show that transition can induce a mixture of stress, anticipation and excitement. Differences between expectations and reality, in this case of course content and academic expectations. Yorke (1999) discusses the need for this time to be well prepared before the transition takes place.

ICT is generally considered an integral part of any University course for teaching and support (Biggs, 2003, Krause, 2005). Evidence suggests that ICT is most effective when fully embedded and initially it can disadvantage students in the transition to HE (Turney et al, 2009). It cannot be assumed that students are ICT literate or ‘digital natives’ on entry to HE, especially given the diversity of students and ability levels (Kennedy et al 2008). Studies have demonstrated the impact of web-based induction materials in raising awareness of learning requirements. (Wingate, 2007). The use of the VLE has reported to encourage ‘connectedness’, promoting collaboration between students although the design of this needs to be carefully structured (Thurston, 2005).

**Induction week**

Induction week has been found not to be the solution to an induction into HE (Laing et al, 2005) as there is much information exchange that is ‘dull and ‘passive’ (Edward, 2003). This time in the students’ experience should not be seen as an ‘event’, rather a process (Lowe and Cook, 2003) and this can students cope independently later in the course (Yorke, 1999). Studies from Robert Gordon University (as cited in Edward 2003), indicated that 40% students gave an inadequate induction as a primary reason for leaving the programme.

The structure of the induction week and the styles of learning need to be considered. Some evidence supports effectiveness of active and student centred approaches (Braxton et al, 2008), although this may become a misconception for what may lie ahead in the course. Student-centred induction programmes have been shown to be effective but they are resource intensive (Edward 2003).

Yorke (1999) recommends mentoring and peer support during induction. There should be time for peer interaction. Collaborative activities encourage peer support beyond that which can be provided by tutors. (Lowe and Cook 2003). Students can feel as if they exist in a vacuum in the first few weeks of university. Many students are in the same situation but they many are unaware of this and continue to feel isolated (Baker, 2006). Students who do not socialize are more vulnerable (Mackie 2001) and have been reported to be lower achievers (McInnis et al, 1995, 2001, Wilcox et al 2005). Making friends and a sense of belonging within the university is a predictor of retention (Krause, 2005). Christie et al (2008) observed students setting up ‘study groups’ with peers, this combated feelings of lack of confidence and loneliness.

Coming to university offers challenges, with the social aspect being prevalent in the minds of the new students. Although course friendships and relationships with personal tutors are important, the ‘compatible friends made at university have the biggest impact on student success. Integrating in to the university experience is complex and over attachment to social contacts at home can have a detrimental effect on the students. (Wilcox et al, 2005, Barron D’Annunzio-Green, 2009).

Social opinions made of students by peers in terms of class, age can impact on their relationships. This can be considered in terms of motivation, and who is the ‘right’ person to attend university (Reay, 2005, Christie et al, 2008)

**Starting the BEd Programme**

Yorke (1999) stresses the importance of the first few weeks and the need for a sense of belonging for the students. Longer term supportive programmes, either online or face to face, are more successful.
McInnis (1998) argues the need for distinction between ‘hand-holding’ and developing autonomy within the students. HE institutions use formative assessment, teaching conducive to learning and ‘quality time’ with staff and students although this can again raise the issue of time and availability of staff. (Yorke, 1999)

Christie et al (2008) discuss the culture and ‘learning’ shock of starting a new course in university and many even considered the first semester as a ‘write off’. In the case of students coming from FE, they observed that students ‘secure learning identities’ built up in FE were dislocated and in some terms lost.

In order to facilitate adjustment, students need to be aware of time management and the need for a ‘process of reciprocal expectation building’. Students should be able to communicate within a responsive environment. This should continue beyond the first few weeks in a Vygotskyian scaffolding way (Krause, 2005). Social aspects predominate the first few weeks of the student’s experiences where induction to a ‘new and free environment’ can make parties or money worries more important than working (Yorke 1999, Wilcox et al 2005)

A major challenge is lack of academic skills and this permeates all students, regardless of age, gender and experience (Yorke 1999, Johnson 1997). Working within HE brings new challenges for students coming from previous experiences in learning. The existing skills students may come to university with, are often insufficient (Lowe and Cook 2003). Students come to university and base their learning on previous experiences, which often are not compatible (Crabtree et al, 2007).

There can be a gap between the students’ expectations of the course and the reality of the experience (Gorard et al, Harvey et al 2006). Many students do not have an understanding that independent learning is a major factor in HE. Coming from High School, students are unused to reading and are not familiar with writing extended essays (Crabtree et al, 2007). Coming from FE, students are not familiar with large class settings and being able to ‘decipher the academic standards and expectations. This leads to a lack of self confidence. (Christie et al, 2008)

Active learning as a method of teaching in HE has many benefits for the learning of the students. This is not only an enhancement on the learning of the students but reduces attrition of students. The pedagogical approaches encourage higher order thinking skills and give students more discretionary time to engage in social communities within the university. (Kuh 2008, Braxton et al, 2008).

Research Questions
1. How are students supported before, during and after transition to University?
2. What are the main institutional and peer support mechanisms for students during the transition?
3. What impact does the University VLE have in student transitions?

Sample/ Methodology

The cohort of students entering the BEd programme numbered 114 in total, at the time of the distribution of the questionnaire; this had already dropped to 110. All of the students involved in the study are on the full time course. The sample had no direct entry students as this is not an option onto the course. The sample of students completing the study was 85% female and 15 % male. The majority, 65%, had come to the course straight from high school with 35% having a further education background. 65% are under 21, 34% between the age of 21 and 30 and 6% were aged 31-40. 43% of the sample live within Dundee, the remaining within Scotland.

The study employs a mix of qualititative and quantitative methods to interrogate the experiences of the students. Following the initial period determined by the research timescale, the questionnaire was sent out to all 110 BEd students. The timescale of the questionnaire allowed the students to experience the time periods indicated for the study; the lead up to the course from applicant status, the induction week and the first four weeks of the semester. An online questionnaire was chosen for ease of use and accessibility for all students, they have previously used a similar format of questionnaire so were familiar with the format.

The questionnaire was structured with 12 questions, using a variety of dichotomous, multiple choice and Likert scale questions to gather the quantitative data. Options were given to the respondents to add additional comments, or give information other than the suggested answers. This data as well as the open questions at the end of the questionnaire provided the qualitative data for the project. The questions focused on their opinions of their experiences and support within the university throughout the three stated transition times. They were given an opportunity to share these experiences and suggest improvements.
The questionnaire was available for the students to complete over a 10 day period and throughout this time, two reminder emails were sent. A total of 62 questionnaires were completed (56.4%).

**Findings**

Although this study does not distinguish between the different ages, class or gender of the students, the associated challenges and support issues are clear throughout this diverse group of students.

In general, the expectations of the course at this stage were met or exceeded. Many of the students felt that the course had exceeded their expectation, in terms of the enjoyment and learning but also in terms of the overall workload. Some students saw this as a challenge rather than a negative factor. All of the students were looking forward to starting the course.

*I feel that my expectations of the course have been exceeded, as my experiences so far have been all positive.*

*I think the course has high expectations and this is evident in both the amount of work but it is what I was expecting.*

**Before induction**

Opportunities for students to engage with the university before starting were seen as positive for the majority of the respondents. 67.8% of the sample felt that the information provided after accepting the place and before the induction prepared them well for the university. 90.2% felt the communication between the institution and themselves was good. This was highlighted through the use of letters and arranged visit and open days.

*Yes. The university was always sending informative letters and emails so keep you on track with what was happening.*

None of the students in the study indicated that they had used the online resource in the Virtual Learning Environment (VLE) ‘Applicant Status’ before coming into the University. No students in the study referred to this as a support in the transition to University. In general, there was a large disparity in the results of student’s use of and the support required through ICT at all stages.

**Induction week**

77.4% of the sample agreed or strongly agreed that the Induction week was interesting with 71% indicating that it was useful specifically in terms of the Programme. There were issues highlighted that showed that some of the students found that there was too much on and some of the activities clashed with other university wide activities.

*‘return-to-study’ seminars clashed with BEd timetabling making it very busy and stressful week for me (not studied for 20 years) no time for socializing at all*

This was supported by the fact that there were too many activities planned throughout the week were generic to the whole university and not just to the BEd course. 51.3% felt the planned activities were relevant to them, 56.5% felt there were enough specific activities with 52.9% feeling prepared for the course in general. The students felt there 65.5% feeling there was not a need for more formal learning situations required on the Programme.

*We did have a lot more inputs than others courses and they were useful and enjoyable.*

90.3% of the students felt that the staff were supportive and were available for them throughout the week. The buddy system was less successful with 69.4 feeling this had not been beneficial. This seems to have been down to a lack of need for a buddy, finding the support elsewhere or lack of effectiveness within the buddy system.

*I haven't needed this at all to be honest, so this has not been beneficial for me.*
I didn’t ever meet buddy, had no effect on me. However knowing people further on in the course has.

Also many suggested more informal times with their peers. Because of heavy timetabling and shared activities with other departments with the school, students felt that there was little time to share their experiences with their peers.

*I think I would have melt much more comfortable if I had more informal time with peers in freshers week*

Better induction, more ice breaker type activities at start of the week, keep mixing the groups so you have the chance to meet lots and lots of people

Although this was the case, there were a number of students who found this to have been a helpful time to make connections with others on the course. In addition to this, 70.5% have or already had friends studying at the university and the majority of them found this was a support for the. 66.1 felt their families supported them in the transition.

**Starting the programme**

Although the students indicated that they felt well supported, over half of the students felt there were a number of issues that could have been better. Many wanted less work and more time for independent study, several also felt that some of the inputs were too long and could have been condensed. They felt that a longer ‘adjustment period’ would have been beneficial and for this not to take place all within Induction week.

The first week was a bit confusing but I suppose most courses would be when you first start. It didn't seem to make sense however, now that we are further on it seems to be falling into place.

We were given quite a hectic timetable right from the beginning which could have been cut down slightly to ease us in more

The students indicated a number of challenges in starting the programme. The main factor in these was the academic change to HE. 56 (%) found the workload the biggest challenge, with 69% finding the adjustment to the expectations of HE a challenge. 60% found the academic expectations of study and books hard with 44% also finding the change in the style of teaching a challenge.

Within the first four weeks, all students were able to indicate aspects of the programme that they felt were most enjoyable and beneficial to them. Most students commented on a variety of subjects across the course, but it was the style of the teaching that was the major influence for them. By far, the inclusion of active learning, workshops and interactive engaging activities were the most popular. The range and variety of subjects and classes was a motivating aspect also.

Interactive activities and workshops, as this gives us ideas for future practice and helps us to understand how to go about teaching a certain topic.

The interactivity of the inputs because I don’t think I would enjoy just sitting listening to someone talk all the time and keeps you more focused.

Throughout the first four weeks, the students felt supported but were overwhelmed and apprehensive. The heavy timetabling and workload was cited as the most inhibiting factor within their time period. The inclusion of a reading week in Week 5 was highlighted as a positive aspect of the programme, this allowed students to take time to reflect and consolidate the work.

*....yes but it did take quite a few weeks for me to stop feeling apprehensive.

I didn't expect the course to be so demanding and so I am finding it difficult to get to terms with the workload, etc. I am not used to working independently*
Yes, it was good to have the reading week to consolidate learning and reflect on the first few weeks of university.

Reflecting on previous learning and experiences before embarking on the course, many have found these to have benefitted the students. All commented on the practical experience they had within the classroom or with students to have been a benefit to their work on the course (this is a stipulation for entry on the course). Although the students hadn’t been out on a practical school placement by this point, they were able to use their experience to aid their abilities and understanding within the inputs. Many also commented that they were able to make more sense of experiences for a theoretical perspective. Students coming in from the FE setting, in particular the access courses specific to primary teaching particularly useful and relevant, with some even feeling they were repeating some of the work done.

Expected to be doing much more reading and independent study. A little disappointed that we need to be spoon fed so much of the course content. I feel this is a backward step compared to the work required & expected in my HNC qualification.

The time of the questionnaire coincided with information on the first two assignments for the end of the semester. This also gave a lot of anxiety to the students at this early stage (2 months before submission) and this was reflected in the responses. Many felt they needed more guidance in this area earlier rather than closer to the submission date.

Having the input on academic writing earlier in the year would have been good.

Give us more inputs towards the start of the course regarding how to write assignments. For example, what is expected, structure and referencing

One of the main areas of discussion linked with the workload and reflected the amount of independent study time. It was clear from student responses that they wanted less directed time, although previous comments indicated their inability to use this independent time.

Challenge us to get on with it. Timetable less full to enable further reading to take place which will ensure coherence through a depth of subject knowledge.

More space in timetable for independent study or to carry out allocated group work.

Having more self study time within university hours/between classes. Time to reflect and digest the learning as it is all very intense and I sometimes find it difficult going from one intense lecture to the next and having to keep switched on and process all I am learning.

Many felt the use of the VLE was slow, unhelpful and awkward. Others felt that time was wasted in ICT inductions as they knew how to use the software; others felt that they needed more support.

A lesson on how to use the VLE as ICT skills do not come easily to some people.

The course is stretching me as I expected that it would, not having had an academic challenge in a while I was well aware that it would take time to get back into a mindset of studying. I underestimated the level of ICT to be used within the course.

An area called the ‘BEd Forum’ was set up on the VLE to provide a support for all students in terms of information pertaining to the course and this has been quite well received. It is, however clear that this has not been properly accessed as the students still required information on aspects of this. Some even commented that it was too much work to access information independently.

They expect you to look at the announcements on blackboard for every module, everyday. They should email if they want us to bring something or read something
more time to get to know blackboard and how it is used to put inputs on - it is still a bit confusing, because everyone uses it a slightly different way.

Discussion

Many of the finding of this case study reflect the previous work that has been done in this area. This is most evident in terms of the student’s lack of academic preparedness (Yorke 1999, Johnson 1997). It is clear from the data that most students, regardless of their previous experiences have found this challenging. The main reason for this has been the high workload of directed time within the university. This has equally impacted on their ability to develop relationships with peers and on their time management in general. This is consistent with the work of McInnis (1998) and the distinction between ‘hand-holding’ and developing autonomy within the students in their work. Although the School prides itself in the student contact and support given through this, it has, in fact, disadvantaged the students and has disabled their abilities in independent study more that it has encouraged it. This further facilitates the ‘learned dependence’ (Yorke, 2003) rather than enabling the autonomy required for success within HE (Railton and Watson, 2005)

Opportunities for social collaboration with peers have also been hindered by the intense workload. Although students have recognized the need to make friends and work with peers, they have not been able to do this as much as they would have liked. The university needs to provide more guidance for students to do this, both in social and academic terms (Christie et al, 2008). The buddy system has not provided the support required but students have indicated the need for time with their peers. Evidence tell us that the students will benefit from this time with friends throughout their time within university (McInnis, 1995, Krause 2005, Wilcox et al , 2005) and this should be what we focus on as a major support mechanism.

The VLE and ICT issues in general have highlighted a number of problems. The diverse range of abilities of students (Kennedy et al 2008) has meant many students feel dissatisfied and frustrated with the system. The expectation that students will use this and see this as a useful support has been superseded by the support they seek from peers and face to face contact. Although other studies have indicated that web-based materials can support students with the academic requirements in University (Wingate 2007). In this case, it seems more work has to be done to embed this further so the students can use this as a support, in addition to the face to face support, not in place of it. Turney et al (2009) who also recognize this and further warns that students can become more strategic in their learning approach, to the detriment of their learning, through lack of attendance. In addition to this, the importance of a clear structure and planning within the use of the VLE would increase the collaboration of students within this (Thurston, 2005)

The nature of this research in the form of this case study has highlighted a number of limitations of this work. These findings are particular to this course and this particular year group of students. Because of changes to the timetabling on the programme this year, the students have experienced a higher, more intense workload than usual. The structure of Induction week was different to previous years with a larger number of generic university activities. This was very well received and beneficial, and did not impact of the specific activities of the programme and indeed was better able to offer the students more appropriate activities. These factors need to be taken into account when considering the findings.

Conclusions/ implications

This has been a useful study, not only for the BEd Programme but for all programmes within the university and beyond. It is important to realize that although the support available on the VLE is valuable, this may not always be most relevant at the time of transition, but after when the students have more understanding. The school recognizes the support for students as an important issue; this has been highlighted in previous year student evaluations. Given the nature of this degree, it could be viewed that there is more emphasis on this than in other courses for less vocational professions. It is important that the transitional stages are fully recognized within the institution in order that students are fully supported appropriately at each stage.

This study will also benefit the next cohort of the BEd and the current year groups transitions for year to year. Many of the same issues relating to academic expectations will apply as the course develops and more demands are placed on the students.
The follow up to this study will concentrate of the social and academic aspects of the transition into the course. Focus group discussions will take place with students to further interrogate these ideas and look at some of the issues in more detail than can be elicited for the questionnaire. The main implications are as follows,

**Academic Issues.**
- The students need more preparation for academic work. This encompasses the expectations of learning in higher education, the ability to work independently and the structure of work within the university. Moves towards more independence and autonomy in work with and without peer support should be considered. The structure and planning of the student timetable will strongly figure in this.

**Social/Peer links**
- It is clear that there need to be more opportunities for informal and formal work with peers on the course. This will support students in a social sense and also within their work. Students will need mechanisms to further support this kind of work to enable them to make the most use of this.

**Use of online materials**
- The School of Education needs to develop the effectiveness and use of the online support materials available for students. These need to be made more apparent as a supportive feature before, during and after the transition into HE. Considerations need to be made whether investment in the VLE would be most effective after the induction period.

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Distance Additional Education at School “Photon” as means of Developing Interest in Physics

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Analysing additional education much attention has been given to its general activities and results by various researchers. However, no research has been made on influence of distance-additional education in natural sciences on developing schoolchildren’s interest in subject so far. This article deals with distance-additional education at junior physicists’ school “Photon”. “Photon” was founded in 1973 at Siauliai University, Faculty of Natural Sciences, Department of Physics. Every year 800 – 900 9th form schoolchildren from various secondary schools in Lithuania enter this Junior Physicists’ School. The studies last for four years. The pupils have to solve 60 problems in different ways every year. Part of solved problems they send to the “PHOTON” Council in correspondent way by post, another part – solve in e-way by using internet. “PHOTON” Council sends them the booklets of the correct solutions. “Photon” school is distance-additional educational institution, so schoolchildren continue their studies there until their needs and interests are satisfied. 17600 schoolchildren have completed their studies at “Photon” school. The aims of this article are: to present the tasks, principles and activities of distance-additional education junior physicists’ school “Photon”; to research schoolchildren’s learning motivation and needs for additional education; to analyse the developing of interest in physics.

Methods of research: analysis of cumulate experience, survey of schoolchildren and physics teachers, systemic, comparative analysis. The research has been carried out in 2003 – 2008 year. 1530 young physicists school “Photon” – schoolchildren of 9th – 12th forms and 140 teachers of physics from the various schools of Lithuania have been involved in the research. The received data was processed using statistical research methods. For analysis of the research data software SPSS (Statistical Package for Social Sciences) has been used.

Research has showed, that „Photon“ school is a good form of deepening and expanding knowledge and raising interest in Natural sciences. The main factors defining preferential studies at “Photon” school are needs for knowledge, self – development and novelties. Those factors are directly connected with future plans, ways of overcoming difficulties and opportunities to get good results. “Photon” trainees are highly self – motivated, their need for knowledge and novelty is very strong and long – term. A 36 year activity of “Photon” school, active schoolchildren’s and teachers’ participation have revealed significance of its existence educating harmonious and creative personalities.
Exploring virtual mobility: some experiences in a shared virtual campus

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Abstract: The development of the European Higher Education Area (EHEA) suggests the convenience of exploring new ways of teaching and learning, emphasizing the role of Information and Communication Technologies (ICT), student mobility and university networks.

In this context, virtual campuses provide the opportunity of efficiently implement ICT and cooperative university networks. In fact, this was the aim of the G-9 Shared Virtual Campus developed in 1999 by nine Spanish public Universities.

In this paper we present our ten years e-learning experiences in this virtual campus, combining teachers’ and students’ points of view. More specifically, we describe the teaching-learning resources, mainly emphasizing the role developed by the free software, the communication tools, the teamwork and the evaluation system.

We also summarize some facts and figures, related both to academic indicators and online surveys, showing the potential of ICT and virtual mobility in the framework of the EHEA.

Virtual mobility in the EHEA

The Bologna Process, launched in 1999, was meant to strengthen the competitiveness and attractiveness of European higher education and to foster student mobility and employability through the introduction of a system based on undergraduate and postgraduate studies with easily readable programs and degrees. In this context, mobility can be considered both a means and an end, since it is one of the overall goals but can also be looked at in terms of instruments (European Commission, 2009).

Mobility is linked to the increasing internationalization of higher education and it rests on cooperation and partnership. Nevertheless, some main mobility obstacles must be faced, such as financial restraints, administrative recognition barriers and language diversity.

In this context, virtual mobility can be considered as a new strategic tool in the European convergence process, since it provides many advantages also solving some of the previously identified problems. Thus, the E-learning Programme launched by the European Commission (http://www.elearningeuropa.info) seeks the effective integration of Information and Communication Technologies (ICT) in education systems, including some specific actions related to the development of virtual campuses and the virtual mobility.

The existing virtual networks can be very helpful in the development of higher level institutional co-operation, through the dissemination of experiences and good practice. Focusing on the Spanish context, four different virtual campuses exist, including three university networks (ADA-Madrid, Intercampus and the G-9 Shared Virtual Campus) and also a cooperative alliance involving both public and private organizations. The main characteristics of these initiatives are summarized in table 1.
Table 1: Spanish Virtual Networks.

<table>
<thead>
<tr>
<th>ADA-Madrid</th>
<th>Intercampus</th>
<th>G-9 Virtual Network</th>
<th>IUP</th>
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<tbody>
<tr>
<td>46 subjects</td>
<td>49 subjects</td>
<td>89 subjects</td>
<td>9 online Masters</td>
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<td></td>
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<td>1 online Master</td>
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The experiences described in this paper are referred to the G-9 Shared Virtual Campus, created in 1999 and currently involving nine Spanish public universities located in different regions. In fact, the geographical diversity is one of the most outstanding characteristic of this initiative, while ADA-Madrid and Intercampus are respectively located in Madrid and Catalonia.

The G-9 Shared Virtual Campus has faced several legal, academic, technical and administrative challenges in order to guarantee the full academic recognition of the credits coursed at each of the involved universities. Once these difficulties have been solved, G-9 virtual activities increased considerably, currently including more than 4000 students following 89 subjects organized in different itineraries (e-business, ICT and e-learning, environment and sustainable development, education, health and social development). A more detailed description of the G-9 Shared Virtual Campus experiences can be found, amongst others, in Salinas et al. (2002) and López & Pérez (2005).

Opinions of students involved in the G-9 Shared Virtual Campus are yearly collected, showing that they are mainly motivated by the flexibility of e-learning and consider this experience very satisfactory. Teachers and administrative staff have also been interviewed with positive results, and the G-9 universities must now face some new challenges in order to adapt this virtual network to the new European Higher Education Area (EHEA).

**An online learning experience: Economic Data Analysis**

*Economic Data Analysis* is one of the first subjects included in the G-9 Shared Virtual Campus. In fact, this free-election matter was launched in the course 1999/2000 and it currently involves more than 500 students. From its very beginning, this subject was implemented in AulaNet, the virtual campus of the University of Oviedo (www.aulanet.uniovi.es), which initially was a self-developed platform, then moving to WebCT and finally to Moodle.

The teaching-learning process was designed considering the students as users of the statistical information and trying to make an efficient use of Information and Communication Technologies (ICT) and the free software ADE+. With this aim the proposed syllabus contains a three-module structure, following the sequence of the origin, treatment and dissemination of statistics.

Our learning materials have gradually changed according to the available online tools and students’ opinions. Thus, during the initial years a first approach to each item was provided by a “virtual lesson”, designed as a twelve-minute multimedia presentation, offering an overview of its main contents, but after some courses this option has been replaced by new online materials (presentations, interactive questions, statistical links, glossaries of terms, self-assessments) ... which are developed with free software. Furthermore, students can access a wide variety of online communication facilities, including e-mail, forum and wiki.

In terms of learning outcomes, *Economic Data Analysis* mainly focuses on instrumental competences such as *Information management skills, Problem solving, Capacity for analysis and synthesis* and *Computing skills*. Nevertheless, some interpersonal competences such as *Critical abilities* or *Teamwork* are also encouraged, and with this aim the course includes a “Statistical Mistakes” section, showing some historical anecdotes and risks of statistical analysis and several interactive open questions, suggesting a further debate.
Following the “learning by doing” approach, the practical contents of *Economic Data Analysis* are based on ADE+, which is a software specifically designed for teaching purposes. This application has been developed and registered by R. Pérez & A.J. López (1996) and it is available from the AulaNet website: http://www.aulanet.uniovi.es/ade+.

As it is shown in figure 1, ADE+ is organized in three different areas: a text editor, a spreadsheet-like data table and an object container. This structure allows a comprehensive treatment of the statistical information, including data collection, graphical representations, statistical analysis and interpretation of results.

According to our experience, which has been described in Pérez & López (2003) and López & Pérez (2006), ADE+ results to be a suitable tool for educational purposes, since it supports interactive data analysis, allowing the students to build and analyze their data sets and solving some of the limitations of another statistical packages and spreadsheets.

**Figure 1: The ADE+ Software.**

**Communication facilities and Evaluation**

Although there is a general agreement about the e-learning potential, some risks have also been detected, mainly referring to the isolation of students. Therefore, the success of an online course depends to a great extent on its communication facilities. Furthermore, the evaluation procedure plays an outstanding role and must be coherent with the whole teaching-learning process.

In the case of our course *Economic Data Analysis* communication is strongly encouraged and therefore tutorials are provided in several ways, such as e-mail and forum. Thus, online assistance connects students with their tutors, providing quick answers (within 24 hours) to their questions and comments.

Forums are intensively used for debates regarding statistical mistakes, news, survey errors, graphical representations, …, trying to encourage students’ participation. In fact, during the last years some new forums have been added regarding the Frequently Asked Questions (FAQ) and the most common mistakes while using ADE+.

The previously described tools are based on asynchronous communication, allowing a flexible participation of students any time they have a question. Furthermore, students have access to chats,
allowing synchronous discussion with classmates under the coordination of a teacher, and for those preferring a face-to-face debate, video-conference tutorials are also available.

According to our experience, students attach great value to the access to personalized information. Therefore, confidential reports are available, providing students progress indicators (such as assessment results) and specific comments about their personal work.

The evaluation system of Economic Data Analysis has been designed trying to achieve coherence with the whole teaching-learning process. More specifically, the final grades are obtained according to the following criteria:

- Self-assessments (40%)
- Personal work with ADE+ (40%)
- Online participation (20%)

As expected, this evaluation system lead to satisfactory results as it will be shown in the next section.

**Facts and Figures**

Our teaching-learning experience with the subject Economic Data Analysis has provided some useful information about academic results and students’ opinions. First, as it can be seen in Figure 2, the number of students shows an increasing path both for the University of Oviedo and the other institutions included in the G-9 Shared Virtual Campus.

![Figure 2: Evolution of Students in Economic Data Analysis.](image)

It must be stressed that the positive evolution of this subject refers not only to the increasing number of enrolled students but also, and more important, to their rate of participation in the course, which could be interpreted as the complementary of the percentage of desertion. This fact is quite interesting, since desertion has been identified as one of the most outstanding risks of the e-learning experiences and in the case of Economic Data Analysis this rate has been reduced to an 11%.

In order to collect the opinions of all the agents involved in the e-learning process, the coordinators of the G-9 Shared Virtual Campus have developed a wide variety of tools, including online surveys for students and teachers and also specific interviews for those students who have given up their virtual experiences.

According to their answers to online surveys, our students choose Economic Data Analysis following advices of other students (52%), and mainly attend e-learning from home (70%). They also consider than this subject requires a similar effort than another free-election options and the level of satisfaction with different aspects of the teaching-learning process is quite satisfactory, as summarized in table 2.
Table 2: Economic Data Analysis: Level of satisfaction according to online surveys

<table>
<thead>
<tr>
<th></th>
<th>Very High</th>
<th>High</th>
<th>Intermediate</th>
<th>Low</th>
<th>Very Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Campus Facilities</td>
<td>18,8%</td>
<td>61,3%</td>
<td>12,5%</td>
<td>6,9%</td>
<td>0,5%</td>
</tr>
<tr>
<td>Economic Data Analysis Contents</td>
<td>16,5%</td>
<td>58,2%</td>
<td>25,3%</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Software ADE+</td>
<td>33,1%</td>
<td>38,1%</td>
<td>24,4%</td>
<td>3,1%</td>
<td>1,3%</td>
</tr>
<tr>
<td>Professors</td>
<td>15,9%</td>
<td>61,1%</td>
<td>21,7%</td>
<td>1,3%</td>
<td>-----</td>
</tr>
<tr>
<td>Students</td>
<td>26,6%</td>
<td>43,0%</td>
<td>28,5%</td>
<td>1,9%</td>
<td>-----</td>
</tr>
<tr>
<td>Evaluation system</td>
<td>19,6%</td>
<td>59,5%</td>
<td>16,5%</td>
<td>4,4%</td>
<td>-----</td>
</tr>
<tr>
<td>E-learning experience</td>
<td>27,5%</td>
<td>68,8%</td>
<td>3,1%</td>
<td>0,6%</td>
<td>-----</td>
</tr>
</tbody>
</table>

In general terms, the best scores are related to the most participative tools, such as interactive questions, self-assessments, or practical contents solved with ADE+. Although our students also appreciate the personal assistance and tutorials, the use of communication tools (chat, forum, video-conference, ...) has obtained intermediate average scores with high relative dispersion. This lack of representativeness shows the existence of two different groups of students with active and passive behaviors.

It is convenient to stress that technical difficulties, considered as the most negative aspect at the beginning of our experience, have been solved to a great extent. Furthermore, once students became familiar with e-learning methods and experienced their advantages, most of them are highly interested in further e-learning experiences.

Regarding academic indicators, figure 3 shows the evolution of the efficiency rate, which is defined as the proportion of registered students passing the subject Economic Data Analysis in the considered academic year. As we have previously said, this satisfactory trend is a consequence of both the reduction in the percentage of desertion and the success of the evaluation criteria. Furthermore, no significant differences have been found among students from different universities of the G-9 Group.

![Figure 3: Evolution of Economic Data Analysis Efficiency Rate](image)

**Concluding remarks**
Ten years after the Bologna declaration and the implementation of the G-9 Shared Virtual Campus, it seems clear that the development of the European Higher Education Area (EHEA) should also include a virtual dimension. In fact, some existing experiences show that virtual mobility can be a helpful tool in the European convergence process.

Economic Data Analysis has provided us the opportunity to experience new teaching-learning methods, mainly based on e-learning tools and the intensive use of the free software ADE+, leading to satisfactory results. Thus, according to online surveys, our students are quite satisfied with this e-learning experience, especially with the most interactive tools, communication facilities and tutorials.

Furthermore, the academic indicators show a positive evolution, since the percentage of desertion has gradually decreased and the evaluation criteria (including personal work with ADE+, self-assessments and online participation) lead to satisfactory figures.

In this context, new uncertainties and risks must be faced during the coming years, regarding the adaptation of this subject to the new European degrees. We are confident that the G-9 universities would face this challenge, successfully adapting their e-learning experiences to the new European Higher Education Area.

References


CRUE (several years), UNIVERSITIC, Las Tecnologías de la Información y las Comunicaciones en el Sistema Universitario Español, www.crue.org.


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We would like to acknowledge the University of Oviedo for previous support through Innovation Projects and also our colleagues of the G-9 Shared Virtual Campus for sharing their interesting experiences during these years.
An Environment of Learning for e-learners: Good Practice and Barriers

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Abstract: In teaching the skills curricula at UEL, it appeared that there was little in the way of labs where students could experiment with variables which affect the learning environment. While putting together a pilot for an environment of learning lab, wherein to experiment with variables such as sound, temperature, lighting and even arrangements of furniture, it appeared that what we were doing could have tremendous benefit for our distance learners working in an e-learning environment. To begin make that knowledge accessible, we have coded some of the good practice from the pilot in binary with barriers to life-long learning, focusing on transition. This paper presents our findings and plans for how these might be operationalised to benefit mixed cohorts of new and existing e-learning students. The goal is to find those barriers to life-long learning by which students unknowingly allow their performance to be limited.

Keywords: e-learning, skills, environment of learning, transition, life-long learning.

Introduction

Life-long learning requires innovation in practice to keep pace with technological and social realities. While students may want to return to their studies, or continue with Higher Education, after a certain period of absence, the very environment of the interaction may prove the greatest barrier. The most common examples would be students that attempt courses where the primary learning materials are distributed via a virtual learning environment (VLE) like WebCT or Blackboard. These students then face a duality in learning how to learn, while attempting to keep pace with the learning of other students on their modules.

Even good students may not be fully aware to the degree in which their learning environment directly affects their performance. For example, riding a bicycle. Many of us know how to ride a bike and would feel comfortable getting on a bike and peddling away. However, in observing cyclists in London, it becomes readily apparent that many are not aware of how to adjust the seat properly for their height. As such, they inadvertently impair their performance, and can even expose themselves to the greater risk of early muscle fatigue and ultimately injury. The adjustment of the bicycle seat clearly illustrates how one may not have the complete knowledge necessary to benefit from the tool, although they certainly may use it regularly. The gap in knowledge need not be limited to the less advanced rider. More advanced riders may compensate.

Sometimes, people continue activities simply because they work, thus they are in a habit of doing it that way, because that is how they have always done and would need to pay an opportunity cost if they wished to change. They maintain a status quo of impaired performance due to a lack of knowledge. To gain the knowledge, they would need a source.

Some of the skills required for accessing materials in a VLE while having the appearance of being ubiquitous are not. For the e-learner, the acquisition of such skills may be monitored to some degree through problem based learning (PBL) tasks. Yet, what about the knowledge for the e-learner to manage the environment of learning? In the classroom, variables such as temperature and light may be managed to some degree by the tutor. However, in an e-learning environment where the tutor and the student need not be physically present in the same room, if the student is expected to achieve an optimal level of performance, the student then needs to be empowered with the knowledge to manage their learning environment.
As Valcke and DeWewer (2006) observe, few studies define the precise role of Information Communication Technologies (ICT) in education (p.40). While an emerging body of research addresses the lacuna Valcke and DeWeaver identified, less research exists to identify the inherent problems learners face as part of their environment. In part this work was inspired by working with students, wherein a large portion is comprised of adults returning to education. The median age would be approximately 28 years. Due to family and work responsibilities, most commute, and a majority use the underground system. Within this cohort an interesting case emerged, where those students who were taking the tube regularly also had the hardest time in morning tests of their concentration. However, there were some notable exceptions, where students had long-journeys and did not experience the same level of fatigue or problems with their concentration.

A correlation appeared between those students with better level of concentration and those who had some sort of noise isolating headphones. The inverse also seemed to hold that those students who did not have any protection for their ears from the noise appeared to have the most trouble with concentration. The effect of noise on workers in industrial settings has been explored (Cheremisinoff, P. and Ellerbusch, F., 1982; Kryter, K. 1985). Where the noise is of a repetitive mechanical nature, the fatiguing effect appears to correlate both to the decibel level and the duration of exposure.

A survey of students revealed that they experience noise in many different ways throughout the day. While it could be the loudness of the underground, equally it can be noise from an overhead projector in the classroom, or a computer on which they are working. Similarly, our e-learners often need to work at home where a noisy computer fan could be present. Our initial results proved consistent with those of Moreno and Mayer (2000) where adjunct noise overloaded the capacity for learning. Since noise appeared an important variable affecting our students, it began a larger enquiry into the way in which the environment affects our ability to learn.

The following presents some findings from the environment of learning lab pilot we have been working on, along with what may be best described as the state of our practice. As caveat emptor, while it may be construed as best practice, these prove very tentative results, and should be used as the basis for further enquiry, and to stimulate the discourse and investigation into the ways in which our environment affects the ability of students to learn. The presentation concentrates on two specific areas of temperature and light.

Temperature

In our experience the temperature of the student can directly affect their ability to concentrate and complete tasks. In the classroom, by intentionally increasing the temperature and making a small capture with a web cam, when played back students can see how many were dozing off. Doing the same thing with the air conditioning on or a decreased room temperature can contrast significantly by showing a higher level of alertness. Students may also be asked to remove excess clothing, such as scarves and coats in which they may be dressed due to inclement weather conditions.

From our work, there appears a baseline optimal temperature for cognition and the rendering of tasks correctly which rests between 20 to 21 degrees Celsius. As the temperature climbs higher, students tend to lose focus, and become sleepy. Inversely, as the temperature decreases, a perceptual increase in fidgeting appears. Moreover, after a certain point of decreasing temperature, the ability to concentrate also significantly decreased. When asked, students say that when it gets to cold they also cannot focus.

Interestingly, the tolerance of being able to concentrate appears to be much smaller for increasing temperatures rather than decreasing temperatures. In other words, students find it harder to concentrate and work as it gets slightly warmer.

In e-learning environments, while one cannot feel the temperature in which the students are studying, it is possible to create tasks where they should experience different temperatures and the effects these have on their learning. Tasks can include getting everyone together for a video conference wearing a sweater, and at an agreed point ask every to remove the sweater and sit in a t-shirt. Students can be asked to wear the sweater which best represents x, y, z where these variables can be any learning outcome such as customary dress, even just the colour and pattern. For those in a particularly warm or cool room, the effects will be more pronounced. Everyone, and especially the tutors should be looking for the points of change. While they may be harder to detect via video stream they nevertheless should be present.
Light
Light influences the ability to learn in at least four dimensions: Luminance

Total luminance of the room
By decreasing the luminance in the room, the eyes may be fatigued quickly by working in high contrast environments, for example of bright white backgrounds with black letters. The worst case scenario appears with projection screens in darkened classrooms. Our analysis indicates that eye fatigue links to the level of concentration. Although, the effect may be soporific, hypnotic or irritating, in each case, the students have left an optimal state of learning due to the level of the light.

To redress the issue of luminance, two basic solutions derived from equalizing the level of light entering the eye may be applied. The first makes the letters white and the background dark. Note that the background is usually not made black. Rather, in versions of Microsoft Word from 97 to 2003, it was possible to select from the menu tools options general Blue background, white text. The blue applied allows working in a much lower light level while diminishing the eye fatigue. The second solution increases the level of light in the room. Note that where the light is bounced to the ceiling and is not beamed down, the light levels may be increased further without creating another problem.

Distance learners typically do not work on a projection screens. Rather they will be working on a monitor or TFT flat screen. Yet, the problem of luminance and eye fatigue still applies. Students may be made aware of the problem by having them work for a period on the screen with the lights of the room out. Likewise, if they will be working late in the evening, and be feeling tired, they can increase the level of the light to become more alert and improve their level of concentration.

Location of the light source
Closely related to the perceived level of luminance is the location of the light source. The light may be in the field of the view of the learner, and therefore be causing eye strain. Especially in evening situations or where no natural light will be present in the room, lights in the field of view cause squinting. The tightening of the facial muscles brings the onset of fatigue more quickly. The worst case of location could be the monitor which sits in front of a sunny window. There the eyes must compete with much higher level of contrast. While the location of a desk in front of a window for writing on paper may be optimal, working on a computer screen that is backlit proves perfectly detrimental.

The bright beaming light from above proves troublesome. A bright overhead light even when not in the field of vision, can create screen glare, and even a brightness on the eyebrows which leads to facial and eye strain. In these cases, a simple solution may be to have students trying wearing a baseball cap. Thereby, they can increase the overall level of light in the room, while not having it in their field of vision.

Color of Light
Many studies have linked color to learning (NCEF, 2009). While we acknowledge that the color of walls can be important, we are most interested in the color of the light. Traditional lighting installations such as lamps and overheads are often to the lay person said to be white. However, for a photographer a tungsten bulb produces a very different color of light than that of a fluorescent or halogen bulb. While the lay person may not be able to articulate the differences in the same way as the photographer, their eyes can feel a difference. A simple experiment that can be done with the student is to have them take a sheet of white printer or Xerox paper, and the to look at it while putting it under various light sources. They can also perceive a discernable difference in their ability to write and work under the halogen and tungsten bulbs as opposed to the fluorescent bulbs. With the European Union (EU) pushing the move to energy saving bulbs the recourse for choice appears to be diminishing in degrees of freedom as to the alternatives available. The mainstream energy saving bulbs tend to be encapsulated fluorescent bulbs. Since the bulbs are much cooler in temperature as well as the color of light (a blue white light), they can be put in translucent shades made of paper or plastic to slightly mitigate and soften the cold whiteness.
Conclusion

Since students returning to study often have environment which has not been optimized for learning, and is rather that which is available, the first step is creating an awareness in the learner. The second step is to make sure that the students have simple tasks which lead them to creating a better learning environment for themselves. As can be seen from our work, for the e-learner, variables such as light and temperature are of critical importance. Since many study late in the evenings due to other commitments very few work in natural light. Thus, issues of luminance, location of source and color are all very important. Equally, being in the evening, it is critical to maintain an alert state.

The future of the research will head in the direction of developing pedagogies both for the experiments in the lab as well as the dissemination of the results and findings. At present, students have been learning through mini-experiences, where we bring in some equipment for them to play with. In the future, we would like to create activities that make the students self-sufficient as well as able to experiment and want to find an optimal environment for their learning.

References


Guide for industrial noise control.


Collaborative Global Project Management in Second Life: Lessons Learned and Future Research Directions

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Abstract: The paper shows how we used virtual meeting spaces and technologies in the virtual world Second Life to enable role-play simulations of global collaboration during engineering work. Using a detailed episode from the class, we show how the virtual meeting spaces and virtual technologies within these spaces allowed students to exchange virtual boundary objects fluidly and how students were able to use spatial gestures to support their communication with each other and with the boundary objects. In this way we provide first empirical evidence that virtual worlds and virtual tools can overcome problems that traditional teaching tools, such as group support decision systems offer with realistically simulating “real world” cultural encounters.

Introduction

In engineering based industries people from different cultures work together on projects. Firms, therefore, demand that students acquire competencies about global collaboration as part of their university education. Universities react to this need by offering classes that center around the teaching of theoretical concepts that are linked to historical cases. Due to time and resource restrictions that would enable life “real world” global encounters in educational contexts and due to the inadequacy of many technologies that fail to simulate “real world” global encounters remotely, it is not easily possible for educators to offer students the possibility to test these concepts themselves on class projects. Without such class projects to support action-based learning, it is questionable whether students really acquire the necessary competencies to become valuable members of global project teams.

Virtual worlds promise universities a cost efficient and practical way to offer their students the possibility for action-based learning of global collaboration competencies. However, at the moment, the educational community still lacks sufficient knowledge about the behavior of students in virtual space and how to develop virtual worlds that enable students to work productively on collaboration projects accounting for the students’ behavior and that, at the same time, realistically simulate face-to-face encounters. In turn, little help is available for teachers who plan to develop global collaboration projects for their classes. To overcome this knowledge gap, this paper presents insights from a global collaboration project in which students from Finland, India, the Netherlands, and the USA collaboratively developed a project plan using a custom tailored meeting environment in the Second Life (SL) virtual world. The paper describes the meeting environment from a technical and functional perspective, and analyzes the behavior of the students within this environment during the project. Based on the findings from this case, the paper then presents future research directions.

Action Based Learning of Multi-Cultural Project Management Collaboration

Traditionally, educators based their intercultural education classes and training programs on two underlying learning theories: Behavioral approaches and cognitive scheme approaches (Weber 2005). Teachers who applied the behavioral approach based their teaching on the assumption that it is possible to learn multi-cultural project collaboration by imitating the successful behavior of others. These teachers gather experiences, critical incidents, and specific occurrences and teach multi-cultural collaboration by using these historical examples. In terms of successful learning, behavioral approaches often fail as they do not specifically consider the varying goals and motives of participants of inter-cultural encounters (Chao
practically not feasible in the boundaries of most higher education institutes. On the other hand, simulating because group decision support systems lack two major characteristics of face-to-face encounters. First, students were able to meaningfully work with epistemic boundary objects and how well they were able to gestures while doing so. Before the paper discusses these findings, the next chapter, first describes the virtual world meeting spaces and the general global collaboration class project in detail.

The advancement of Virtual Worlds has the potential to overcome these practical problems. However, many Virtual World simulation environments for global collaborative project management activities still lack a close resemblance of realistic practical situations. So far it is not clear how Virtual World developers can design virtual tools that allow for the use of boundary objects during virtual meetings, in particular, how to enable meeting participants to work with fluid boundary objects. Further, we have little knowledge about how we can enable meeting participants to use spatial gestures during their interaction with each other and boundary objects in the context of virtual meeting spaces. To learn more about how to develop meaningful virtual meeting spaces that are equipped with virtual tools that support the meaningful exchange of boundary objects during multi-cultural collaboration in Virtual Worlds, we conduct ongoing research of how to design meeting spaces in the virtual world Second Life (SL) to enable global collaborative project work. In particular, we develop and equip meeting spaces with a number of virtual tools to allow meeting participants to share boundary objects and to enable them to use spatial gestures. We then used, but also tested these meeting spaces, by teaching a global collaboration engineering university class. This paper will analyze first outcomes of our teaching exercise in light of how well students were able to meaningfully work with epistemic boundary objects and how well they were able to use spatial gestures while doing so. Before the paper discusses these findings, the next chapter, first describes the virtual world meeting spaces and the general global collaboration class project in detail.
Virtual Multi-Cultural Collaboration Education in Second Life

In 2009, the Helsinki University of Technology (TKK) in Espoo, Finland, the University of Twente in Enschede (UTwente), The Netherlands, the Columbia University (CU) in New York, USA, and the India Institute of Technology in Madras (IIT Madras) started the Global Virtual Collaboration Project (GVCP) course. In the course, the students work together in global teams to solve a real-life civil engineering business project scheduling and management problem. The global teams consisted of students from the Netherlands, India, and the USA who each had a different project responsibility. The task of the students from India was to develop a three dimensional (3D) computer model of the construction project and to plan a schedule for the necessary construction activities to build the civil engineering structure. The students from the USA were responsible to design a project team to carry out and manage the planned construction work. Finally, the team from the Netherlands was responsible to estimate and control the costs involved in constructing the project. The GVCP team chose for these different tasks because they allowed the members of each group from the same country to work together on a specific task, while at the same time each of the different country specific groups had to regularly exchange information as each of the sub-tasks strongly influenced each other. The task of the Finish team was different in that the Finish students were responsible to facilitate some of the teams to enable the GVCP to learn about the effects of facilitation during virtual meetings. In summary, the GVCP team designed the class to allow students to acquire competencies for collaborating virtually, using virtual applications, coordinating virtual team work, and offer the students the possibility to discover and explore cultural differences.

The class used a special GVCP class’ house in Second Life which hosts an auditorium, where the students can meet course staff or make contacts across groups, and dedicated virtual meeting rooms for each student group. As a class requirement, students had to conduct all global team communication within GVCP class house. The use of other tools, such as e-mail, was prohibited. To enable the groups to share fluid boundary objects the GVCP team equipped each of the rooms with a number of virtual technologies that the Global Virtual Education (GloVEd) project group at TKK developed. Each team room was equipped with a team wall that allowed students to display and share images during meetings in a dynamic manner. The students could use the team wall to share their calendars, broadcasts each other’s computer desktops, or as a virtual whiteboard. The three rooms of the groups that Finish students facilitated were also equipped with a process screen. The facilitator students used these process screens to assist them with their facilitating tasks. The process screen, for example, allowed the facilitators to present process charts that describe the team’s collaboration process and the advancement of their team project. Because SL does not support file sharing, the team provided the students with an external file sharing tool – Windows Live Sync.

To follow the students activities during virtual meetings the GVCP team video recorded all meetings of students and maintained a log of all chat communications. Additionally, the team recorded when and where students used the virtual communication tools. We used this data to identify all student interactions with the tools. We then analyzed these interactions with respect to how well the tools allowed the students to meaningfully use epistemic boundary objects during group discussions. Due to the space limitations of this conference paper, we decided to focus this discussion of one single episode of a global meeting during the class. This in depth focus allowed us to illustrate very detailed how students used boundary objects and spatial gestures. The next sections describe this episode.
Example Episode: “For us it is not possible to even make small changes”

In this episode, we report the discussions that occurred around a construction schedule boundary object. Two students, Alyssa and Jim, created this new schedule before the meeting in virtual space and during the meeting tried to convince another student, Serven, that he should integrate this schedule in his part of the project plan, the 4D simulation.

Figure 5 illustrates the spatial setting of the meeting and the following is a verbatim excerpt from the chat log discussions of the student communication during the meeting:

Ali Meskin: Good morning Alyssa
Alyssa Genezzia: good morning
Jim Burckhardt: hi guys...so where's everybody else?
Alyssa Genezzia: hi all
Mia Gridolfo: hi!
Alyssa Genezzia: ok are we ready to begin?
Mia Gridolfo: yep
Alyssa Genezzia: Serven... you there?
Serven Rodas: yes.....tell me Alyssa...a very good evening to you...
Alyssa Genezzia: great!
Mia Gridolfo: u too
Alyssa Genezzia: ok
Alyssa Genezzia: so we ran the model based on the schedule you had for the 3-d model
Alyssa Genezzia: up top here is a jpeg of our findings

[Alissa broadcasts a figure showing a schedule on the team wall]
Serven Rodas: ok.
Alyssa Genezzia: we discovered that based on the optimal work hours, labor and linkages and a number of different risk variables we are going to be almost 1 month behind schedule
Serven Rodas: so...how it will be help full for us...

Serven Rodas: And report we are preparing the same now..
Alyssa Genezzia: well i mean the changes are minimal and we had to make the schedule based on the 3-d model so these tasks need to be interdependent for us to work together if you look on the screen
Serven Rodas: But Alyssa....we can get the details only through mail and we are unable to access the group file..
Alyssa Genezzia: oh well Serven, we did not know that... you should have e-mailed us... the schedule has been in the file base for some time but this is ok we are at the finish line here lets just discuss what to do now
Serven Rodas: We thought that everybody knows about our probs of not able to access the group files in Live sync
Mia Gridolfo: i recall that too
Jim Burckhardt: Serven..i gave everybody my email on april 8th...i didn't receive one email asking for the schedule file.
Alyssa Genezzia: ok all no worries, we did not know ... but this is ok, let’s just discuss this issue and move from there
Alyssa Genezzia: ok
Jim Burckhardt: our Simvision [an engineering tool the students used to create the construction schedule boundary object] results only require minor changes...... Alyssa Genezzia: what I did Serven, was even though we DID produce a schedule I still spent the last few days changing our schedule to match yours
Mia Gridolfo: so, what should be the schedule for writing our final report?
Alyssa Genezzia: so as to not confuse everybody and I realized you had spent time on the 4-d model
Serven Rodas: u should have told us on Wednesday itself that the schedule u created has some delays... Because we had meeting on Wednesday.....
Alyssa Genezzia: I did, but then you told me that you had created your own schedule so I needed to re-run mine
Mia Gridolfo: well, now we have a schedule and a 4d model and that's great :) Alyssa Genezzia: to match what you did
Mia Gridolfo: we just need to report all this :) i think it's ok
Jim Burckhardt: all...look at the board behind us....all we are talking about is changing a few durations....it's not a major change

Serven Rodas: For us it is not possible to make even small changes..we incorporated everything in 4D and the report in in final stage...so what to do now?
Alyssa Genezzia: ok this is fine we will write about the delay on our side

The excerpt shows that Alyssa and Jim tried to use a visual representation of the schedule as boundary object and posted it on the team wall so that all meeting participants would be able to grasp the importance of the changes in the schedule. Using the visual representation, Alyssa and Jim tried to explain the changes they made in the schedule to the other team members and to convince them that it is necessary to integrate the new schedule into the rest of the project plan. Doing so, Alyssa and Jim tried to constantly draw attention to the, on the team wall, projected schedule. Alyssa faced the team wall throughout the meeting and pointed to it a number of times. Jim even flew – flying is one option to move through virtual space in Second Life – up and down the schedule in an effort to underline his chat statement: “all...look at the board behind us....all we are talking about is changing a few durations....it's not a major change”. At the same time, however, Serven did express his disinterest into the changes by not looking at the team wall, but facing Alyssa directly during the discussion. The spatial context of the virtual meeting room allowed Serven to make clear to all other meeting participants that he is not interested in discussing the content of the schedule. In this way, Serven’s intention, “For us it is not possible to make even small changes..we incorporated everything in 4D and the report is in the final stage...”, quickly became clear to all meeting participants during the discussions. Finally, at the end of the episode, Alyssa gave in: “Ok this is fine we will write about the delay on our side”, and decided to not push Serven any further.

Implications and Findings

Despite the apparent unsuccessful boundary spanning, this episode shows how the spatial context that the virtual meeting space provides together with the virtual tools, enabled meeting participants to create meaningful spatial interaction around boundary objects. In particular, Alyssa and Jim tried to draw the attention on the schedule using spatial gestures, such as pointing towards the schedule or moving towards it. Nevertheless, they were not successful, because Serven refused to look at the detailed content of the schedule. With this negative gesture Serven was able to clearly show his disinterest by facing his avatar away from the schedule throughout the meeting. This close look at the episode shows that virtual worlds allow for socially richer interaction of meeting participants during the use of boundary objects. This is mainly caused by the spatial context the virtual meeting room offers that is not available in traditional group support systems. The virtual technologies that we provided in virtual space allowed meeting participants to, not only share boundary objects in a dynamic way, but also to use spatial gestures to support their discussions about the boundary objects. Meeting participants were able to walk towards the screen, “fly” up and down it, or point towards it to additionally highlight the importance of certain aspects of the virtual boundary object. At the same time, meeting participants were also able to show their disinterest in certain aspects of the boundary objects by turning away from them, or by not facing them. The episode clearly shows that these spatial gestures allowed all meeting participants to better understand each others’ positions. This allowed everybody to get involved in more meaningful discussions, more meaningful exchange of knowledge, and more meaningful joint development of new knowledge. Overall, the evidence from the episode shows that it is possible to allow for social contacts in virtual worlds that more closely resemble “real world” encounters in academic settings than it is possible with other methods, such as group decision support systems. With this closer resemblance educators are able to allow for more meaningful action based learning by enabling more realistic role-play and project work simulations.

Conclusion

This paper presents a first qualitative analysis of our efforts to teach students global collaborative project work in an engineering context. It theoretically derives a number of requirements that allow for action based learning of global collaboration: Students need to be able to meaningful interact around boundary objects, and students need to be able to use spatial gestures during their interactions with each other and the boundary objects. We then provide first evidence that virtual environments offer the possibility to fulfill these two requirements by describing and discussing one episode of a student encounter in great detail that clearly shows that students during the class were able to meaningfully interact with the use of boundary objects and spatial gestures. In this way, the paper provides first empirical evidence that
virtual worlds offer educators the possibility to allow for true and meaningful action based learning using role-play and project work simulation.

In future research efforts, we plan to provide more evidence for our claims from consecutive teaching efforts and to develop new and improve on the existing virtual technologies. Our initial lessons learned so far show that virtual world technology developers need to consider the behavioral aspects of students in virtual worlds to design virtual meeting spaces that allow for meaningful global collaboration projects in education. We believe that multi-disciplinary research efforts of behavioral scientists, global project management researchers, and technology researchers are necessary to establish this necessary link between student behavior in virtual worlds and virtual world technology. In the long run we hope that, in this way, our research efforts can overcome the limitations that universities face in preparing their students for the inter-cultural encounters they will face in their future careers in a more and more globalizing job market.

**References**


Communicative tasks for language students and teacher trainees in video web communication and virtual worlds

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Abstract: The European NIFLAR project aims at making foreign language education more authentic and interactive through innovative e-learning environments: video-web communication and voice-enabled 3D virtual worlds. In these ‘networked’ environments language students and native speaker teacher trainees can synchronously communicate, collaborate and share experiences, focusing on intercultural awareness. For this, pedagogical tasks have been developed in which intercultural awareness and authentic social interaction play a much larger role than in present-day classroom language education.

In order to design effective networked interactive tasks and assess their effectiveness a set of design principles has been developed. In this paper we present this framework and discuss its application to networked communication and education. Examples of tasks will be shown and evaluated that have been developed for and applied in both video web communication and virtual worlds. Examples will include: (1) Czech students of Dutch communicating with Dutch teacher trainees by means of the video-web communication tool; and (2) Dutch students of Spanish communicating with Spanish teacher trainees in the virtual world Second Life. We will discuss what the potential and differential effects are of such environments on distant interaction and how this can be exploited in higher education.

The NIFLAR project

The NIFLAR project (Networked Interaction in Foreign Language Acquisition and Research) is a two year project (2009-2010) which received a grant from the European Commission within the Lifelong Learning Programme. The NIFLAR project aims at enriching and innovating foreign language teaching and learning processes, by creating opportunities for enhancing authentic social interaction between peers (students of foreign languages and pre-service teachers) according to relevant interaction tasks developed for the project with a focus on intercultural awareness. The interactions take place in two innovative digital environments: video-web communication (VWC) and voice-enabled 3D virtual worlds (VW). The first one facilitates distant spoken and written interaction among dyads and group of students, and collaborative work (sharing photos, presentations, films) while seeing each other. In the second environment, voice-enabled 3D VW, students participate as avatars (participants cannot see the real “you”), can engage in textual and voiced interactions with other avatars and can undertake all kind of actions in different virtual locations.

The project target languages in NIFLAR are Dutch, Portuguese, Russian and Spanish, in a consortium of seven universities (Valencia and Granada in Spain, Coimbra in Portugal, Palacky University in Olomouc, Czech Republic, Nevsky Institute and Novosibirsk in Russia, and Concepción in Chile), four Secondary Schools (two in Spain and two in The Netherlands), an e-learning consultancy organization (TELLConsult in The Netherlands) under the coordination of Utrecht University (The Netherlands). They all share the interest in exploring the added value of video-web communication and/or virtual worlds for the development of communicative and intercultural competence in L2 according to adequate tasks.

Task effectiveness

In current teaching practice, second language learning tasks are used to engage learners in different types of learning and communication processing. As Moonen, de Graaff & Westhoff (2006) and Moonen (2009) point out, there is not one single, generally accepted definition of a task in the field of second
language acquisition (see for an overview e.g., Bygate, Skehan, & Swain, 2001; Ellis, 2003). Essential components of most task definitions are meaning-orientation, goal-orientation and acquisition-orientation. For the present study we further include an orientation on intercultural awareness (Byram, 1997; Müller-Hartman, 2000), and we specify task characteristics for exploiting the added value of a virtually supported distant communication setting (Jauregi & Bañados, 2008, in press; Deutschmann, Panichi & Molka Danielsen, 2009; O’Dowd & Ware, 2009).

Design principles for the tasks in the present study take into account intercultural communicative competence (ICC) in L2 acquisition within the context of VWC and VW. Following the literature on tasks for communicative competence (Doughty & Long, 2003; Ellis, 2003; Ware & O'Dowd, 2008; Westhoff, 2004; Willis, 1996), for IC competence (Byram, 1997; Müller-Hartman, 2000), and for exploiting the challenges of a virtually supported distant communication setting (Deutschmann & Panichi, 2009) the following template was used for task development and evaluation in the study:

Table 1: template for intercultural communicative competence (ICC) task design and evaluation in video-web communication and virtual worlds.

The task exposes the learners to rich TL input.

Does the task:
- provide input that is authentic/unmodified, relevant/challenging and multimodal?
- enhance interactional modification or negotiation of meaning?
- elicit the use of authentic resources both before and during performance?
- elicit the use of both predefined resources and resources provided by the interlocutors themselves?

The task elicits meaningful TL use

Meaningfulness: Do the learners:
- use the language pragmatically and communicatively?
- use the language to engage in activities involving real-world processes of L use?
- have the choice how to use the language, that is, no linguistic forms are prescribed in advance?

Use: Does the task:
- involve some kind of gap (information, reasoning, culture)?
- have the right balance between language-demanding and content-demanding processing?
- promote learning by doing (processing and interaction)
- promote collaborative learning?

The task requires de learners to focus on form

Does the task:
- create a “semantic space” in order to elicit processing specific L forms?
- promote the detection and use of relevant chunks?
- elicit feedback on form by the native speaker (NS) on language of the learner?
- Provide opportunities to focus on form when learner need arises (negotiation, elaboration, recasts etc.)?

The task has a clearly defined communicative outcome

Does the task:
- have a clearly defined purpose that is relevant for all interlocutors?
- have a clearly defined communicative end product?
- elicit following a logical, relevant and challenging procedure?
- provide instructions that meet the needs of all interlocutors?
- aim at subjective, personal information exchange, related to objective, factual resources?
- Is the task both open (not fixed, prescribed) and determined (goal-oriented)?

The task enhances strategic awareness on language learning and use
Does the task:
• elicit planning, feedback and reflection
  ◦ on language use
  ◦ on communication
  ◦ on intercultural issues

_The task enhances focus on intercultural linguistic competence_

Does the task:
• require learners to focus on intercultural topics, beliefs, contrasts?
• elicit focus on everyday, implicit cultural habits, and beliefs?
• create intercultural awareness, but providing topics that contrast students’ own beliefs and habits with that of their interlocutors?
• elicit awareness and reflection not only on target culture, but on own cultural habits and beliefs as well?

General:
• Are clear stages in task sequencing provided?

_The task takes the communicative and intercultural competence level of all interlocutors into account_

Does the task align with proficiency level on oral interaction and intercultural awareness:
• with respect to task goal?
• with respect to task topic?
• with respect to task procedure?

_The task makes effective use of the challenges and opportunities VWC or VW_

VWC:
• Is non verbal communication (gestures etc) supported?
• Are there no additional task demands caused by dislocated communication?
• Are there no additional task demands caused by fixed location (limited by webcam view)?
• Is the use of both shared and separated resources provided?

VW:
• Is the virtual context sufficiently culture-specific/-focusing/-contrasting?
• Is the virtual context sufficiently relevant and attractive for the task goal?
• Is the virtual context sufficiently prototypical, without being caricatural?
• Is the virtual context used in a socially, cognitively, affectively, creatively and spatially effective and challenging way?
• Does the virtual context provide a safe environment (e.g., no other listeners/interlocutors are present at lower levels)?
• Is the number of interlocutors relevant for the communicative goals, topic and procedure?
• Is sufficient familiarization provided with environment and technical aspects of virtual communication?
• Does the task trigger oral communication, that is, is intensive oral communication needed for successful task completion

_Pilots_

In order to test the application of the template for effective networked interactive tasks two pilots were conducted, in both video web communication and virtual worlds. In the first pilot Czech students of Dutch communicated with Dutch teacher trainees by means of the video-web communication tool Adobe Connect; in the second pilot Dutch students of Spanish communicated with Spanish teacher trainees in the virtual world Second Life. Both pilots are presented and discussed here.
Pilot on video-web communication in Dutch

NIFLAR’s objectives were integrated in foreign language and pre-service teachers’ courses at two universities: Dutch foreign language courses at A2 and B1 levels (CEFR) at Palacky University in Czech Republic and the Educational Master Course Language Education at Utrecht University (The Netherlands). 36 Czech students of Dutch as a FL and 32 Dutch pre-service teachers participated in the study. The project took place between February and April 2009 and lasted 10 weeks.

The objective of this integration was for the FL learners to enrich their learning context by facilitating authentic interactions through VWC with NSs in a peer to peer basis. As for pre-service teachers the integration aimed at getting them familiar with pedagogical processes of innovating and enriching educational contexts by reflecting about and experimenting with ways to introduce, coach and monitor networked interaction in language teaching. During the course pre-service teachers (1) discussed and reflected about crucial issues concerned with task elaboration for networked interaction (elaboration criteria, conditions for networked interaction, focus on intercultural communicative competence, proficiency levels according to the CEFR, research on networked interaction), (2) they engaged in task elaboration for VWC, (3) they elaborated pre-and post tests in order to measure learners’ communicative growth, (4) they conducted the interactions one to one during 25 minutes each through VWC according to the tasks they elaborated for the exchanges and (5) they finally monitored and evaluated the experience (see Table 2).

Table 2: overview steps undertaken during the project at Utrecht University (UU) and Palacky University (PU)

<table>
<thead>
<tr>
<th>Pre-service teachers (UU)</th>
<th>FL learners of Dutch (PU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction to NIFLAR</td>
<td>• Introduction to NIFLAR</td>
</tr>
<tr>
<td>• Workgroup sessions on tasks, CMC, CEFR, ICC</td>
<td>• Virtual meeting with UU</td>
</tr>
<tr>
<td>• Virtual meeting with PU</td>
<td>• Tutorial about VWC tool</td>
</tr>
<tr>
<td>• Development of tasks in groups</td>
<td>• Plenary session</td>
</tr>
<tr>
<td>• Creation of evaluation schemes for interaction sessions</td>
<td>• 3 interaction sessions (25 min.)</td>
</tr>
<tr>
<td>• Development of pre-/posttests</td>
<td>• NIFLAR evaluation</td>
</tr>
<tr>
<td>• Tutorial about VWC tool</td>
<td>• NIFLAR surveys + interviews</td>
</tr>
<tr>
<td>• Plenary session</td>
<td>• Certificates of participation</td>
</tr>
<tr>
<td>• 3 interaction sessions (25 min.)</td>
<td></td>
</tr>
<tr>
<td>• Poster-presentations &amp; paper experiences</td>
<td></td>
</tr>
<tr>
<td>• NIFLAR surveys + interviews</td>
<td></td>
</tr>
<tr>
<td>• Certificates of participation</td>
<td></td>
</tr>
</tbody>
</table>

Each pre-service teacher group elaborated 3 interrelated tasks with a clear focus on intercultural information exchange. From the 8 pre-service teacher groups who elaborated interaction tasks, one group designed the first task around the student life topic, the second task on where and how people live in both countries and the third task on leisure activities. In order to support task completion pictures, video fragments showing different cultural topics and word webs with key vocabulary items related to the main discussion topics were uploaded in the Adobe Connect environment.

Results of the video-web communication pilot

During the project three sources of data were gathered: interaction recordings, questionnaires and interviews.

Recordings

Interaction recordings show that both foreign language learners and pre-service teachers collaborated intensively resorting to the affordances and the multimodality of the environment to create and
enrich meaning. The verbal interactions, the facial gestures made, the chat application, the whiteboard, the pictures and video clips uploaded and shared in the environment all contributed to make interaction sessions meaningful and relevant to the learning process of both foreign language learners and pre-service teachers.

**Questionnaires**

At the end of the pilot participants evaluated the project at both institutions by means of surveys and interviews. 25 students at each institution filled in the questionnaires. For the closed questions a 5 point scale was used: 1 indicating low or negative values and 5 indicating high or positive ones. The researchers were particularly interested in knowing (1) how the platform had worked, (2) how interlocutors experienced the tasks, (3) how participants valued the fact of being able to see the speech partner while they were talking, (4) what they had learned during the experience, and (5) how they valued the project as a whole.

As we can see in Table 3 participants at both institutions were quite positive about the platform used and very positive for being able to see the speech partner while they were talking. The relevance of tasks was positively valued by both groups although 3 of the 25 Czech students reported tasks to be irrelevant. The overall project was highly valued by all participants. When asked about the learning process of FL learners (items 38a/b/c), both groups agreed that FL learners had learned particularly to talk more fluently and had become more confident talking in the TL.

Table 3: evaluation responses about the platform, tasks, the project and the learning process by pre-service teachers (T) and FL learners.

<table>
<thead>
<tr>
<th></th>
<th>T (UU)</th>
<th>FL (PU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=25</td>
<td>N=25</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>VWC tool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. How do you value the VWC tool? (1 bad … 5 good)</td>
<td>3.8 0.6</td>
<td>3.4 0.4</td>
</tr>
<tr>
<td>18. How did it work?</td>
<td>3.3 0.7</td>
<td>3.3 0.5</td>
</tr>
<tr>
<td>Tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Were tasks relevant for the language learning process of FLLs?</td>
<td>4.3 0.7</td>
<td>3.9 0.4</td>
</tr>
<tr>
<td>Were tasks adequate to the FLL’s proficiency level?</td>
<td>4.2 0.8</td>
<td>4.2 0.4</td>
</tr>
<tr>
<td>Visual cues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50. How do you value being able to see your speech partner during interaction? (1 unimportant … 5 important)</td>
<td>4.8 0.5</td>
<td>4.9 0.1</td>
</tr>
<tr>
<td>Project evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63. How do you value the NIFLAR project?</td>
<td>4.1 0.7</td>
<td>4.3 0.7</td>
</tr>
<tr>
<td>66. I would like to continue participating in this project</td>
<td>3.7 1.3</td>
<td>4.3 0.7</td>
</tr>
<tr>
<td>67. I would recommend peer students to participate in this project</td>
<td>4.2 0.8</td>
<td>4.4 0.5</td>
</tr>
<tr>
<td>Learning experiences FLLs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 a. They/I have learned to talk more fluently</td>
<td>4.0 0.7</td>
<td>3.5 0.9</td>
</tr>
<tr>
<td>38 b. They/I became more confident talking in the TL</td>
<td>4.1 0.7</td>
<td>4.0 0.4</td>
</tr>
<tr>
<td>38c. They/I became more aware of cultural contrasts &amp; similarities</td>
<td>3.7 0.9</td>
<td>3.2 1.3</td>
</tr>
</tbody>
</table>

As for their learning process (Table 4) pre-service teachers highly agreed that through the experience they had learned how to use VWC tools for teaching purposes and for implementing purposeful interaction by developing adequate tasks for interaction.
Table 4: Evaluation responses about the learning process of pre-service teachers (T).

<table>
<thead>
<tr>
<th>What have you learned in this project?</th>
<th>T (UU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=25</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>60 a. How to use VWC tools for teaching purposes.</td>
<td>4,2</td>
</tr>
<tr>
<td>60 b. How to use VWC tools for implementing purposeful interaction in the TL.</td>
<td>3,9</td>
</tr>
<tr>
<td>60 c. To get familiar with (the elaboration of) tasks that contribute to the development of (I)CC.</td>
<td>3,9</td>
</tr>
</tbody>
</table>

Pilot on virtual worlds in Spanish

In June and July 2009 a pilot was conducted within Second Life, using interaction tasks for native non-native speaker conversations according to the task design principles outlined above. The participants in the pilot were two foreign language learners of Spanish (one female and a male) at B1 proficiency level (CEFR) from Utrecht University in The Netherlands and two native pre-service teachers of Spanish (two females) from the University of Valencia and the University of Granada in Spain. All students volunteered to participate in the pilot experience with Second Life and had been involved during March and April 2009 in a project using video-web communication tools to conduct five interaction tasks in a cross-cultural communication setting.

The pilot aimed at studying the following issues: (1) to analyse the kind of interaction the tasks elicited in the virtual world, by means of the task evaluation template; (2) to explore the possibilities of existing SL worlds for enhancing interaction; (3) to study whether and how the conditions anonymity versus familiarity may play a role in modeling interaction; and (4) to compare student experiences on interactions conducted through video-web communication versus Second Life.

Tasks

Four tasks were developed for the pilot:

Task 1: The main objective for this task was to reflect upon intercultural similarities and differences. Students were asked to meet at an intercultural learning space in Second Life (Bluepill, Sietar) [http://slurl.com/secondlife/Bluepill/230/194/67](http://slurl.com/secondlife/Bluepill/230/194/67). Once there, they had to individually complete a questionnaire related to a chosen nationality. Afterwards, all four students rejoined at the NIFLAR space and discussed their findings, trying to explain differences and similarities with their own culture.

Task 2: The objective of this task was to explore Hispanic locations in Second Life and to interact with other native speakers there. The task was conceived as a preparatory step for task 3. Students were paired: Dutch students together and Spanish pre-service teachers together. Dutch students went to Barcelona, Jalisco and Al-Aldalus. Pre-service teachers were asked to explore some “Hot Spots, the places to be in Second Life” ([http://b-places.com/](http://b-places.com/)). The landmarks had to be Hispanic related and they had to discuss their adequacy for teaching and types of activities that could be done there.

Task 3: For this task, the students were paired native – non-native, as it was a continuation of task 2. The main objective was to share experiences and tour together some of the locations visited in task 2. They had to tell their partner what were the things that they liked/disliked in the places they visited, in which way were the three places similar and different, something that surprised them and their experiences when trying to communicate with other avatars. After that, they had to choose one of the three locations, teleport their partner there and show them around.

Task 4: This task was conceived as an evaluation of the experience. The students met at the NIFLAR space in Second Life and were given a number of aspects to discuss: general evaluation of their experience in a virtual world, things that worked and things that did not work, the most and the least
interesting task, adequacy of Second Life for learning languages and a comparison between Second Life and video web Communications.

**Results of the virtual worlds pilot**

During the project three sources of data were gathered: interaction recordings, questionnaires and interviews.

**Recordings**

When analyzing the recordings a clear difference was found in terms of verbal engagement and interaction behavior between the first and the fourth task, on the one hand, and the second and the third task, on the other hand.

In the first task, after having completed individually the survey for a specific culture, the four students met at the NIFLAR space and discussed their experiences with that specific culture comparing findings and sharing impressions. As for the fourth task, participants were asked to evaluate with each other the project experience in Second Life according to specific points. Both sessions were characterized by a dynamic verbal turn-taking exchange among participants, with almost no space for silences and with little action. They met to exchange information and impressions (I think…), to share opinions (I agree…), to show understanding (I know what you mean) and puzzlement (I was surprised about…), to share past experiences (I really enjoyed touring around) and different views (I think you could look at it from the perspective…), seeking to reach common ground.

As for the second and third tasks, participants were asked to explore Hispanic places in SL with a peer (in task 2 foreign language learners went together, and the same did the pre-service teachers) and try to interview other avatars in those places, while in task 3 taking the other peer for a tour to the places that had been visited in session 2. In these tasks there was much action and a lot of movement going on, but interactions were characterized by large episodes of silence while touring around, which contrasts with the other two tasks where information and opinion exchange was the focus of the task. These interactions also contrasted with similar tasks carried out through video-web communication tools, where interlocutors were engaged in the dynamic process of creating conversational meaning by exchanging turns to talk.

In tasks 2 and 3 conducted in Second Life, interactions focused on action planning (we will first do X and then will visit X…), proposing activities (shall we go for a horse ride?), describing spaces (this is a sauna), evaluating experiences (this is really nice), giving directions (here we have to turn to the right, follow me), establishing comparisons with real life (it is the same in real life; we can fly with our horses, I like that), expressing preferences (there is nobody in the beach, I prefer this to the overcrowded Spanish beaches in July), and giving many explanations on how to achieve technically things in Second Life: how to lie down, how to ride on a horse, how to get a guided tour on a dragonfly, how to activate music…

**Questionnaires**

Questionnaires were administered to the both foreign language learners (FLLs) and teacher trainees (TTs) at the end of the pilot and had open and closed items. For the closed items a five point scale was used: 1 indicating negative or low values and 5 indicating positive or high ones. We were particularly interested in (1) the adequacy of tasks, (2) the learning experience, (3) adequacy of SL for learning purposes and (4) comparison between VWC and SL.

As we can see in Table 5 tasks were in general terms positively rated and the virtual world Second Life (SL) was unanimously selected as the most adequate environment for enriching learning possibilities, although foreign language learners seemed to feel more comfortable using VWC than SL (items 51, 52).
Table 5: Evaluation responses about tasks and environment adequacy.

<table>
<thead>
<tr>
<th>Tasks’ interest</th>
<th>TT1</th>
<th>TT2</th>
<th>FLL1</th>
<th>FLL2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Task 2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Task 3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Task 4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

SL v. VWC

48. I would like SL to be part of my courses. 5 2 4 4
51. How comfortable did you feel when using SL? 5 4 2 3
52. How comfortable did you feel when using VWC? 4 3 3 4
59. In your opinion, which environment offers more possibilities to enrich your learning language experience? (a. Second Life b. video web communication)

Among the negative aspects of using Second Life for learning languages were some problems with audio that prevented the participants from doing the activity properly and left only the text chat option, and the fact that in Second Life one cannot use face expressions to support interaction. Some of the positive aspects found by the participants were more things to talk about, a new way of teaching and learning and a more relaxed way of talking due to its anonymity. As for the learning experiences, FL learners reported to have learned particularly to talk more fluently and with more confidence in the target language (Table 6).

Table 6: Evaluation responses about learning experiences of FL learners

<table>
<thead>
<tr>
<th>43. What have you learned during the sessions?</th>
<th>FLL1</th>
<th>FLL2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. To be aware of cultural contrasts and similarities</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. To talk more fluently</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c. To become confident talking in the TL</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>d. New words</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>e. To use grammar more accurately</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Discussion

The pilots conducted so far indicate that both environments, video-web communication and virtual worlds, with their specific affordances, can contribute to enrich the learning context of students and are felt to be motivating and relevant to the learning process.

Tasks designed for the pilots elicited vivid and task-related interaction among the participants. Tasks stimulated participants to focus on intercultural issues; this did not seem to be artificial for the participants within the virtual setting. Interaction was used to engage in real-life activities. Some of the interaction was outcome-directed (task-related information exchange), but part of the interaction was process-oriented: how to upload material in VWC, how to adapt your avatar, how to move around in Second Life, for example. Process-oriented sequences were far more common in VWs than in VWC.

An interesting aspect which emerges from the pilots relates to presence or absence of “facial cues” during interaction. In a VWC setting participants see each other while communicating and value it very positively, since as they say, facial cues contribute to enhancing intersubjectivity, crucial to intercultural interaction, and to clarifying meaning. Although in Second Life the participants could not see the real person behind the avatar, the fact that they mostly interacted with the same partners who used their voices, highly contributed to create a pleasant and safe environment for them to interact and establish intersubjectivity. In this sense communicative exchanges in SL were not characterized by anonymity but by familiarity and rapport.

An interesting outcome of the second pilot relates to students’ preferences for a specific e-tool. The four participants preferred oral communication in Second Life compared to video web communication. However, their motivation for this doesn’t show a clear picture: some preferred Second Life because they felt more comfortable communicating with virtual interlocutors, others preferred the topic-specific setting in which communication in Second Life took place, yet others had experienced fewer technical problems.
with *Second Life* than with video-web communication. Clearly more research with a larger number of participants is strongly needed. A large-scale follow-up study comparing VWC and VWs for similar tasks and target groups is currently being prepared for February-March 2010.

**Conclusions**

A key issue in foreign language education concerns the development and use of adequate interaction tasks which contribute to enhance effective Intercultural Communicative Competence between foreign language learners and native speakers. In this article criteria for elaboration of interaction tasks to be carried out in synchronous e-learning environments (video-web communication and virtual worlds) have been presented and applied in two pilots conducted in VWC and *Second Life*, which aimed at exploiting the specific affordances of the virtual environments in interaction processes.

In both pilots, the integration of VWC and VW in FL learning and teacher training programs were positive, although technological problems concerning firewalls, sound not always working properly, delays in the communication flow were sometimes faced, as well as organizational troubles. It is well known how difficult it is to organize synchronous sessions at a distance. Care has to be taken in keeping good communication with participants and coordinators, in getting used to synchronicity (being on time for the sessions), and in developing patient and flexible attitudes since unexpected problems may arise in such projects.

We should take full advantage of the positive attitude students seem to have towards these environments and of the powerful educational potential they have. Efforts and resources should be geared towards the development of life-like settings and tasks that would give foreign language learners the opportunity to enhance their intercultural communicative competence. The findings of this type of research will help us to further explore the powerful potential of video-web communication and virtual worlds for second language learning.

**References**


**Acknowledgments**

This paper describes the results of two pedagogical experiences carried out in close collaboration with other NIFLAR members, particularly, Silvia Canto, Milan Kriz, Huub van den Bergh, Ton Koenraad and Machteld Moonen.
Academic and social integration of international and local students at five business schools, a cross-institutional comparison

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Abstract: An increasing number of students choose to study at a university in a foreign country. A common belief among educators is that international students are not well academically adjusted. Recent research has found a mixed picture on whether international students underperform in academic integration and academic performance. Therefore, Morrison et al. (2005) argue that research should extend its focus on comparisons in performance of international versus local students to the underlying reasons for these differences.

In a cross-institutional comparison among 871 students of five business schools, we investigated the differences in academic and social integration amongst local and international students. International students value their faculty and educational system more than local students. However, international and local students have limited social contact with each other and spend their private time differently. Finally, students with a non-Western background are less integrated than Western students and have considerable lower academic and social integration scores. Institutes with small classes and collaborative learning settings seem to provide a more favourable learning environment for international students.

Introduction

An increasing number of students choose to study at a university away from their home country (EUROSTAT, s.d.). Next to the enriched, more international atmosphere at the host universities (Van der Wende, 2003), there are some reservations among educators regarding the academic and social integration of international students. A common assumption in higher education is that academic integration, that is the extent to which students adapt to the academic way-of-life, of international students is not well aligned with the requirements of higher educational institutes (Asmar, 2005; Barrie, 2007; Morrison, Merrick, Higgs, & Le Métais, 2005). Recent research has found a mixed picture on whether international students underperform in academic integration and academic performance. Therefore, Morrison et al. (2005) argue that research should extend its focus on comparisons in performance of international versus local students to the underlying reasons for these differences.

According to Tinto (1975, 1998), students not only need to persist at university in order to graduate but they also need to participate in the student culture, both within and outside the immediate context of the learning environment. According to Severiens and Wolff (2008), students who feel at home, who are well connected to fellow students and teachers and who take part in extra-curricular activities are more likely to graduate. For example, Wilcox et al. (2005) found that social support by family and friends (i.e. social networks of students) has a positive influence on the study-success of first-year students. Having a sufficient number of friends, sharing accommodation with other students as well as contacts with the university staff can influence social integration. We define social integration as the extent to which students adapt to the social way-of-life at university. Recently, researchers are broadening the focus on academic integration and academic performance to the social integration of students (Severiens & Wolff, 2008; Wilcox et al., 2005; Yazedjian & Toews, 2006). The goal of this paper is first to identify whether academic and social integration differs for local and international students. Second, we will identify the
underlying reasons why academic and social integration between local and international students are different. Finally, we will investigate whether institutional differences can explain why some business schools are more able to facilitate the adjustment processes of international students than others.

**Academic integration**

Baker and Siryk (1999) have assessed that academic integration has a large influence on study performance. Baker and Siryk (1999) distinguish four concepts in academic integration, namely academic adjustment, social adjustment, personal and emotional adjustment and attachment. *Academic adjustment* refers to the degree of a student’s success in coping with various educational demands such as motivation, application, performance and satisfaction with the academic environment. *Social adjustment* on the other hand describes how well students deal with the interpersonal-societal demands of a study, such as working in groups. Thirdly, the scale *personal and emotional adjustment* indicates the psychological and physical level of distress experienced while adapting to the academic way-of-life. Finally, *attachment* reflects the degree of commitment to the educational-institutional goals.

In contrast to the U.S., in Europe there is a distinction between universities of applied science (Uas) and universities (Uni). A main distinction between these two types of universities is the degree of *professional orientation*, that is degree of practical relevance of education to specific jobs such as accountants, marketers or sales managers. While universities are mainly research-driven with a strong theoretical focus in education, universities of applied science offer education of professional and practical relevance. Research in the Netherlands indicates that ethnic minorities are more likely to register for Uas due to the practical applications (Severiens & Wolff, 2008; Wolff, 2008). Therefore, we have added professional orientation of students to academic integration.

**Social Integration**

Current research indicates that institutes and the social networks of students have a large influence on how first-year students adjust (Christie, Munro, & Fisher, 2004; Severiens & Wolff, 2008; Tinto, 1998; Wilcox et al., 2005). Therefore, in line with Severiens and Wolff (2008) we distinguish two elements in social integration among international students, namely the social integration facilitated by the institute (i.e. formal social integration) and the social integration facilitated by the social network of students (i.e. informal social integration).

Based upon an extensive literature review, we have identified two factors for formal social integration: the perception of the faculty and the educational system. The *perception of faculty*, that is the perceived esteem of the faculty by family, friends, the general public and future employers, influences the social integration of students (Gloria, Castellanos, Lopez, & Rosales, 2005). Higher Educational Institutes are increasingly aware of impacts of ranking lists such as those published in the Financial Times on the choices that students make when selecting a new business programme. Therefore, business institutes spend considerable effort in providing non-academic facilities to students (e.g. campus, ICT-facilities, social life, cultural programmes) in order to differentiate them from other institutes (Bok, 2003). An business institute with a well-perceived reputation by the social network of the student is expected to have a positive influence on the persistence of study. The *educational system* used at the institute has a strong influence on academic and social integration of students. For example, Christie et al. (2004) found that institutes with smaller classes and intensive mentoring are more successful in retaining students during the first year of studies than institutes with large classes. Research on constructivist learning methods like Problem-Based Learning (PBL) has highlighted that students are more likely to develop social relationships with other students than when students are following education in large lecture halls (Hmelo-Silver, 2004; Lindblom-Ylänne, Pihlajamäki, & Kotkas, 2003). In addition, a common educational method among universities of applied science is Competence-Based Education (CBE), whereby education is focussing on relevant professional competences and skills of students rather than theoretical and general knowledge (Baartman, Prins, Kirschner, & Van der Vleuten, 2007; Segers, Dochy, & Cascallar, 2003).

With respect to the informal social integration of international students, we distinguish three factors, namely: social support by family and friends; social life; and national/ethnic identity. Wilcox et al. (2005) found that *social support by family and friends* has a strong influence on study-success of first-year students. In general, the role of the family on the attitudes and motivation of students has been consistently found in educational psychology (Attewell, Lavin, Dominia, & Levey, 2006; Cokley, Bernard, Cunningham, & Motoike, 2001). The *social life* outside of the academic environment has a strong influence
on academic integration. Having a sufficient number of friends, sharing accommodation with other students, being member of a study association, student fraternity or sports club can influence social integration (Bok, 2003; Severiens & Wolff, 2008). This allows students to become part of a social life that is closely attached to the university setting (Tinto, 1998). Finally, research on cross-cultural differences has highlighted that both national and ethnic identity (Asmar, 2005; Phinney, 1990; Yazdedjian & Toews, 2006) influence how students learn in social networks. For example, Skyrme (2007) found that Chinese students who entered at a New Zealand university had significant transitional problems. German students differed significantly with respect to learning styles and study performance to Dutch students at a Dutch business school (Rienties, Tempelaar, Dijkstra, Rehm, & Gijselaers, 2008; Tempelaar, Rienties, & Gijselaers, 2007). In addition, recent research on interaction patterns among international and local students indicates that local and international students live in separate social groups and therefore lead different social lives (Rienties, Niemantsverdriet, Kommers, & Grohnert, 2009). Last-but-not-least, research on cultural differences has highlighted that an individual’s self-concept is influenced by the sense of belonging to a particular ethnic group (Phinney, 1990). For example, Yazdedjian and Toews (2006) found that self-esteem, ethnic identity and acculturation among Hispanic students were more important than parental education and attachment to the institute. Gloria et al. (2005) found that perceived social support from friends, mentorship and perception of the university significantly influence whether Hispanic students successfully remain in college. Asmar (2005) found substantial differences in integration between local Muslims from Australia and international Muslims who studied in Australia.

Research questions

- To what extent do international students differ from local students with respect to academic and social integration?
- To what extent do non-Western students differ from Western students with respect to academic and social integration?
- To what extent do institutional settings influence the academic and social integration of international students?

Method

Setting

In this research, academic and social integration will be compared among local and international students using a dataset that was composed from nine institutes of higher education in the Netherlands. In this study, we will focus on five business schools who offer business and economics programmes to first-year bachelor students. Four out of five institutes in our setting are universities of applied science (see Table 1). Three of these Uas offer International Business and Management (IMBS). The HHS and HES are located in The Hague and Amsterdam, while NHTV, HZ and UM are located in the smaller cities of Breda and Maastricht. The largest foreign group of students in four out of five institutes are German. Finally, four out of five institutes use CBE as a pedagogical approach, while NHTV also uses PBL. Finally, UM uses primarily PBL. Given that the five business schools use a variety of student support systems and pedagogical approaches, we expected that some business schools will be more able to support their international students in adjusting to the institute than others. In particular, business schools with small-scale education and a professional orientation were expected to better facilitate academic and social integration of international students. Next to the SACQ and professional orientation, five variables were hypothesized to mediate a student’s social integration: perception of the faculty; educational system; support by friends and family; the social life; and nationality/ethnic identity.

Participants

The integrated questionnaire was distributed to 2647 students in February-April 2009 among nine Dutch Higher Educational Institutes. The students had been at their institute for six to seven months (see Table 1). Particular care was taken to target programs that had a significant portion of international and local students in order to be able to make direct comparisons on both the institute and the aggregate level. In total, 1340 (50.6%) questionnaires were returned, with the subset of five institutes consisting of 959 (50.8%) respondents. 871 respondents fully completed the questionnaire. In return for their effort, students
were offered a feedback on their scores relative to other students from their institute. In addition, students could win an iPod Nano or one of five vouchers of 25 Euros.

Table 1 Respondents per institute and educational program

<table>
<thead>
<tr>
<th>Institute</th>
<th>Educational programme</th>
<th>Uas/Uni Education system</th>
<th>Largest Foreign Group</th>
<th>Total respondents %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hogeschool Zuyd (HZ)</td>
<td>International Business and Management Studies (IBMS), HEBO and Hotelschool</td>
<td>Uas</td>
<td>CBE</td>
<td>65</td>
</tr>
<tr>
<td>NHTV Breda</td>
<td>International Media and Entertainment Management (IMEM), International Leisure Management (ILM)</td>
<td>Uas</td>
<td>PBL &amp; CBE</td>
<td>159</td>
</tr>
<tr>
<td>Haagse Hogeschool (HHS)</td>
<td>International Communication Management (ICM), International Business Management Studies (IBMS)</td>
<td>Uas</td>
<td>CBE</td>
<td>172</td>
</tr>
<tr>
<td>Hogeschool van Amsterdam (HES)</td>
<td>International Business Management Studies (IBMS), International Financial Management (IFM)</td>
<td>Uas</td>
<td>CBE</td>
<td>40</td>
</tr>
<tr>
<td>Maastricht University (UM)</td>
<td>International Business (IB), International Business Economics (IBE)</td>
<td>Uni PBL</td>
<td>German</td>
<td>435</td>
</tr>
</tbody>
</table>

Measurements

Student Adaptation to College Questionnaire and Professional Orientation

Academic integration was measured by the Student Adaptation to College Questionnaire (Baker & Siryk, 1999), which consists of four scales and a total score. Firstly, academic adjustment was measured by 24 items such as ‘I know why I am at this institute and what I want out of it’ and yielded a Cronbach alpha (α) of .824. Secondly, social adjustment was composed of 20 items like ‘I am meeting as many people and making as many friends as I would like at the institute’ with α = .838. Thirdly, personal-emotional adjustment consisted of 15 items such as ‘I have been feeling tense and nervous lately’ with α = .838. Lastly, attachment to institute was measured by 15 items like ‘I expect to stay at this university for my master degree’ with α = .847. Applications of SACQ in Belgium and the Netherlands have confirmed that SACQ is also useful in a European context (Beyers & Goossens, 2002; Niculescu, Nijhuis, & Gijselaers, 2009). In addition, professional orientation was included in academic integration, which consisted of four items like “My study is oriented to the actual developments of future professional activities” with α = .731.

Social Integration Questionnaire

Social integration was measured by the Social Integration (SI) instrument developed at Maastricht University (Rienties et al., 2009), which consists of 37 questions in six subscales. Firstly, perceptions of the institute by others was measured by three items like “I think that employers have a good perception/image of my study”, yielding α = .747. Secondly, the appropriateness of the educational system used by the institute was measured by two items like “The reason to go the Maastricht University was mainly Problem-Based Learning” with α = .627. Thirdly, the support of the social network of the students by family and friends was measured by three items like “My family encourages me to stay in the faculty” with α = .796. Fourthly, the satisfaction of social life was assessed by six items like “I am satisfied with my social life outside of class” with α = .778. Fifthly, the national/ethnic identity was measured by four open questions, namely mother’s mother tongue, father’s mother tongue, own mother tongue and official citizenship(s). In total 79 nationalities and 129 ethnic identities were present in the database. Therefore, in order to prevent a fragmented approach of comparing a limited amount of students within each ethnic category, students were categorized according to the “degree of Westernness”. We assumed that the more Western influences a student had, the easier it would be for the student to adjust to the Dutch culture. Thus, in each of the four categories a distinction was made between Western cultures (European Union, USA, Canada, Australia, New Zealand) and non-Western cultures. Consequently, four groups (Dutch, Western, mixed-Western, non-Western) were distinguished. Dutch students can thus compared to students that had a completely Western background (e.g. German student with German parents), a mixed-Western background (e.g. a German student with Turkish parents who was born and raised in Germany), or a purely non-Western background (e.g. Chinese students with Chinese parents). Finally, students were asked whether they were member of fraternities or study associations, had a part-time job and what their degree of contact was with local
students, with students of the largest foreign groups (German or Chinese students) and with other international students.

**Results**

In Table 2, the mean and standard deviations of the ten academic and social integration variables are illustrated. As was found previously (Baker & Siryk, 1999; Beyers & Goossens, 2002), the four subscales and total scores of SACQ are highly intercorrelated. In addition, there is a positive correlation between the SACQ scales and professional orientation. The two formal social integration variables (perception of the faculty, educational system) are positively correlated with the academic integration variables. The perception of the faculty is particularly correlated with the attachment and professional orientation of the institute. The choice for a particular educational system is positively correlated with academic adjustment and professional orientation. For the two informal social integration variables, support of family and friends is mainly correlated with perception of the faculty and professional orientation, while social life is mainly correlated with social adjustment and attachment to the institute.

Table 2 Correlations among academic and social integration variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Tot</th>
<th>AA</th>
<th>SA</th>
<th>PEA</th>
<th>A</th>
<th>PO</th>
<th>PF</th>
<th>ES</th>
<th>SFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SACQ Total (Tot)</td>
<td>411.00</td>
<td>50.18</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Adjustment (AA)</td>
<td>143.64</td>
<td>20.83</td>
<td>.802**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Adjustment (SA)</td>
<td>123.76</td>
<td>19.78</td>
<td>.726**</td>
<td>.506**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal-Emotional Adjustment (PEA)</td>
<td>91.16</td>
<td>18.45</td>
<td>.731**</td>
<td>.509**</td>
<td>.420**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment (A)</td>
<td>104.25</td>
<td>15.93</td>
<td>.745**</td>
<td>.626**</td>
<td>.833**</td>
<td>.446**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Orientation (PO)</td>
<td>18.81</td>
<td>2.86</td>
<td>.348**</td>
<td>.462**</td>
<td>.382**</td>
<td>.188**</td>
<td>.433**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception of Faculty (PF)</td>
<td>11.36</td>
<td>2.09</td>
<td>.182**</td>
<td>.213**</td>
<td>.246**</td>
<td>.085**</td>
<td>.296**</td>
<td>.455**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational System (ES)</td>
<td>6.02</td>
<td>1.84</td>
<td>.165**</td>
<td>.231**</td>
<td>.115**</td>
<td>.03</td>
<td>.154**</td>
<td>.286**</td>
<td>.102**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Social Support by Family and Friends (SFF)</td>
<td>12.10</td>
<td>2.36</td>
<td>.157**</td>
<td>.151**</td>
<td>.191**</td>
<td>.070*</td>
<td>.222**</td>
<td>.262**</td>
<td>.283**</td>
<td>0.06</td>
<td>1</td>
</tr>
<tr>
<td>Social Life (SL)</td>
<td>33.79</td>
<td>6.84</td>
<td>.672**</td>
<td>.397**</td>
<td>.865**</td>
<td>.326**</td>
<td>.686**</td>
<td>.360**</td>
<td>.212**</td>
<td>.114**</td>
<td>.167**</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

*Correlation is significant at the 0.05 level (2-tailed).

Table 3 shows the aggregated results for the academic integration of local (Dutch) and international students. International students score significantly higher on professional orientation (d = -0.28), while Dutch students score higher on personal-emotional adjustment (d = 0.30), but all effect sizes are small. Table 4 illustrates the social integration of local and international students. Dutch students have significantly more contact with fellow Dutch students (d = 0.91). The effect size is the largest for this variable, implying that substantial differences in social contacts occur between Dutch and international students. In addition, Dutch students are more likely to be a member of a student fraternity (26% compared to 12%) and to have a part-time job (60% compared to 39%). International students indicate that their social networks have a higher perception of their institute (d = -0.34) and international students are in more contact with the largest foreign group (d = -.81) and other international students (d = -.37). Lastly, they are more likely to be the member of a study association (15% compared to 7%). In other words, by looking at the overall scores of academic and social integration of international students in comparison to Dutch students, one could conclude that there are no substantial differences on academic integration with the exception of personal and emotional adjustment. In contrast, the social life of international students is substantially different from Dutch students. A potential caveat of these findings are that aggregating all international students together in one category undermines the (expected) substantial differences in academic and social integration between Western and non-Western students.
In order to gain a more detailed perspective of the different (sub)groups of international students, Table 5 and 6 illustrate the academic and social integration of Dutch, Western, mixed Western and non-Western students. In comparison to Dutch students, Western students score higher on all scales of academic integration with the exception of personal/emotional adjustment. In addition, mixed-Western student score significantly higher on all dimensions of academic integration in comparison to both Dutch and Western students. However, non-Western students score significantly lower on all elements of academic integration with the exception of academic adjustment. The lower academic integration scores for non-Western students are replicated for social integration with the exception of the educational system. Non-Western students are less satisfied with their social life and have less contact to Dutch and other Western students. Mixed-Western students score highest on support by family and friends and social life. Western students have the highest perception of their institute and are mostly in contact with the largest foreign group of students.

Overall, we can conclude that the social worlds of Dutch and international students (in general) are highly segregated. That is, Dutch students are more likely to have contact to only Dutch students, who mostly have a part-time job and who are more likely to be a member of a student fraternity. Mixed-Western and non-Western students have mostly contacts among other mixed/non-Western students. Western students mainly have contacts to the largest foreign group, mainly Germans. In other words, the social
segregation of social networks in Table 4 is replicated when we distinguish various subgroups of international students in Table 6.

### Table 5: Academic Integration of Dutch students versus international student groups

<table>
<thead>
<tr>
<th></th>
<th>Dutch</th>
<th>Western</th>
<th>Mixed Western</th>
<th>Non-Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>SACQ Total</td>
<td>415.96</td>
<td>409.46</td>
<td>412.26</td>
<td>397.23</td>
</tr>
<tr>
<td>Academic adjustment</td>
<td>142.42</td>
<td>143.50</td>
<td>151.17</td>
<td>145.23</td>
</tr>
<tr>
<td>Social adjustment</td>
<td>123.26</td>
<td>125.31</td>
<td>128.51</td>
<td>116.13</td>
</tr>
<tr>
<td>Personal/Emotional</td>
<td>94.74</td>
<td>89.58</td>
<td>92.03</td>
<td>86.40</td>
</tr>
<tr>
<td>Attachment</td>
<td>103.88</td>
<td>106.31</td>
<td>105.21</td>
<td>95.40</td>
</tr>
<tr>
<td>Professional Orientation</td>
<td>18.35</td>
<td>19.22</td>
<td>19.96</td>
<td>18.63</td>
</tr>
</tbody>
</table>

ANOVA F-Test for Dutch students (n=290), Western students (n=415), mixed-Western students (n=36) and non-Western students (n=88).

**Coefficient is significant at the 0.01 level (2-tailed).

*Coefficient is significant at the 0.05 level (2-tailed).

†Coefficient is significant at the 0.10 level (2-tailed).

### Table 6: Comparison of Dutch students and international student groups in social integration

<table>
<thead>
<tr>
<th></th>
<th>Dutch</th>
<th>Western</th>
<th>Mixed Western</th>
<th>Non-Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of institute</td>
<td>10.87</td>
<td>11.91</td>
<td>10.97</td>
<td>10.52</td>
</tr>
<tr>
<td>Educational system</td>
<td>5.96</td>
<td>5.86</td>
<td>6.26</td>
<td>6.84</td>
</tr>
<tr>
<td>Support family &amp; friends</td>
<td>12.26</td>
<td>12.06</td>
<td>12.99</td>
<td>11.38</td>
</tr>
<tr>
<td>Social Life</td>
<td>34.19</td>
<td>33.72</td>
<td>35.11</td>
<td>32.55</td>
</tr>
<tr>
<td>Contact with Dutch</td>
<td>4.01</td>
<td>2.91</td>
<td>3.32</td>
<td>2.74</td>
</tr>
<tr>
<td>Contact with largest</td>
<td>2.63</td>
<td>4.04</td>
<td>2.97</td>
<td>3.25</td>
</tr>
<tr>
<td>Contact with other</td>
<td>2.55</td>
<td>2.84</td>
<td>3.56</td>
<td>3.50</td>
</tr>
<tr>
<td>Member student fraternity</td>
<td>26</td>
<td>9</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Member study association</td>
<td>7</td>
<td>14</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Part-time job (%)</td>
<td>60</td>
<td>40</td>
<td>47</td>
<td>37</td>
</tr>
</tbody>
</table>

ANOVA F-Test for Dutch students (n=290), Western students (n=415), mixed-Western students (n=36) and non-Western students (n=88) and Chi-Square analysis for last three variables

**Coefficient is significant at the 0.01 level (2-tailed).

*Coefficient is significant at the 0.05 level (2-tailed).

From Table 2-6, one can conclude that the standard deviation of several academic and social integration variables is substantial, indicating that some (groups of) students do better or worse than the average student. In order to further differentiate which participants are clustered according to their scores on academic and social integration, a k-means cluster analysis was performed. Due to the fourfold division of the nationality score, four cluster centres provided the best fit. As can be seen from Table 7, cluster 1 and cluster 2 contain the highest-performing students of the sample across academic and social integration, up to the variable social life. Cluster 3 and cluster 4 contain the lowest and lower scoring students on academic and social integration. In Table 8, 70% of Dutch and Western students are present in cluster 2 and cluster 4 regarding academic and social integration. Mixed-Western students can also mainly be found in cluster 2 and cluster 4, while 60% of all non-Western students are represented among the low-adjusted students of cluster 3 and cluster 4. In other words, by using a cluster analysis, the academic and social integration among local and foreign students shows an appealing picture for both proponents and opponents of further internationalisation of higher education. That is, from a proponents’ point of view, we find that Western and mixed Western students do at least as well as local students, while 41% of the non-Western students also do well on academic and social integration. From an opponents’ point of view, the relatively large subgroup of 59% of non-Western students who belong to the underperforming cluster 3 and cluster 4 students indicates that the majority of non-Western students is not well equipped to start at a business school.
Table 7 Cluster Centers for Academic and Social Integration

<table>
<thead>
<tr>
<th>Cluster Centers</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=143</td>
<td>n=306</td>
<td>n=124</td>
<td>n=255</td>
<td></td>
</tr>
<tr>
<td>SACQ Totaal</td>
<td>484.47</td>
<td>429.41</td>
<td>334.87</td>
<td>383.68</td>
<td>2034.87**</td>
</tr>
<tr>
<td>Academic adjustment</td>
<td>170.76</td>
<td>150.48</td>
<td>118.66</td>
<td>133.8</td>
<td>448.36**</td>
</tr>
<tr>
<td>Social adjustment</td>
<td>144.71</td>
<td>131.51</td>
<td>98.34</td>
<td>115.72</td>
<td>330.25**</td>
</tr>
<tr>
<td>Personal/Emotional adjustment</td>
<td>111.21</td>
<td>96.5</td>
<td>70.79</td>
<td>83.74</td>
<td>253.09**</td>
</tr>
<tr>
<td>Attachment</td>
<td>120.01</td>
<td>111.18</td>
<td>80.99</td>
<td>98.51</td>
<td>413.51**</td>
</tr>
<tr>
<td>Perception of the Faculty</td>
<td>11.9</td>
<td>11.59</td>
<td>10.78</td>
<td>11.13</td>
<td>8.91**</td>
</tr>
<tr>
<td>Educational System</td>
<td>6.55</td>
<td>6.1</td>
<td>5.35</td>
<td>6</td>
<td>9.72**</td>
</tr>
<tr>
<td>Social Support by Family and Friends</td>
<td>12.54</td>
<td>12.34</td>
<td>11.63</td>
<td>11.8</td>
<td>5.93**</td>
</tr>
<tr>
<td>Social Life</td>
<td>14.56</td>
<td>14.07</td>
<td>12.57</td>
<td>13.16</td>
<td>18.08**</td>
</tr>
<tr>
<td>Contact with Dutch</td>
<td>3.55</td>
<td>3.44</td>
<td>2.97</td>
<td>3.1</td>
<td>7.97**</td>
</tr>
<tr>
<td>Contact with largest foreign group</td>
<td>3.45</td>
<td>3.5</td>
<td>3.34</td>
<td>3.36</td>
<td>0.59</td>
</tr>
<tr>
<td>Contact with other nationalities</td>
<td>3.12</td>
<td>2.86</td>
<td>2.78</td>
<td>2.82</td>
<td>2.06</td>
</tr>
<tr>
<td>Member of student fraternity</td>
<td>16</td>
<td>17</td>
<td>19</td>
<td>14</td>
<td>0.78</td>
</tr>
<tr>
<td>Member of study association</td>
<td>10</td>
<td>13</td>
<td>14</td>
<td>11</td>
<td>0.7</td>
</tr>
<tr>
<td>Part-time Job</td>
<td>51</td>
<td>45</td>
<td>43</td>
<td>45</td>
<td>0.71</td>
</tr>
</tbody>
</table>

K-means cluster analysis with four cluster centers (n=828)
**Coefficient is significant at the 0.01 level (2-tailed).
*Coefficient is significant at the 0.05 level (2-tailed).

Table 8 Cluster Centers across students’ nationality (in %)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>F</th>
</tr>
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<tbody>
<tr>
<td>Dutch Students</td>
<td>17</td>
<td>40</td>
<td>13</td>
<td>30</td>
<td>0.822</td>
</tr>
<tr>
<td>Western Students</td>
<td>16</td>
<td>38</td>
<td>16</td>
<td>30</td>
<td>0.776</td>
</tr>
<tr>
<td>mixed Western Students</td>
<td>23</td>
<td>31</td>
<td>0</td>
<td>46</td>
<td>2.876*</td>
</tr>
<tr>
<td>non-Western Students</td>
<td>19</td>
<td>22</td>
<td>28</td>
<td>31</td>
<td>5.606*</td>
</tr>
</tbody>
</table>

Comparison among five business schools

In general, the students at NHTV score higher on academic and social integration than the other four institutes (not illustrated). Western students at NHTV score higher on academic integration than the other four institutes. With respect to social integration, Western students are more likely to have social contacts with Dutch students at HZ, NHTV and followed by HES, HHS and finally UM. Non-Western students do particularly well at NHTV on academic and social integration, while non-Western students at HES and HHS underperform relative to their Dutch and other non-Western peers.

Discussion

In this paper, we tried to determine whether academic and social integration of international students differed from local (Dutch) students at five business schools in the Netherlands. A common assumption among educators is that academic and social integration of international students, that is the extent to which students adapt to the academic and social way-of-life, is not well aligned with the requirements of higher educational institutes. A new feature of this study was that we extended the typical focus on academic integration on explaining student retention (Baker & Siryk, 1999; Beyers & Goossens, 2002) to include social integration (Severiens & Wolff, 2008; Tinto, 1998; Wilcox et al., 2005). In addition, in line with recommendations of Christie et al. (2004), we tried to determine the underlying reasons why students integrate well at their Higher Educational Institute or not. Finally, by extending our focus to five
Our first main finding is that contrary to popular beliefs the academic integration of international students was not worse than local students. International students did score lower on personal and emotional adjustment than Dutch students, but this can be explained by the fact that adapting to a new culture takes time and might cause stress (Asmar, 2005; Skyrme, 2007). Given that the questionnaire was distributed after six to seven months after the start of the students’ academic study, one might expect that international students were not yet fully emotionally adjusted. With time, one might expect that the emotional and personal adjustment problems of international students will disappear.

A second major finding is that the social worlds of international students differed significantly from local students. That is, international students were less likely to have contact to Dutch students. Furthermore, international students were less likely to have a part-time job or be member of a student fraternity. An obvious reason for this segregation of social worlds is that international students mostly need to be able to speak Dutch when becoming member of a student fraternity or working besides one’s study. This might be a substantial barrier for some international students. At the same time, the limited social contacts of Dutch students to international students indicates that Dutch students, who mainly study at an international business programme and do not have difficulties to speak English, perceive substantial barriers to make contact to international students in their social life. Whether this is due to the lack of effort of Dutch or international students to make social contacts needs to be investigate in future research.

A third major finding is that the successfulness of academic and integration is partly related to the degree of Westernness of international students. In general, (mixed) Western students performed equal or even better than Dutch students on academic integration. This is a positive and optimistic finding for all educators who are concerned with the impact of increased internationalisation (Van der Wende, 2003). Furthermore, (mixed) Western students had a higher perception of the reputation and the educational system at the institute. In contrast, 61% of non-Western students performed significantly lower on all scales of academic integration with the exception of academic adjustment. Furthermore, most non-Western students were less satisfied with their social life and received the lowest amount of social support from family and friends. Non-Western students were well represented among student fraternities and study associations. However, given that most non-Western students studied at HES and HHS who have specific student fraternities and associations for international students, it is quite likely that the actual contacts with Dutch students are limited. This was reflected by the fact that non-Western students had the lowest contacts of all three Western groups with Dutch students. Overall, there are substantial acculturation problems for 61% of non-Western students in our sample. This requires a pro-active institutional approach (e.g. study coaching, mentoring, small classes) to facilitate non-Western students with their adjustment process when studying at a business school.

Finally, in particular the NHTV and HZ were effective in facilitating the academic and social adjustment processes of international students, while in particular non-Western students at HHS and HES seemed to have more academic and social integration issues. It seems that if large groups of a certain category of international students are present at the institute, it becomes easier for international students to form separate social networks. This might explain why Western students at UM (who form 70% of response group) have limited contacts to Dutch students. At the same time, the relatively large group of non-Western students at HHS might have sufficient size not to integrate with Dutch students, while the 4 or 5 non-Western students who study at HZ or NHTV were “automatically” stimulated to join social activities of the large Dutch community. However, given the different student populations and unequal response rates among the five business schools, one should be cautious in making inferences about the (lack of) successfulness of certain business schools to facilitate international students in their study.

**Limitations and future research**

A first limitation of this research is that we used self-reported scores of students on academic and social integration. Besides the known issues with using self-reported scores, groups or persons who are “at risk” might not have returned the questionnaire or would have filled in the questionnaire in a socially desirable manner. By distributing the internationally validated questionnaires in class on paper, we tried to limit this selection bias. In addition, we indicated that each student would be given feedback on their academic and social integration scores without that this would influence their results. A second limitation of this research is that the questionnaire was distributed after six to seven months, which might (possibly) prevent us to incorporate (international) students who had already dropped out. Last but not least, the actual
academic study success was not taken into account in this study. Even though non-Western students scored lower on academic and social integration, their actual study success after one year might not be different from other students. Nonetheless, previous research (Baker & Siryk, 1999; Beyers & Goossens, 2002; Gloria et al., 2005; Niculescu et al., 2009; Severiens & Wolff, 2008) has consistently found that low scores on academic and/or social integration leads to poor academic performance of students. In addition, the primary focus in this paper was to assess how international students perceive the academic and social worlds in which they study, in line with recommendations of Christie et al. (2004).

Given the above limitations, we aim to do a second measurement of the questionnaire among to new first-year students in December 2009. In addition, we will gather longitudinal study performance data of the respondents in order to assess what the impact of academic and social integration is on their learning outcomes. Finally, in the NAP acculturation project nine online acculturation courses among nine higher educational institutes in the Netherlands were implemented in spring-autumn 2009 to a large number of international students in a range of disciplines. By offering these courses, we focussed on getting international students acquainted with the Netherlands and the specific issues at the institute. In this way, we hope to facilitate in particular non-Western students who have according to our findings the largest adjustment problems in our business schools.

References


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This research has been financed by SURF Foundation as part of the NAP acculturatie project (http://www.acculturation.nl/). We found like to thank the following people who helped with the data collection and the overall implementation of the NAP project: Paul Jacobs, Wim Swaan, Ilja Kogan and Albert Lamberix from UM, Bert Kamphuis and Marleen van der Laan from HZ, Mascha Lommertzen and Sylvia Hermans from NHTV, Toke Hoek, Sofia Dopper and Dagmar Stadler from TU Delft, Jan Brouwer from HHS, Brechtine Detmar and Peter Dekker from HvA, Carien Nelissen, Henk Frencken and last but not least Ria Jacobi from Universiteit Leiden.
How can E-learning help with the acculturation processes of foreign students? A cross-institutional comparison

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An increasing number of students decide to study at a university in a foreign country in order to acquire international experience and increase their attractiveness for international companies. Institutes can have an active role in helping foreign students to smoothly academically integrate. Therefore, a growing number of institutes are trying to assist the acculturation process of foreign students by designing and implementing getting-acquainted courses, summer courses, or preparatory courses. By offering these courses, institutes focused on getting international students acquainted with the new country and to soften the transitional barriers they could have to deal with.

Increasingly, many European institutes are assisting prospective foreign students by using Information Technology (IT) to provide them with the necessary knowledge and skills to succeed in university (Rienties, Tempelaar, Dijkstra, Rehm, & Gijselaers, 2008). The reasons to use IT are straightforward. Namely, IT has some powerful Web 2.0 tools to support independent learning as well as to learn irrespective of time and geographical constraints with the wide-spread implementation of Internet (Resta & Laferrière, 2007; Rienties & Tempelaar, 2009). More importantly, IT has some powerful tools for learning in collaborative settings, where learners work and learn together using WIKI’s, discussion forums or web-videoconferencing (Giesbers, Rienties, Gijselaers, Segers, & Tempelaar, 2009; Williams, Duray, & Reddy, 2006).

In this paper, we will conduct an in-depth analysis of online summer courses from five higher educational institutes in the Netherlands (i.e., Hogeschool Zuyd (HZ), TU/Delft, NHTV Breda, Hogheschool van Amsterdam (HvA) and Maastricht University). These courses were given in July-September 2009 to foreign students in a range of disciplines, mainly economics, mathematics, financial management and languages. A wide range of pedagogical scenarios and tools (Wiki, discussion forums, chats, web-videoconferencing, etc.) were used. The following question will be addressed: What are the success ingredients for effective online learning and teaching of foreign students?

Keywords: E-learning, Information Technology, Acculturation process, CSCL.

Acknowledgements

This research has been financed by SURF-foundation as part of NAP Acculturatie-project (http://www.acculturation.nl/). We found like to thank the following people who helped with the data collection and the overall implementation of the NAP project: Paul Jacobs, Wim Swaan, Ilja Kogan and Albert Lamberix from UM, Bert Kamphuis and Marleen van der Laan from HZ, Mascha Lommertzen and Sylvia Hermans from NHTV, Toke Hoek, Sofia Dopper and Dagmar Stadler from TU Delft, Susan Niemantsverdriet from Leiden University of Applied Sciences, Brechtine Detmar and Peter Dekker from HvA, Piet Kommers from University of Twente, Carien Nelissen, Henk Frencken and last but not least Ria Jacobi from Universiteit Leiden. In addition, we would like to thank the audience of EDINEB 2009 for their helpful comments to improve our research.
An Interactive Exercise Player for Math-Bridge

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Abstract: Math-Bridge is a European project which aims to provide facilities for bridging the mathematics gap between schools and higher education in Europe. The Open Universiteit Nederland is responsible for the interactive exercise player for Math-Bridge. This paper discusses the various forms of interaction that can take place when solving mathematical exercises, the kind of feedback an exercise player should give according to teachers and developers of learning environments, and how strategies can be used to automatically calculate many of these kinds of feedback. Furthermore, it discusses some of the peculiarities of mathematical exercises that challenge our strategy framework.

Introduction

In most European countries there is a high demand for tailored remedial teaching materials for mathematics enabling the transition of students from schools to higher education, in particular engineering students. As a rule, existing content for remedial mathematics is available in a single language only, rarely online, and badly accessible. Moreover, it is represented in multiple formats, in various notations, and cannot be tailored to the learners’ needs.

Math-Bridge aims at changing this situation to the better and helps to bridge the gap between schools and higher education in Europe. It will provide multi-lingual and multi-cultural semantic access (e.g. search and course generation) to remedial mathematics content which adapts to the requirements of a learner and his/her subject of study. It will bring together content from different European sources and offer it in a unified way. This access will be provided through a sustainable Pan-European learning service for remedial mathematics, which will be built by collecting appropriate learning resources, extending them in terms of structure and multi-linguality, and making them useful and easy-to-find. The extended formats of the content will make a wider use of standards and, hence, will make this content re-usable and “transferable” between different learning environments. In order to achieve its goals, Math-Bridge will study the (target) competencies required for target subjects of study, adapt existing semantic and multi-lingual search software, tailor assessment tools and methodologies, and adjust the cutting-edge ActiveMath learning environment to the remedy-scenario which includes specific diagnostic means and decisions for the transition from school to higher education. The service will be able to adapt to the level of learner competences and interests.

Moreover, Math-Bridge will enable collaborative authoring of the content on the basis of Creative Commons’ licenses and improve instrumental support to collaborative authoring. This will stimulate collaborative production and assembly of educational content, which, we believe, is a future must. The results will be usable way beyond mathematics.

In this paper we will discuss one of the main tasks for which the Open Universiteit is responsible within the Math-Bridge project: the interactions in the exercise player, assessment tools, and diagnosis tools. We will use strategies for classes of exercises to give hints, worked-out examples, and to provide more detailed feedback. Mathematical exercises pose some challenges to our strategy framework, and we will describe some peculiarities of mathematical exercises.

This paper is organised as follows. Section 2 discusses the kind of interactive exercises in mathematical learning environments, and the kinds of feedback that are requested by teachers and learning environment developers. Section 3 introduces feedback services and strategies, and shows how they can be used to support interactions and feedback in learning environments. Section 4 discusses some of the kinds of mathematical exercises that are harder to model in our strategy framework. Section 5 concludes and gives future work.
An interactive exercise player

Learning mathematics requires practicing with the material that has to be mastered. Mathematics courses usually come with lots of exercises. Any remedial learning service for mathematics has to offer the possibility to practice with exercises. Furthermore, such a service should give feedback to students about their progress and errors. Many learning environments for mathematics offer interactive exercises to the user, and so does ActiveMath, the mathematics learning environment used in Math-Bridge (Goguadze, Gonzalez Palomo, & Melis, 2005). Interactivity appears in various forms. Furthermore, when discussing feedback in interactive exercises with high-school teachers, university teachers, educational experts, and learning environment developers, we obtained requests for various forms of feedback. In this section we discuss the various kinds of interactivity, and the kind of feedback teachers expect.

We illustrate the various forms of interactions together with the corresponding feedback with an exercise about solving the quadratic equation $x^2 - 4x = 12$. Three possible derivations for this equation are shown in Figure 1, which will be our running example in this paper.

Figure 1: Three possible derivations for a quadratic equation

<table>
<thead>
<tr>
<th>Derivation 1</th>
<th>Derivation 2</th>
<th>Derivation 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x^2 - 4x = 12$</td>
<td>$x^2 - 4x + 4 = 16$</td>
<td>$x^2 - 4x - 12 = 0$</td>
</tr>
<tr>
<td>$(x - 6)(x + 2) = 0$</td>
<td>$(x - 2)^2 = 4$</td>
<td>$D = (-4)^2 - 4 \cdot 1 \cdot (-12)$</td>
</tr>
<tr>
<td>$x = 6 \lor x = -2$</td>
<td>$x = 2 \lor x = -2 = -4$</td>
<td>$D = \sqrt{64} = 8$</td>
</tr>
<tr>
<td>$x = 6 \lor x = 2$</td>
<td>$x = 6 \lor x = -2$</td>
<td>$x = \frac{4+8}{2} \lor x = \frac{4-8}{2}$</td>
</tr>
</tbody>
</table>

Multiple-choice questions. The most basic form of interaction is via multiple-choice questions. For example, four possible answers offered to our running example might be $x = 6 \lor x = -2$, $x = -6 \lor x = 2$, $x = 4 \lor x = -3$, and $x = 6$. With the wrong answers a teacher can store the common misconception that leads to this answer, and show this to a student who submits a wrong answer. It is labour-intensive to specify wrong answers for each multiple-choice question. Randomising these questions is desirable. Then we want to automatically calculate not just the correct answer, but also wrong alternatives that are based on common misconceptions.

Submitting final answers. Many exercises just ask for a final answer to a question. Checking whether or not a final answer is correct often involves more than a syntactic check: answers can be given in many different formats, and the students’ answer has to be normalized to some extent to be able to verify correctness (Sangwin & Grove, 2006; Bradford, Davenport, & Sangwin, 2009; Heck & Gastel, 2006). An obviously correct variant that appears in solutions to quadratic equations is the order in which the solutions for $x$ are given. It is not always easy to specify how much a student should simplify. For example, many teachers will want to see $2\sqrt{2}$ instead of $\sqrt{32}$ in an answer, but sometimes the difference doesn’t matter. Teachers want to specify erroneous answers together with appropriate feedback with an exercise, and show this to a student upon an error. Another response teachers wish to be able to give is a simpler question, in which a student only solves an initial part of the exercise. For example, if a student answers $x = 4 \lor x = -3$ to our running example, we might ask the question: Bring all terms to the left-hand side of the equation.

Solving exercises stepwise. Using pen-and-paper, students solve mathematical exercises step by step. ActiveMath can be used to mimic this process by offering interactions in which a student stepwise solves an exercise. The preferred way of interacting varies among teachers and learning environment developers: some prefer a student to select part of the current expression and a rule, and then apply the rule to the selection automatically (Beeson, 1998), others just want a student to submit a new expression (Chaachoua, Nicaud, Bronner, & Bouhineau, 2004), and yet others let a student both select a rule, and
apply the rule to obtain the next expression (Boon & Drijvers, 2005). Various kinds of feedback are desirable.

- Is the submitted expression the final answer to the exercise? As in the case of submitting final answers, questions about simplification play a role here.
- Is the submitted expression similar to the previous expression? This implies that the student didn’t take a step towards the solution, but instead performed some simplifications to the current expression.
- Is the submitted expression semantically equivalent to the previous expression? If not, the student has made a mistake.
- Does the submitted expression follow the strategy for solving the class of exercises? For instance, in our running example rewriting the left-hand side of the equation into \( x(x - 4) \) does not bring you closer to a solution. Hence, this step is not part of the strategy.
- Can the submitted expression be obtained by applying a common misconception to the previous expression? A common misconception for our running example would be to forget to change the sign when bringing the constant 12 to the left-hand side.

Furthermore, teachers want to be able to give hints about which step to apply next, to show how much progress a student has made towards a solution, or to show the complete derivation of the solution to the exercise. Note that when giving hints we can show only the step an expert would take towards the solution, or we can give all rules which bring the current expression closer to a solution at this point, including rules that lead to longer derivations. For example, after moving 12 to the left in our running example, we can choose to suggest just factorising the expression (the expert step), or also show the quadratic formula (allowing longer derivations).

Exercise completion. A good way to learn algebraic skills is to first study a worked-out example, than fill out a worked-out example from which some steps have been omitted, and only then completely solve an exercise (Sweller, Merriënboer, & Paas, 1998). ActiveMath offers fill-in-blanks exercises, which can be used for this purpose.

Feedback services

How do we realise the various kinds of feedback discussed in the previous section? To automatically calculate various kinds of feedback, we have introduced the concept of rewrite strategies for specifying exercises (Heeren, Jeuring, van Leeuwen, & Gerdes, 2008; Heeren, Jeuring, & Gerdes, 2010). A rewrite strategy specifies how an exercise is solved stepwise. For example, to solve a quadratic equation \( ax^2 + bx + c = 0 \), we first check if one of the simpler cases applies, in which either \( b \) or \( c \) equals 0. If not, we determine whether or not there exist “nice” factors that can be used to factorize the expression. This is the case in our running example. After factorizing, the resulting two linear equations are solved. If no nice factors are found, the quadratic formula is applied, and the two resulting answers are simplified.

A rewrite strategy is specified as a context-free grammar over rewrite rules, where the language for context-free grammars is extended with some constructs necessary for specifying exercises. A sequence of rewrite steps is a sentence of this grammar, if it follows the strategy. Correctness of a sequence of rewrite steps can be determined by parsing the sequence against the grammar. Our rewrite strategy language is a domain-specific language for specifying domain reasoners (Zinn, 2006).

Viewing a strategy as a grammar, and solving an exercise as constructing a sentence of the grammar has turned out to be a very useful way for automatically calculating various kinds of feedback. Strategies are used for calculating all the kinds of feedback described in the previous section.

We offer the various kinds of feedback as services (Gerdes, Heeren, Jeuring, & Stuurman, 2008). An exercise player uses our services to obtain feedback on a particular submission. Most services expect an expression, usually specified in some standard format such as OpenMath (The OpenMath Society, 2006), a strategy with which the exercise is solved, and a location in the strategy specifying which steps of the strategy have already been performed. The service then calculates the desired feedback and some other information, such as an updated location, which is returned to the exercise player. The updated information can be used in the next service request.
Services for mathematics

The strength of our approach based on rewrite strategies and services is that it is completely independent of the domain on which the rewriting takes place. We have used it successfully to solve particular classes of exercises in logic, relation algebra, and linear algebra. The exercises in mathematics we have worked on thus far introduced new challenges that need to be addressed. Most of these challenges followed from requests made by teachers.

Intermediate values. For some classes of exercises it is important to see and manipulate intermediate values. Applying the quadratic formula provides an example. Using this formula involves the following steps: identify the values for a, b, and c (the variables appearing in the quadratic formula), determine the discriminant, and in case the discriminant is positive, calculate its square root. Some of these steps are also visible in the right-most derivation in Figure 1. Omitting these intermediate values would make it hard to follow the calculation in a worked-out example, and would make the application of the quadratic formula quite involved. Having intermediate values in a derivation is challenging because its associated steps are not rewrite rules. It is more like having a scribbling pad at ones disposal. From the perspective of a student, supplying intermediate values can be helpful since it provides guidance in performing a complex step. The extra steps also allows for new kinds of feedback: submitted intermediate values can be checked for correctness, and common misconceptions can be recognized and acted upon.

We have introduced a so-called clipboard to deal with this issue. This clipboard is communicated as part of the context that is attached to the current expression. Values can be written to (and read from) the clipboard, both by the exercise player and the domain reasoner. Hence, a common understanding of the content of the clipboard is needed at both ends.

Rounding numerical values: Although most interactive exercises require students to provide an exact answer to a question, in certain cases it is desirable to ask for an approximation of the final answer. For example, instead of accepting $x = \sqrt{17}$ as a solution, an environment could make a student use a pocket calculator and submit $x \approx 2.062$.

Approximations complicate diagnosing intermediate student answers: rounding errors are propagated, and comparing floating-point numbers is notoriously difficult. To circumvent these problems, we only accept approximations as a final step, and we make the rounding explicit by choosing a different symbol (that is, $\approx$).

Exercise in parts. Some exercises are solved in parts. For example, a standard strategy for solving a quadratic inequation (such as $x^2 - 4x < 12$) is to first solve it as an equation, and then use the result to provide an overall answer. Simply turning the inequation into an equation as a first step would be inappropriate because these two clearly have different meanings and solutions.

A solution is to place the inequation in the context of the current expression at the introduction of the equation. This way, a consistent meaning is available during the whole derivation.

Implicit simplification: The treatment of automatic simplification and the use of canonical forms in the domain of mathematics is particularly subtle. For instance, applying the distribution rule $a(b + c) \rightarrow ab + ac$ to the expression $4(x + 2)$ would result in $4x + 8$, thus performing the simplification step $4 \cdot 2 \rightarrow 8$ silently. This makes perfect sense for an interactive exercise that focuses on solving equations, and not on performing basic calculations. The degree to which expressions are simplified automatically can vary between exercises.

In the case of an exercise on solving quadratic equations, one must decide on how to simplify square roots. For this, we use views (Heeren & Jeuring, 2009) in our domain reasoners. A view describes a canonical form. For instance, we could choose to view $V32/2$ in the canonical form $2\sqrt{2}$, and to not distinguish between the two expressions. Both expressions are equally well-suited as a final answer. Alternatively, we could decide to make a distinction, and to require an extra step by the student to turn $V32/2$ into $2\sqrt{2}$ if the latter is expected as the final answer. Regardless of whether the simplification of square roots is implicit or explicit, an environment should be able to provide useful feedback to the student.

With respect to simplifying square roots, one should take into account that not all square roots can be normalized easily without the help of a pocket calculator, especially when large numbers occur. Similarly, finding the factors of a quadratic equation can be of varying difficulty. Interactive exercise assistants should allow teachers to indicate the boundaries of what can be expected from a student, and what not.
Conclusion

To bridge the gap in mathematical competencies between schools and higher education, the European Math-Bridge project provides on-line mathematics learning facilities. The Open Universiteit is responsible for the interactive exercise player for Math-Bridge. In this paper we have discussed the various forms interactions can take, and the kinds of feedback desired by teachers and learning environment developers. Strategies can be used to automatically calculate all these kinds of feedback. We have discussed some of the peculiarities of mathematical exercises that pose challenges to our strategies framework.

In the near future we will develop feedback services for the domains that are necessary for courses developed within Math-Bridge. We expect to develop many domains and rewrite strategies. We will investigate how these domains, rewrite rules, and strategies are best organised, maintained, and reused.

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A Zillion of Math Exercises

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Abstract: Since 2005, a new ICT-tool is used at the University of Amsterdam for supporting the transition regarding mathematics from secondary education. In science and economics the freshmen typically lack algebraic skills, which leads to problems during the first years. So, entering the university, they are submerged in a training of mathematical skills.

At the basis is the test and assignment software “Maple TA” that is built upon the mathematics software Maple. This mathematics engine can handle mathematical equivalence of expressions. It can be programmed to check answers to open-field questions, and to generate customized feedback. Moreover, by replacing numbers in the exercises by parameters, the system can generate many exercises on the basis of a single template. Suppose we have three parameters with each ten allowed values, this already gives a thousand of exercises. Serious use of a new ICT tool may encounter some problems, and we will yield our experiences.

In this paper, we pay attention to the design considerations, to implementation issues and to student opinions and results. The approach at faculty of Science will be evaluated. Some of the results will be compared with the experiences at the faculty of Economics and Business. We will conclude with plans for the future.

Introduction

In the Netherlands, 2004, a wave of consternation went through the disciplines like science, technology and economics that use mathematics in the first study years. The perception was that the level of algebraic skills suddenly dropped substantially. Soon, entrance tests for mathematics were developed to check the mathematical level, especially the algebraic skills. Unfortunately, these tests only appeared after the event, so they could not show a difference. But the dramatic results drew attention of media and politics. At the background several educational reforms changed considerably the form, contents and assessment of mathematics. (van Gastel, e.a. 2009). Apparently, these reforms had a negative impact on the level of algebraic skills, but as they took place in the same timeframe, it is not easy to isolate the effects. Jan van de Craats, professor at the University of Amsterdam, challenged the teachers and mathematics education researchers that introduced the reforms. In the meantime he wrote a book with ample opportunity to practice. The debate he started is still raging anno 2009.

At the same time, around 2004, the test and assignment system Maple TA was released. It is a combination of a web-based environment for assessment developed by Brownstone, and a mathematics engine Maple developed by MapleSoft [http://www.maplesoft.com]. The mathematics engine Maple is able to perform symbolic computations, and it is well suited for formula manipulations like checking answers, providing feedback depending on the given answer, and generating instances of questions on the basis of a template and parameter variation. This capability yields that instead of writing a single question, a template and 3 parameters with each ten choices, will lead to a thousand instances of questions. Thus, with a test of 20 questions 20,000 other versions of the test can be generated. Of course, care should be taken to ensure that the difficulty of the question does not change with different parameter values. This will make an interesting research subject. But in essence, the same test can be offered to students to practice as to assess their level, because as soon as the student understands the method independent of the specific numbers, the desired level is reached.

(Heck, e.a. 2006). When the technology push of the Maple TA system meets the market pull of the demand of the training of algebraic skills, a project springs into existence. In fact, a line of projects at a national level was started with the University of Amsterdam in an important or leading role: Webspijkeren (2004), MathMatch (2005), Webspijkeren 2 (2006), NKBW (2006), NKBW 2 (2008). (Brouwer, e.a. 2009).
Design of Remedial Activities at the Faculty of Science

The first implementation in 2005/2006 focused on the development of two diagnostic tests in Maple TA, one in at the very start of the study year, and one after four weeks. The purpose was to provide a diagnosis to students and staff. However, as the results were unsatisfactorily, neither students nor staff were happy with negative welcome at the moment of entering the university. One year later, 2006/2007, the same design was used, but it was shifted by one week. A drawback of this design was that in student perception, it stood loose from the Calculus course. So, a tighter integration with this course was developed, where the tests would better fit the basic mathematics training of the first weeks of Calculus.

The design of the remedial course for the students from the Faculty of Science was the same for the academic 2007/2008 and 2008/2009 years. In the first five weeks of the course Calculus 1, remedial teaching took place once per week. This teaching was in the form of a practical. In the first two weeks the students had to do written exercises and later the problems were discussed in the class. The third and the fourth sessions included a demonstration of how to work with the Maple T.A. program and actual practice with digital tests. In the fifth week a final test took place. Due to a technical problem, in the 2008/2009 academic year, the test was not done on a computer as planned, but the students had to give a written exam. For the students who did not succeed from the first time there were two other opportunities to redo the test. In comparison with the 2007/2008 year, for preparing the digital tests a different question bank was used. This time questions from the Faculty of Economics and Business were taken and adjusted. The students had also the chance to practice with the digital tests at home, but the two practice tests had to be done in a university setting during the practice sessions. The students worked in pairs due to lack of enough computers. According to the results from the evaluation forms, the majority of the students who participated in the survey have spent between 2-4 hours practising.

Research Design

To evaluate the impact of the trajectory for improving students’ basic algebraic skills, analysis of the students’ performance was done. For the students’ results, the overall grades from the Calculus 1 course for the academic 2008/2009 were correlated with the results from the final basic algebraic skills test. The grades correlate significantly (overall grade from the course Calculus 1 and grade from the basics algebraic skills test: 0.69, \( p<0.001 \), \( \chi^2 \) test). The results concur with the implications from previous case study (Heck, e.a. 2006). Next, we looked whether there is significant correlation between students’ mathematical background and their performance in the course Calculus 1. Since the students come from various mathematical backgrounds from high school, it was assumed that they would spend different amount of time for preparation, as well as the course would have a different effect on the students’ progress. Students’ opinions on the above issues were collected from a survey and then they were compared within the bachelor’s program and within mathematical background. Finally, the students’ appreciation of the course was compared to their performance. For this purpose, the students were grouped according to their mathematical background.

The evaluation project aimed at investigating didactical, mathematical and technical aspects of Maple TA tests and assessment. Stakeholders were asked to give their opinions and experience. Analysis of the students’ performance was done: their results were compared and evaluated. The instruments for data analysis of the stakeholders’ opinions about the remedial trajectory and diagnostic testing include a survey and focus group interviews. For the academic 2007/2008 four students from the exact sciences were interviewed. From the teaching staff the coordinator of the course Calculus 1, the coordinator of Bachelor’s Physics, the lecturer of the course Mathematics 1 at the Faculty of Economics and Business, and 4 teaching assistants were interviewed. For the 2008/2009 year the main lecturer of Calculus 1, the coordinator of the course Calculus 1, and the educational director of the College of Science (for Chemistry and Bio-exact Sciences, in particular), were interviewed. The developer’s perspective is included in separate technical report. He was also asked to answer a prepared questionnaire.

The data that is compared includes results from the academic years 2007/2008 and 2008/2009 from the Faculty of Science and occasionally from the Faculty of Economics and Business. In the survey from 2008/2009 at the Faculty of Science were included a few new questions for comparison, and the ones which would not provide enough information were left out. Other questions were rephrased in order to make them explicit as possible, but they were still comparable to the questions addressed in the previous
evaluation phase. For the students’ performance, cohort 2008, statistical analysis was conducted. Whether the remedial trajectory and the digital diagnostic tests have a positive effect on the students’ overall scores in the course Calculus 1 correlations between the students’ performance in the final basic algebraic skills test and their overall Calculus 1 grade were made. For the statistical analysis is used SPSS software.

Thus, for the students’ responses and performance there are two data sources: qualitative from survey and quantitative from their grade reports. The surveys were anonymous, so in order to draw some general conclusions, data were grouped in more general categories, e.g. per students’ high school background, or Bachelor’s program they followed. Therefore, some of the variables were re-grouped in new categories. For the students’ mathematical background is used categorisation in accordance with the old situation before August 2007 in Dutch high schools (Oude Tweede Fase).

**Results**

First, the students were asked to give their opinion about the design of the remedial course. The results are compared for the past two academic years. The majority of the students liked the organisation of the remedial course: 75% of the students agreed that the organisation was good. (This is the sum of the percentages of the Agree and Strongly Agree answers.) The extreme poles remained the same: 1% totally disagree, and 11% totally agree with the posed statement (see Figure 1).

![Survey: Faculty of Science](image)

<table>
<thead>
<tr>
<th>Num. resp.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/119</td>
<td>3.8</td>
</tr>
<tr>
<td>12/135</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**Figure 1:** Student opinions

Next, we focused mainly on students’ opinions and performance for the 2008/2009 academic year. For the purpose the following evaluation questions were posed:

*How do the Maple T.A. tests fit with the students’ previous mathematical knowledge?*

*Does the Maple T.A. help for diagnosing students’ mathematical skills?*

We are interested in two groups in particular: students with background Mathematics B1 and with Mathematics B1,2, respectively. The Mann-Whitney Wallis statistic was calculated and statistically significant difference in the students’ voting was found (U=302.500, p=0.000). After examining the cross-tabulation (see Table 1), it appears that the majority of the students with Mathematics B1,2 background (75% cumulative of the positive answers) agreed with the statement that the content of the written basic algebraic skills test fit with their pre-knowledge. On the other hand, the other group shared the exact opposite opinion (51% cumulative of the negative answers).
Comparing the questionnaires from the two previous years, the difference is that in the new survey, the direct question about whether the practice tests help in diagnosing one’s skills was omitted due to the fact that the results from it were not really informative. There could be also a difference in what students think is satisfactory level for their skills and knowledge and what the teachers consider to be sufficient. Thus, this time the students were asked in two parts how they find the level and the scope of the practice questions. In this manner we hoped to get information about their opinion of the design of the course as well. The level of difficulty of the questions was the same as the one from the previous year. If the students considered the level of the tests too high, that would be a signal for themselves that they should spend more time practicing, and for the teachers: to pay more attention to certain problematic areas. As a result from the survey for the academic 2008/2009, 78% of the students held the opinion that the level of the written skills test was average. With regard to the scope of the test, 71% of the students found it average.

The question whether the students felt confident in their basic algebraic skills after the remedial course triggered relatively the same percentage of responses. However, in 2008/2009 year it can be noted that a higher percentage of students claimed to happy with their acquired skills (66% compared to 59% from the previous survey). (see Figure 2)

Table 1: Cross tabulation of the Student’s high school mathematics background and their opinion

<table>
<thead>
<tr>
<th>High school mathematics background</th>
<th>The content of the written basic algebraic skills test fit with my pre-knowledge from high school.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>strongly disagree</td>
<td>disagree</td>
</tr>
<tr>
<td>Mathematics B1</td>
<td>1</td>
<td>4.5%</td>
</tr>
<tr>
<td>Mathematics B1,2</td>
<td>9</td>
<td>11.5%</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>66.7%</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale:</th>
<th>1 - strongly disagree</th>
<th>2 - disagree</th>
<th>3 - neutral</th>
<th>4 - agree</th>
<th>5 - strongly agree</th>
<th>Num. resp.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007/2008</td>
<td>91/119</td>
<td>3.6</td>
<td>113/135</td>
<td>3.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Students’ opinions about the level of their skills after the remedial course
It is also necessary to clarify which of the students claimed that they could follow the rest of the course and the other courses. Where these the students who needed to brush up their knowledge, or who didn’t think that their previous knowledge was sufficient?

The correlation between students’ performance in the basic algebraic skills test and in the course Calculus 1 is significant (0.69, p<0.001, $\chi^2$ test). Here it was taken the average score of the basic algebraic skills test (two trials) and the final grade from Calculus 1 (total after first trial and second trial). A scatter plot of the regression of the scores from Calculus 1 and the basic algebraic skills tests indicates a linear relationship between the two variables, with an adjusted R square of 0.47. (see Figures 3,4,5). Thus, the goodness of fit is moderate.

Figure 3: Scatter plot of Students’ performance, 2008/2009

Figure 4: Results Calculus (Total after 2 trials)

<table>
<thead>
<tr>
<th>Bachelor’s Program</th>
<th># Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td>Chemistry</td>
<td>17</td>
</tr>
<tr>
<td>Physics and Astron.</td>
<td>50</td>
</tr>
<tr>
<td>Mathematics</td>
<td>26</td>
</tr>
</tbody>
</table>
Evaluation question: Does the Maple T.A. help to improve basic algebraic skills?

With responding to the next question the students who did at least one of the practice tests, gave their opinion whether the tests helped them to improve their basic algebraic skills. (see Figures 6,7). The results are scattered. There is no majority expressing extremely negative or positive opinion. Thus, further explanations from student interviews were taken into account. On average, the students seem to be neutral about this issue because they came from very different background. The groups who took the Calculus 1 course consisted of students studying mathematics, physics and astronomy, double mathematics and physics, chemistry, and bio-exact sciences. As a result, most of the students who studied mathematics or physics and/or came from “Nature and Technology” high school profile, found the remedial course very easy and therefore not adding to their previous mathematical knowledge and skills. On the other hand, for the majority of the chemistry students this course was extremely difficult, which means that they needed to do something about their insufficient knowledge and skills. The focus group also mentioned as a possible explanation for the neutral results here, the technical issue: not only from content point the digital tests were difficult for some students, but also they had to deal with the Maple T.A. program for the first time. This meant for them, getting to know the specific syntax of the program, which could be time-consuming, especially in a moment when they were supposed to practice their algebraic skills. A statistically significant correlation was found between the number of digital tests made and students’ opinion. (Pearson Correlation, $p =0.516$).

![Figure 5: Students’ results Calculus (total after 2 trials)](image)

![Figure 6: Students’ opinions](image)

<table>
<thead>
<tr>
<th>Mathematical Background</th>
<th># Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics B1</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics B1,2</td>
<td>7</td>
</tr>
<tr>
<td>Other (Dutch)</td>
<td>7</td>
</tr>
<tr>
<td>Unknown</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>strongly disagree</td>
<td>disagree</td>
<td>neutral</td>
<td>agree</td>
<td>strongly agree</td>
</tr>
<tr>
<td>Faculty of Science</td>
<td>11%</td>
<td>6%</td>
<td>10%</td>
<td>34%</td>
<td>26%</td>
</tr>
<tr>
<td>Faculty of Business and Economics</td>
<td>37%</td>
<td>30%</td>
<td>8%</td>
<td>21%</td>
<td></td>
</tr>
</tbody>
</table>
Evaluation question: Does Maple T.A. stimulate the students to practice?

The students’ opinions whether the tests stimulated them to practice their basic algebraic skills are shown on Figure 8. For the Faculty of Science the average score remained the same in comparison with the previous year. However, it can be noted that the responses are distributed differently. For example, this time there are less neutral answers: 25% stayed neutral compared to 42% in the previous survey. (see Figure 8). A statistically significant correlation was found between the number of digital tests made and students’ opinion. (Pearson Correlation, p =0.418).

Discussion

Looking back at the evaluation questions, the basic algebraic skills tests can be used for diagnosing students’ performance during the course Calculus 1. The threshold was determined by the management and if it had been set to higher level, it would be more predictive. The mathematical background of the students is important variable to be considered for students’ performance and attitudes. The majority of the students shared the opinion that the content of the tests fit well with their mathematical pre-knowledge. The disagreement with this statement came from most students with the “lower” level of mathematical background Mathematics B1. The number of tests made and the time spent on preparation for the course also made a difference in the students’ opinions. Students who made more than 3 digital tests appreciated them more. By doing more tests they would acquire the necessary technical skills to work easily with the Maple T.A. program.
Implications for 2009/2010 and experiences

For the science students, the design of the remedial activities was changed. Since almost all students needed some refreshment of algebraic skills, an overview was lectured during the first two weeks. Then the first diagnostic test was performed and an individual advice was given on the basis of this test. This advice concerned practicing with interactive materials that were collected using Wizmo (http://www.wizmo.nl). In view of the differences in results and attitude between the students studying chemistry, physics or mathematics, it was decided to differentiate in the pass/fail threshold. In this way the chemistry students, including most of those with a Mathematics B1 background, were in a track with a more positive stimulus, and the mathematics students were challenged to a higher extent. For student support, three sessions were organized for training and individual advice. A second test followed, and after three more weeks a second resit. Student performance at the Calculus course and survey data are not known at this date yet, but of all students that took the diagnostic test or one of the resits 71% of the chemistry and physics students passed, and of the mathematics students 85% passed.

References


MathMatch, Project documents,


Acknowledgments

We would to thank the teaching staff, coordinators of the Bachelor programs at the Faculty of Economics and Business and at the Faculty of Science, the Maple TA experts and developers, and the students for participating in the interviews and surveys.
On bridging and closing the Mathematics gap

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Abstract: In the Netherlands, local and country-wide initiatives have been deployed to solve the Mathematics problem of unsatisfactory performance at the start of higher education. These initiatives focus especially on the shortcomings in algebraic skills, a severe gap between secondary and higher education. In this paper, we shed the light on two initiatives to solve mathematics transition problems. The first is a community of practice, SIGMA that brings together people involved in the transition of secondary to higher education regarding mathematics. The second initiative is the project NKBW subsidized by the SURF National Action Program e-Learning (www.nkbw.nl). It brings together a broad range of mathematics materials in a web-based repository. Teams of teachers from secondary and higher education developed together algebraic skills tests, that are positioned as a kind of calibration point for the transition. Monitoring these activities yields more insight in the background of the problem and in the success rate of the different approaches.

Introduction

With the purpose of building a European knowledge economy, the European Communion has set in the year 2000 a goal of a 50% participation in higher education. What finally matters is the number of students that successfully finish, so apart from raising the influx in higher education, also the reduction of drop-out rate and study delay is important. Unfortunately, at the moment of the agreement on these plans, there happened to develop a mismatch in the transition from secondary to higher education concerning mathematics in the Netherlands. This mismatch that became apparent in a serious drop in results of the first mathematics course.

For instance, the success rate of Calculus 1 for chemistry students at the University of Amsterdam dropped from 80% in 2003 to 45% in 2004. For mathematics and physics the effect was with 13% less pronounced, because they typically attract students with high mathematical capabilities. At the Technical University of Eindhoven the technical disciplines are undergoing severe problems with first mathematics course. These problems do not only arise in the science and technical disciplines, also for instance in economics success rates became quite problematic (Brouwer et al., 2009). The gap in the mathematics transition was even a central topic in a parliamentary investigation into the problematic outcomes of educational innovations (Dijsselbloem, 2008).

<table>
<thead>
<tr>
<th>Study program</th>
<th>cohort</th>
<th># students</th>
<th>Success rate 1st math exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sciences RUG</td>
<td>2007</td>
<td>159</td>
<td>25%</td>
</tr>
<tr>
<td>(Groningen)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry UU</td>
<td>2006</td>
<td>83</td>
<td>25%</td>
</tr>
<tr>
<td>(Utrecht)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UM-IB</td>
<td>2006</td>
<td>1030</td>
<td>47%</td>
</tr>
<tr>
<td>TUD-EWI</td>
<td>2007</td>
<td>354</td>
<td>37%</td>
</tr>
<tr>
<td>Fontys-TN</td>
<td>2007</td>
<td>48</td>
<td>40%</td>
</tr>
<tr>
<td>UU-economie</td>
<td>2007</td>
<td>262</td>
<td>38%</td>
</tr>
</tbody>
</table>

Table 1. Success rates on the first mathematics exam (Source: NKBW Monitor wiskundeaansluiting)

Also study delay is occurring. At the University of Amsterdam, in view of the poor success rates, it was decided to raise the number of resists for examining the first mathematics course from 1 in 2003 to 5 in 2006. Nevertheless, for a student who has to retry a key course so often, the chance of finishing the first year of the study in 12 months is quite small. You may run as fast as you can, but you cannot catch a train.
that already has departed. In table 1 the success rates on first math exam at several Dutch universities in 2006 and 2007 are presented.

**Causes of mathematics transition mismatch**

There are several education reforms which caused that the mismatch between the secondary and higher education occurred in The Netherlands. At the end of the previous century, important changes have occurred in secondary education. Up to 1999, each secondary school student from age 15 to 18 had freedom to choose subjects, within certain boundaries. To ameliorate the transition to higher education, four profiles were developed with coherent packages of subjects that should prepare for higher education. These profiles were Culture & Society, Culture & Economy, Nature & Health and Nature & Technology. Representatives from higher education participated in the development of the profiles and the new subject contents. The second reason for was setting a “basis education” (basisvorming) which referred to the first three years of secondary education making so a distinction of only two levels which led to less pronounced learning results. Additionally, the idea of New Learning was developed at the same time. Its characteristics are (1) an activating learning environment with attention paid to independent learning, (2) meaningful and authentic contexts, (3) cooperation between learners, (4) change the role of the teacher from more knowledge transfer role to more coaching role. All three educational innovations had a negative impact on the level of algebraic skills of the students preparing for higher education. Especially for the better students, the mathematical fundamentals became weaker because the new learning concept had a strong influence on teaching practice. Typically, mathematics lessons consisted of say 30% explanation, and 70% doing exercises with the teacher assisting. Now, with the new learning, contact hours diminished and students would do more self-study supported by some staff member. So for mathematics, typically exercises would go into the self-study hours, without a mathematics teacher to support.

The educational reforms were not the only cause for the mismatch. The number of students who chose the profile Nature & Technology diminished drastically. Higher education in science and technology felt threatened and started to allow also students with profile Nature & Health. So the possible merit of a thorough preparation for the technology disciplines, evaporated at the very beginning. Moreover, the students and schools complained about an overburdened program. Indeed, motivated by the idea of writing for the right selection of students, the developers had broadened scope and increased depth of the curriculum in all disciplines, and a balance was lost. Another mathematics education innovation of the nineties concerned the graphical calculator. In the spirit of bringing more ICT to the classroom, the graphical calculator replaced the standard calculator and brought quite some functionality in the mathematics classroom as graphing and tabulating functions, finding zeroes, etc. In practice, the students used this tool to a much higher extent than expected. Both the strong focus on contexts and the use of the graphical calculator had a negative impact on the level of algebraic skills.

Politics gave a clear signal that algebraic skills should return to the classroom. Meanwhile, the transition from vocational to higher education and the transition from professional Bachelor education to academic Master education turned out to be equally problematic with regard to mathematical skills, especially the algebraic skills. The Dutch Education Council gave in 2008 the advice to develop “Agreements start higher education” where the different educational parties agree on the entrance level for various disciplines. In particular, sets of tests are developed so that students can check their knowledge and can take action if this turns out to be necessary.

In summary, we see that Dutch mathematics education faced five educational innovations, three generic innovations, two especially for mathematics educations. All these innovations had specific goals that were often met in most cases, but in the meantime there was a negative overall effect on algebraic skills. It is hard to discern which effect is due to which innovation, as the effects were all in the same time frame.

**Many initiatives to improve algebraic skills**

Given the fact that many higher education study programmes need a lot of algebraic skills especially in the beginning, concerns were expressed and entrance tests started to pop up. Up to that moment, the Dutch educational system did not need such tests for the regular transition from secondary to tertiary education. The results of the entrance tests were dramatic, and it arose quite some attention from media and politics. Many higher educational institutes deploy initiatives to encounter the problem of lack of algebraic skills. We list here some of the important initiatives.
To meet in a flexible way the variety of demands regarding transitional education and self-study, the idea of a repository with re-usable learning objects was worked out in the project Math Learning Space of the e-merge consortium (www.e-merge.nu). Finally this idea was to be materialized in the repository www.wizmo.nl of the NKBW-project (see below).

In the project MathMatch (www.mathmatch.nl) of the, by now extinct, Digital University consortium (www.du.nl) interactive mathematical exercises were developed to accompany the book “Basisboek Wiskunde” (Craats 2005). The web-based test and assignment system Maple TA is used. The system is able to process mathematical input, to correct it automatically and to give feedback. It also allows the development of templates that yield each thousands of instances of exercises by varying parameters.

In the project Intelligente Feedback in e-Learning Systems, subsidized by the SURF Foundation (www.surffoundation.nl) parsing techniques from computer science were used to develop an approach to generate feedback for mathematical exercises.

In the SURF-project Web-spijkeren good practices were collected of transitional and remedial education, together with a classification scheme for mathematical test items and a protocol for evaluation of flexible preparatory education.

In the follow-up project het SURF project Web-spijkeren 2 these practices were brought further and effects were measured. Moreover, together with some Dalton schools a new collection of Maple TA exercises was developed that can be used at secondary schools.

The system MathDox (www.mathdox.org) is an ensemble of software tools for creating Interactive Mathematical Documents developed at the RIACA, Eindhoven Technical University. It is a software system including an XML based language for markup; a document server, and mathematical services, providing connections with various mathematical systems. In the project Wortel TU/e (http://wortel.tue.nl) it is used for the algebraic skills for the incoming students.

The University of Leiden maintains a WIMS-server with many materials for practicing algebraic skills.

In the project Aansluiting Wiskunde VO-HO (Connecting Secondary and Higher Education in Math) of the Apollo-consortium (www.apolloplatform.nl) a system was developed on the basis of the Interknowledge tool that allowed students to self-assess their mathematical capabilities.

Some activities in secondary education already existed, but proved very useful in view of the problem at hand.

Since a few years, the site WisFaq was developed by Willem van Ravenstein with a list of answers to often posed questions. There is the possibility for students to pose new questions, and an active group of moderators is available for answering. More than 20,000 questions can be found.

The website WisBase has been set-up by two Mathematics teachers to exchange Mathematics tests among about two hundred of mathematics teachers. Around a hundred schools participate.

At the Freudenthal Instituut (University of Utrecht) a collection of applets for mathematics is brought together in the Digital Mathematics Environment (http://www.fi.uu.nl/dwo/en/frameset.html). This collection contains several interactive applets that are useful to train algebraic skills.

The foundation Math4All (www.math4all.nl) provides interesting and challenging mathematics materials. It offers a algebra-kit that gives ample opportunity to train algebraic skills.

**SIGMA Community**

From 2003 many projects started at different Dutch research and applied sciences universities to solve the mathematics transition problem of incoming students. The projects listed above made it possible that a lot of digital teaching material and new knowledge about the methods how to use ICT in education became available in higher education. However the actual sharing of the results was not as big as might be expected and the universities mostly used those results of projects in which they were involved themselves. Usually there is not much ambition and also very little opportunity to directly collaborate with other projects on other universities which might be going on at the same time working on the same problems. The project teams need to concentrate on their own project targets and plans.
There were a lot of complaints of the higher education institutions towards the secondary education about the low knowledge level of incoming students. On the other hand the most projects were concentrated in solving the problem of first year students and very few projects organized brushing-up activities for the students in the secondary school.

In March 2006 several projects on mathematics transition organized together a conference to discuss the Dutch Mathematics problem and explore the possibilities how to use educational technology in solving this problem together. As a result of this conference in January 2007 a special interest group SIGMA (https://www.surfgroepen.nl/sites/SIGMA/overSIGMA) officially was established by SURFfoundation, a Dutch higher education organization which stimulates and supports the use of ICT in higher education. The experts in the field were invited to brainstorm about the needs and gave input for the SIGMA working plan for the coming two years.

The ambition of SIGMA in the period of 2007-2009 was to build up a community of practitioners: experts in mathematics teaching, developers of mathematics online teaching materials, mathematics tests designers and experts on testing tools, experts on learning technologies, and teachers in higher and in secondary education. The aim was to bring people together in an informal way in order to share knowledge and ideas about how to solve mathematics transition problem and to create new knowledge and spread it around and this way become stronger in getting funding to realize the ideas. An online collaborative learning environment was set up in SURFgroepen. In several working groups experts in field collaborated on specific well defined issues:

1. approaches for effective sharing and search of remedial teaching material
2. synchronization of test items used in the secondary and in higher education
3. defining which international standards are relevant for mathematics electronic tests
4. network for getting funding to realize ideas
5. SIGMA prize for the best Dutch initiative or project on mathematics transition problem.

In November 2006 started a one year project National Knowledge Bank Basic Mathematics Skills (in Dutch NKBW, www.nkbw.nl). See more about this project in the next section. The ideas about effective sharing of materials discussed in the SIGMA workgroup were worked out and further improved in the NKBW project and an online portal for teaching and learning materials for mathematics on transition Wizmo (www.wizmo.nl) was developed.

Because SIGMA was not a project of collaborating partners with a project plan and budget but a community of people who were sharing the same problem it was possible to connect people who worked in different projects with the experts at different institutions who were not involved in these projects. We succeeded for example to make a working group in which teachers/developers of preparatory teaching material in the secondary school and developers of preparatory courses at different higher education institutions came together. The aim of this SIGMA working group was to synchronize the tests which were used at secondary schools to prepare students for the study at the university with the diagnostic entry tests at the university to help students to fill in the knowledge gaps in mathematics when they enter the university. Comparing the exit tests of the secondary school teachers with the entry tests given at the universities it turned out that at some points there were quite big differences in how the test items were formulated and there were some differences in the list of topics. Not surprising there were also differences in the tests used at different universities. The members of the working group agreed that a standardized list of topics with the defined items knowledge levels is necessary. The members of a working group also agreed that decisions should be made about mathematics expressions on both levels. Establishing this, a standard test item bank could be developed to be used in the whole country on both levels. The working group was convinced that this will help to make it clear to the students what is expected knowledge and skills when entering the university. In September 2008 the project NKBW2 started. The work on synchronization of tests was substantively reinforced in this project (see more about it in the next section of this paper) in which 20 HE and secondary education institutions are working together on the mathematics transition problem. In September 2009 the synchronization of tests was completed and the standard tests became available for use in higher and secondary education.

The SIGMA prize working group designed 2007 the criteria and procedures for the prize for the best Mathematics transition project or initiative. Promoting the image of mathematics is also an important issue in winning the SIGMA prize. The working group established two SIGMA prizes, the jury prize of 5.000 euro and the audience prize of 2.500 euro both meant for the study trip. The SIGMA prize 2008 was
presented at one of the most eminent Dutch pop festivals Lowlands 2008. During this festival seven 15 minutes long workshops about mathematics were continuously given in the SIGMA tent. The workshops succeeded to present mathematics as a discipline relevant for everybody and interesting for young people (see the information, photos and videos on the SIGMA website https://www.surfgroepen.nl/sites/SIGMA/SIGMPrijs/). The winners of the SIGMA prize 2008 De Praktijk with the project DisWis went to New York and to Hong Kong to do research on the mathematics problem there (see their report on http://www.diswis.nl/nl/homepage/Nieuws/sigma-studiereis). The SIGMA prize 2009 was presented at the meeting of the Dutch mathematics teachers’ society (NVvW) with about 330 participants (https://www.surfgroepen.nl/sites/SIGMA/SIGMPrijs/SIGMPrijs2009/).

NKBW - National Project for Supporting Algebraic Skills

Apart from supporting special interest groups, the SURFfoundation also coordinates the distribution of government funding of ICT related projects in higher education. In 2006, in view of the Lisbon agenda, SURF started a National Action Program E-learning to stimulate projects that contribute to the goal of 50% participation in higher education. Thirteen higher educational institutions that were struggling with the mathematics skills of the new students were gathered in SIGMA. From there, they started a project Nationale Kennisbank Basisvaardigheden Wiskunde – NKBW (National Knowledge Bank Basic Skills Mathematics). In this framework of SURF they shared the experiences and materials. Due to the big success of this first project which only had a limited life time of one year the second project, NKBW2 was funded for the period 2008-2010. The consortium was reinforced with participants from secondary education. The idea was to meet the gap between secondary and higher education with

- Remedial education to bridge the gap for the student;
- Activities to close the gap.

Repository

Remedial education is characterized by a large heterogeneity among the new students. It would certainly benefit from a small teacher to student ratio, but typically there is no structural budget to cope with transitional problems. Therefore, the use of ICT can worthwhile since it gives students 24h access to the materials, and possibilities for customization, for automatic feedback. Especially for mathematics, possibilities arise such as generating tests, programming feedback, adaptive tests, etc. As pointed out above, many materials were developed, but sharing these did not happen yet enough. A good solution was found in the development of a repository for learning materials for algebraic skills. In the project NKBW a start has been made with the repository Wizmo (www.wizmo.nl) which brings together many of the materials developed in the previous projects. It offers open access to teachers on the basis of the creative commons license. To every learning object, metadata are attached according to the LOM-standard and an extension of the Living Math taxonomy. The site Wizmo consists of a customized user interface on top of a Hive repository. Among other objects, Wizmo contains learning objects from

- the MathMatch-project containing Maple TA question banks for algebraic skills;
- the Digital Mathematics Environment, developed by the Freudenthal Institute of Utrecht University;
- the project Wortel TU/e of the Technical University of Eindhoven;
- a selection of FAQ-questions from the site WisFaq.

See above for a more extensive description of these activities.

Algebraic skills tests as benchmark

Before the project started, there was a considerable distance between what secondary education sees as a reasonable endpoint of the algebraic skills, and what higher education sees as a reasonable starting point. This distance becomes especially clear when the various entrance tests of higher education is compared with the recently published exit test secondary education (Rozenhart, e.a. 2007). Part of the distance can be explained by use of unknown mathematical language or by uncommon use of variables, but there remains a difference in contents and complexity. In the project NKBW a team of teachers from secondary and higher education developed algebraic skills tests, that are positioned as a calibration point for the transition. An example of such a test can be found at the NKBW-site (Consortium NKBW 2009).
These algebraic skills tests are tried out at secondary education schools and at the higher education institutes to collect student results and reactions of teachers at both sides of the transition. By means of the repository, interactive versions of the tests are made publicly available for practicing and for communicating the expectations about content and level. Once well-balanced tests are found, these are put forward to gain support from organizations like the association of mathematics teachers, the Dutch mathematics society, the mathematics examination committee, the committee for the new mathematics curriculum, etc. These tests are not a replacement of the final examination for mathematics of secondary education. The tests are developed from the perspective of transition, so for instance "mathematics A" to economics, and "mathematics B" to sciences. Moreover, it concerns only a part of mathematics, in casu the algebraic skills, for which it turned out that a fine-grained agreement is mandatory and that needs example tests to really express contents and complexity. It is an important goal of the project to acquire nationwide acceptance of these tests.

Transitional Remedial Education

Eighteen Bachelor programs participate in the NKBW project with their transitional remedial education courses. Disciplines vary from chemistry and polytechnics to economics. The experiences in the first NKBW project indicated that investments in the transitional remedial education help to raise the study success of the first year of higher education (Van Gastel & Jonker 2008). Algebraic skills are very important for the first mathematics course. Typically, this course is important for the first year because it supports disciplinary courses in the coming years. In the project, a common goal is set to reach over two years a 10% decrease of study dropout and delay concerning the first mathematics course. So this directly influences the goals of the Lisbon agenda.

In the project NKBW2
- plans for these courses are shared and reviewed
- materials are shared via the repository Wizmo
- the algebraic skills tests are tried out
- data are gathered for a baseline
- effect are measured about students’ results and students’ and staff satisfaction
- results are compared and evaluated.

Conclusion

The special interest group SIGMA joins the experts and practitioners in the Netherlands who are interested in transition mathematics problems. It brings people together to develop new initiatives and start networks which can apply for new projects. The expected outcomes of the NKBW2 project (National Knowledge Bank Basic Skills Mathematics, 2008-2010) in which 20 institutions are working together are several good practices of education for the transition in mathematics. These practices will be disseminated by workshops, publications and presentations at national meetings. Monitoring of the data is set-up to follow the trends and to search for effects of the various approaches. When the approach is successful, we will see a raise of the level of algebraic skills and a decline of dropout rates and study delay.

References


Acknowledgments

SURFFoundation, SIGMA community, NKBW project team.
Curriculum Design, Student’s Nationality and its Effects on Adaptation to University: What Makes the Difference?

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Abstract: The present study examined how international students – as compared to local students – adapt to two different kinds of programs. It was evaluated how freedom to make choices within a curriculum makes a difference on the adaptation process. Freshmen from two faculties using different curricula, but under the same educational system in The Netherlands, were asked to answer the Student Adaptation to College Questionnaire. Although initially German students seemed to be more adjusted than the Dutch, when curriculum was also controlled for, no nationality differences were observed anymore. The results indicate that is not the students’ nationality but the type of curriculum that plays a role in the adaptation to university. The fact that students who follow a fixed curriculum adapt better than those following a free curriculum represents an interesting finding given the direct application of Tinto’s Theory in a European setting. Further research is needed to elucidate the role of nationality in adaptation without ignoring the learning environment in which this process takes place.

Introduction

The transition to college comes along with a variety of changes, to which the freshman has to adapt not only academically but also socially and emotionally (Baker & Siryk, 1999). Adaptation is a key concept to understand dropout from college. As Tinto (1987) pointed out, the degree of one’s social and academic integration influences the likelihood of departure/persistence. He argues that individual departure from institutions can be viewed as arising out of a longitudinal process of interactions between an individual, the other members of the system and the institution itself. For Baker and Siryk (1999), who’s work parallels Tinto’s Theory of Institutional Departure (1987), adaptation to college is a broad concept entailing several domains: academic, social, personal - emotional and institutional attachment. In the academic domain, adjustment involves experiences with faculty, academic staff and academic experiences with other students. The social domain comprises experiences of an informal nature students have with faculty and other colleague students. The personal – emotional domain refers to the degree to which students experience stress, either psychological or physical, during the adjustment process. Attachment supposes the degree of commitment to educational goals and level of satisfaction a student has towards the institution (Baker & Siryk, 1999).

Tinto (1987) argues that individuals enter institutions with a range of backgrounds, bringing with them a variety of personal attributes (gender, nationality), skills, values, previous education and experiences which can directly impact their adaptation. In line with his theory, research up to date sustains important differences in adaptation between international and local students (Asmar, 2005; Barrie, 2007; Morrison et al., 2005). For instance, the study of Morrison et al. (2005) found that the overall academic integration of international students was worse than that of local UK students. Recently, Rienties and co-workers (2009) found similar outcomes in their research on the relation between social and cultural aspects and the degree of academic adaptation among international students. In general, foreign students scored lower on academic adjustment, and substantially lower on social, personal and emotional adjustment. Although it is reasonable to expect that if local students already encounter diverse transition problems from school to college, this might even be a greater problem for foreign students. Nearly no research has been conducted in other European countries that examine how international students adapt to institutional
requirements when studying in a new international environment. Recent studies demonstrate the importance of how learning environments are designed on student's academic adaptation to college (Christie et al., 2004; Wilcox et al., 2005). For instance, Asmar (2005) provided evidence that foreign students should adapt to the local culture of the institute. Despite the evident need to research how international students adapt in various learning environments, the majority of research focuses on single-learning environments which offer fixed programs (Asmar, 2005; Barrie, 2007; Krotseng, 1992; Morrison et al., 2005). This approach limits the generalization of findings and makes it difficult to compare different curricula.

The present study examines how international students – as compared to local students – adapt to two different kinds of programs. We evaluate how freedom to make choices within a curriculum makes a difference on the adaptation process. To our knowledge no research is available that compares effects of curriculum design on student adaptation and its impact on student drop-out.

**Method**

**Research Questions**

The current study analyzes how personal and institutional factors are related to freshmen’s’ adaptation to university. More specifically, we are mainly interested if differences in students’ adaptation can be found by nationality and we expect foreign students to differ from local students in their academic adjustment. Furthermore, we want to explore if differences in students’ adaptation can be found by curriculum. The present study was conducted in the Netherlands among first year students from two faculties with different curricula, but under the same educational system.

**Sample**

The participants in the present study were a cohort of first year students from two faculties at the same university in The Netherlands. The inclusion criteria were set to include only students in their first year of study, of traditional age. The selection is in accordance with Baker and Siryk(1999) when describing their model. The sample size was large enough to detect a medium effect size (E.S.) (Cohen, 1998) with a Power of .80 and an alpha of .05.

**Setting**

The research setting for the present study was comprised of two faculties at a Dutch University, one with a free and the other one with a fixed curriculum. Both offer an international program, having English as the language of instruction and a large proportion of students coming from abroad. The university uses Problem-Based Learning (PBL) as its leading educational approach. PBL, initially developed by Barrows and Tamblyn (1980), typically involves students working in small groups on problems which are processed in a manner that employs deep-learning approaches. Although PBL is the general approach for both faculties, differences can be found between the curricula used. In the fixed curriculum all the courses are laid out and predetermined for students, while in the free curriculum the concept of choice is central.

**Procedure**

The data for this study were collected in November-December, 2007. The students were asked to complete a questionnaire about their first impressions on university life, after four months at the university. Out of 951 students, 786 agreed to fill in the questionnaires (83% response rate). They were also asked to provide their student ID and a signature for consent so their answers could be linked with the demographic characteristics available in the university data base. The questionnaires were processed during the tutorial meetings to increase the response rate and to solve possible problems that might be faced when answering the questions.

**Variables**

Two independent variables were used in the present study: nationality and type of curriculum. Information about nationality was collected from the university database based on the ID provided by the students and the two types of curricula were operationalized through the two faculties.
The adjustment to university life was the outcome variable and was measured through the Student Adaptation to College Questionnaire (SACQ) developed by Baker and Siryk (Baker & Siryk, 1999). The assumption underlying the SACQ is that adjustment to college is multifaceted. The SACQ is a 67 item questionnaire subdivided into four subscales each focusing on a different aspect of adjustment to college. The ‘personal-emotional adjustment’ subscale (15 items) measures the degree to which students is experiencing general psychological distress and/or any associated somatic problems, the ‘social adjustment’ subscale (18 items) measures degree of coping with interpersonal-societal demand inherent in adjustment to college, ‘academic adjustment’ subscale (24 items) demand characteristics of the college experience, and the ‘goal commitment/institutional commitment’ (or ‘attachment’) subscale (14 items) measures the quality of the relationship or bond between the student and the institution (Baker & Siryk 1999). The items are answered on a 9-point scale ranging from 1 (‘doesn’t apply to me at all’) to 9 (‘applies very closely to me’), where a higher score indicates more adjustment. The SACQ is a self-report questionnaire that has shown its usefulness as an assessment aid in counseling students and as a valid and reliable instrument in predicting early dropout and persistence (Krotseng, 1992).

**Reliability**

Reliability estimates include calculations for internal consistency of the SACQ scales. The data reveal strong estimates of reliability on all subscales. The number of items for each construct, the mean inter-item correlation and the Cronbach’s alpha are presented in Table 1. The mean coefficient alpha values all exceed .80, indicating that SACQ has high internal consistency (Pedhazur & Schmelkin, 1991).

<table>
<thead>
<tr>
<th>SACQ scale</th>
<th>Number of items</th>
<th>Mean Inter-item Correlation</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Emotional Adjust</td>
<td>15</td>
<td>.32</td>
<td>.87</td>
</tr>
<tr>
<td>Social Adjustment</td>
<td>18</td>
<td>.32</td>
<td>.89</td>
</tr>
<tr>
<td>Academic Adjustment</td>
<td>24</td>
<td>.26</td>
<td>.89</td>
</tr>
<tr>
<td>Attachment</td>
<td>14</td>
<td>.56</td>
<td>.95</td>
</tr>
</tbody>
</table>

**Results and Discussion**

Descriptive statistics were first used to get an impression on the distribution of Dutch and German students for both curricula. As can be seen from Table 2, German students outnumber Dutch students in the total sample and also those who study in the fixed curriculum.
Table 2. Demographic characteristics of the sample (N=694)

<table>
<thead>
<tr>
<th>Nationality</th>
<th>n (%)</th>
<th>Curriculum</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dutch</td>
<td>262 (37.8%)</td>
<td>Fixed</td>
<td>190 (72.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
<td>72 (27.5%)</td>
</tr>
<tr>
<td>German</td>
<td>432 (62.2%)</td>
<td>Fixed</td>
<td>385 (89.1%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
<td>47 (10.9%)</td>
</tr>
<tr>
<td>Total</td>
<td>694 (100%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T-tests were first run to examine the differences in adaptation by nationality and afterwards by curriculum. The results of these tests are presented in Table 3 and 4.

Finally, ANOVA’s were employed to explore if the observed differences in adaptation between the two nationalities also hold for both types of curricula. The analysis was run for all the adaptation domains and then checking for possible interaction effects. The metric used to estimate and describe differences in adaptation levels was Cohen’s d for T-Tests.

When first looking at difference between nationalities, German and Dutch students seemed to differ significantly on most of the adaptation domains, except the Personal Emotional Adjustment scale. As can be seen from Table 3, German students scored significantly higher than Dutch on the social and academic adjustment. Even more, German students seemed to be significantly more institutionally attached than the Dutch. All these differences were relevant and represented a medium effect size.

Table 3. Differences in adaptation by nationality

<table>
<thead>
<tr>
<th>SACQ scale</th>
<th>Nationality</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Emotional</td>
<td>Dutch</td>
<td>5.7 (1.6)</td>
<td>.67</td>
<td>692</td>
<td>.517</td>
<td>0.05</td>
</tr>
<tr>
<td>Adjustment</td>
<td>German</td>
<td>5.7 (1.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>Dutch</td>
<td>5.4 (1.3)</td>
<td>-5.87</td>
<td>692</td>
<td>.000</td>
<td>0.46</td>
</tr>
<tr>
<td>Adjustment</td>
<td>German</td>
<td>6.0 (1.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic</td>
<td>Dutch</td>
<td>5.4 (1.1)</td>
<td>-4.17</td>
<td>692</td>
<td>.000</td>
<td>0.33</td>
</tr>
<tr>
<td>Adjustment</td>
<td>German</td>
<td>5.8 (1.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment</td>
<td>Dutch</td>
<td>5.9 (1.9)</td>
<td>-5.71</td>
<td>692</td>
<td>.000</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>6.7 (1.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When then comparing the curriculum, significant differences appeared on all of the adaptation domains. As can be seen from Table 4, freshmen studying by a fixed curriculum were significantly more adapted personal-emotional, social and academic and more attached to their faculty than those studying by a free curriculum. The differences found were substantial, representing large effect sizes.
However, the differences in nationality, as presented in table 3, can be attributed to a large extend to the curriculum effect, and the fact that more foreign students follow the fixed curriculum. Large main effects of curriculum are observed for the social and academic adjustment and also for the attachment domains. No significant interactions between the nationality and type of curriculum were observed for these scales. The only significant interaction found for the personal emotional domain is not discussed since, regarding this aspect, there were no initial differences between the two nationalities. Overall, the last results indicate that, for our sample, is not the students’ nationality but the type of curricula that plays a role in the adaption to university.

Our findings neither confirm earlier research by Asmar(2005), Barrie (2007), Rienties et al. (2009) or Morrison et al. (2005) nor Tinto’s Theory, indicating that differences in adaptation can be caused by nationality. Therefore, our hypothesis stating that local students adapt better than international students was infirmed when unexpectedly was found that German students seemed to be more adjusted than Dutch. These findings should be interpreted in context so, when curriculum was also controlled for, the picture appeared differently and overall, no nationality differences were observed anymore. The fact that students who follow a fixed curriculum adapt better than those following a free curriculum can not be linked to

Table 4. Differences in adaptation by curriculum

<table>
<thead>
<tr>
<th>SACQ scale</th>
<th>Curriculum</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Emotional</td>
<td>Fixed</td>
<td>6.0 (1.2)</td>
<td>13.64</td>
<td>692</td>
<td>.000</td>
<td>1.33</td>
</tr>
<tr>
<td></td>
<td>Free</td>
<td>4.3 (1.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Adjustment</td>
<td>Fixed</td>
<td>6.2 (.9)</td>
<td>22.38</td>
<td>692</td>
<td>.000</td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td>Free</td>
<td>3.9 (1.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Adjustment</td>
<td>Fixed</td>
<td>5.9 (1.0)</td>
<td>18.26</td>
<td>692</td>
<td>.000</td>
<td>1.71</td>
</tr>
<tr>
<td></td>
<td>Free</td>
<td>4.2 (1.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment</td>
<td>Fixed</td>
<td>7.2 (1.0)</td>
<td>32.43</td>
<td>680</td>
<td>.000</td>
<td>3.44</td>
</tr>
<tr>
<td></td>
<td>Free</td>
<td>3.2 (1.2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Differences in adaptation by curriculum and nationality

<table>
<thead>
<tr>
<th>SACQ scale</th>
<th>Nationality</th>
<th>Curriculum</th>
<th>N</th>
<th>Mean (SD)</th>
<th>Effect</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Emotional</td>
<td>Dutch</td>
<td>Fixed</td>
<td>190</td>
<td>6.4 (1.1)</td>
<td>Nationality</td>
<td>2</td>
<td>.651</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>Fixed</td>
<td>385</td>
<td>5.8 (1.2)</td>
<td>Curriculum</td>
<td>193.2</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
<td>47</td>
<td>4.6 (1.4)</td>
<td>Interaction</td>
<td>15.7</td>
<td>.000</td>
</tr>
<tr>
<td>Social Adjustment</td>
<td>Dutch</td>
<td>Fixed</td>
<td>190</td>
<td>6.00 (.8)</td>
<td>Nationality</td>
<td>2.8</td>
<td>.095</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>Fixed</td>
<td>385</td>
<td>6.2 (1.0)</td>
<td>Curriculum</td>
<td>454.9</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
<td>47</td>
<td>4.0 (.9)</td>
<td>Interaction</td>
<td>.65</td>
<td>.421</td>
</tr>
<tr>
<td>Academic Adjustment</td>
<td>Dutch</td>
<td>Fixed</td>
<td>190</td>
<td>5.8 (.8)</td>
<td>Nationality</td>
<td>.0</td>
<td>.978</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>Fixed</td>
<td>385</td>
<td>6.0 (.9)</td>
<td>Curriculum</td>
<td>311.8</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
<td>47</td>
<td>4.2 (1.0)</td>
<td>Interaction</td>
<td>1.8</td>
<td>.177</td>
</tr>
<tr>
<td>Attachment</td>
<td>Dutch</td>
<td>Fixed</td>
<td>189</td>
<td>6.9 (.9)</td>
<td>Nationality</td>
<td>.275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>Fixed</td>
<td>384</td>
<td>7.1 (1.1)</td>
<td>Curriculum</td>
<td>1.2</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free</td>
<td>47</td>
<td>3.2 (1.3)</td>
<td>Interaction</td>
<td>1202.8</td>
<td>.474</td>
</tr>
</tbody>
</table>
previous studies but still represents an interesting finding given the direct application of Tinto’s Theory in an European setting.

Consequently, possible reasons can be brought for our results. A first aspect and a possible major difference between local and international students might be that foreign students already made a choice to study abroad. This fact combined with a clear program and career perspective offered in a fixed curriculum can facilitate the adjustment. However, since no randomization could be done to assign students to the fixed or free curricula, it is possible that students already differ in some aspects that influence the adaptation. Apart from this, other demographic variables, such as gender, need to be included in the model for a deeper understanding of students’ experiences. Further research is needed to elucidate the adaptation of foreign and local students without ignoring the learning environment in which this process takes place.

References


Dropout from higher education: an international comparative analysis in the framework of the S.T.E.P. project

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Abstract: In higher education, the number of students who start and complete their studies is one of the indexes to determine the effectiveness of the educational system. By presenting combining results from scientific literature with an analysis of comparative data on dropout rates from 4 European countries, the authors present and discuss methodologies and difficulties of determining dropout rates in higher education. Study programs in which high dropout rates occur are discerned to determine where the use of preparatory learning may be most useful.

Introduction

Liberalization of study conditions has resulted in an increasing number of students in European higher education institutions with each year; meanwhile the number of students who dropout from their studies has become one of the most urgent problems that is undesirable from personal, institutional and (inter)national perspective. Dropout rates analysis state, that nearly 40% of students in OECD countries dropout before they complete a first university degree (OECD, 2009). In individual countries and individual programs, such rates are sometimes considerably higher making it an important factor for universities in the development of successful educational and management processes that improve teaching and learning (Reichert & Tauch, 2003).

The issue how to reduce dropout rates in higher education has been of increasing concern for many years. Predictors of dropout from high schools and universities around the world are and have been extensively researched in the last decades (e.g. Englund, Egeland, Collins, 2008; Croninger, Lee, 2001; Goldschmidt & Wang, 1999; Janosz, Archambault, Morizot & Pagani, 2008; Gaigalienė, 2006; Kaspari, D.S., Peck, Kaplan, H. B, 1997; Gudžinskienė, 2007; Berger, Braxton, 1998; Padaigienė, Purvinis, Dėmenienė & Vasiliauskaitė, 2007). In higher education students are educated to be the future professionals with competences that allow them to be lifelong learners who can provide a valuable contribution to the knowledge society in our constantly changing world. It is worth mentioning that most research is devoted to the identification of dropout in higher education in general and only episodically is aimed specifically at universities. Not by chance the problem of university dropout remains relevant and the gathering of - and research on accurate statistics would help to recognize high dropout domains so measures can be taken to overcome existing barriers more constructively.

Despite some significant research contributions in the area of dropout from higher education, so far little attention has been given to comparative analysis of statistical data on dropout rates from higher education in different countries and different study programs, differences in methodologies of establishing the numbers of students who dropout and the identification of study programs in which the dropout rates are the biggest.

Using comparative data on dropout rates from higher education institutions in four European countries (Lithuania, Netherlands, Poland, Belgium) that is done in the framework of the European project Studies on Transitional Electronic Programmes (S.T.E.P.) project, this paper presents the most significant research results on dropout in European higher education institutions. In addition, differences in methodologies to gather dropout rates are discussed and study domains with the highest dropout rates are discerned as these are the ones where the implementation of preparatory learning programs may be most useful and needful.
Acquiring the exact numbers of students who dropout of different European higher education institutions is quite difficult; finding the different reasons and motives behind dropout even more so. This is due to several reasons. First, the results on dropout in higher education of different countries have shown, that dropout rates are closely related to country-specific educational systems (e.g., admission regulations). Second, there is a difference between institutes in the collection and analysis of dropout data. Dropout data is collected at different time periods during the academic year, using different data collection methods and different methods to calculate the dropout rate. Third, there are differences in collecting dropout data within some universities where data is collected by individual faculties but is not treated systematically across the whole institute.

The aim of this paper is to present and analyse the details of university dropout in different European countries, to discuss methodologies of calculating the dropout rate and to identify study domains in which the highest dropout rates occur.

**Admission regulations for European higher education**

Higher education enrolment worldwide grew\(^1\) to 144 million students in 2005, up from 68 million in 1991; global higher education mobility has grown by 57% since 1999, with more than 2.9 million students seeking education abroad (Bhandari, Laughlin, 2009). How many students finish higher education without dropping out? On average across OECD countries with available data (OECD, Education at a Glance, 2009), university-level graduation rates have doubled from 18% in 1995 to 39% in 2007. Trends in tertiary graduation rates (2000-2007) of a number of European countries are shown in Table 1. It is evident that an increase in tertiary graduation rates has particularly been marked over the last years. However, about one out of five (20 %) students who enroll in European higher education quit without graduating of whom most drop out after the first study year.

Table 1: Trends in tertiary graduation rates (2000-2007), Tertiary A programme
(_Sum of graduation rates for a single year of age by programme destination and duration_)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Netherlands</td>
<td>35</td>
<td>35</td>
<td>37</td>
<td>38</td>
<td>40</td>
<td>42</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Poland</td>
<td>34</td>
<td>40</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>45</td>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>United Kingdom</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>39</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>OECD average</td>
<td>28</td>
<td>30</td>
<td>31</td>
<td>33</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>EU19 average</td>
<td>27</td>
<td>29</td>
<td>30</td>
<td>32</td>
<td>33</td>
<td>35</td>
<td>35</td>
<td>37</td>
</tr>
</tbody>
</table>

\(^1\) Between 2000 - 2009 the number of students in Lithuanian higher education institutions has been increasing. In the 2008–2009 academic year, higher education was pursued by 44 percent of youth aged 19–24 (in the 2000–2001 academic year, by 31 percent; in the 2005–2006 academic year, by 40 per cent). In 2008, each fourth resident of Lithuania aged 25–64 had higher education (in 2006, this was each fifth) (Department of Statistics to the Government of the Republic of Lithuania, 2009).

Over the last decade Poland’s higher education progressed from an “elite” to a “mass” stage. The number of students in higher education has grown from 394,000 in the academic year 1990/1991 to almost 2 million at the beginning of the academic year 2007/2008. The national academic student rating in the age group of 19 to 24 has reached 48%, being one of the largest in Europe.

More than half of the Belgian population of 18 year old start a Bachelor programme at a university or a university college (Hogeschool). During the last 10 years, this participation rate has been growing from 51.8% to 57.8%.
The literature on dropout in higher education within different countries showed that dropout rates are closely related to country-specific educational systems, in particular to the selection procedure. In European countries three kinds of selection procedures prevail (Aghion, Dewatripont, Hoxby, Mas-Colell & Sapir, 2008). They will be discussed in the following.

**A numerus clausus at national level**

Here the government limits the number of places available and exercises direct control over the selection procedure which is usually anonymous. The numerus clausus typically apply to all degrees. In Europe, a system of centralized selection prevails in Denmark, Ireland, Spain, Sweden, Lithuania and Poland.

For example, the general requirements and regulations on admission to universities in Lithuania are determined by the Ministry of Education and Science; they are supplemented by the requirements specified for admission to a particular study programme by a particular higher education institution with the further approval by the Ministry of Education and Science. Admission procedures are dual; higher education institutions may set a numerus clausus in certain disciplines with regard to state-financed places and accept additional students for fees. Currently general admission to Lithuanian state university level undergraduate and consecutive study programs is administered: a student leaving secondary school can apply up to 16 programs offered by any university. Thus applying for admission to the chosen study program school leavers have to pass maturity examinations, both national and school level, with good grades. It is so because admission criterion is a competition rating determined by the results of maturity examinations, i.e. universities do not organise any entrance examinations to the majority of study programs (except arts and sports study programs), a competition rating to a particular program is set on the basis of the grades in competitive school subjects, the list of which is made up by the higher education institutions and the Ministry of Education and Science (Šaučiūnas, 2007).

Research shows that a lack of proper consideration when choosing a study program is an important reason for Lithuanian students to drop out. According to Gaigalienė (2006), the main reason for canceling studies in Lithuania (N=1153) is a blindly chosen study program, as a consequence leading to low academic motivation and canceling studies. This is supported by Stanišauskienė (2005) who shows that many students lack a deeper approach towards their career. The numerus clausus procedure further affects students’ attitudes towards studies and organization process, meaning that if an applicant fails to enroll into their first program of choice s/he forms a negative attitude towards the study organization process which may later result in his/her dropout. Offering professional information and development of a counseling system can offer a solution to this problem.

In Poland the government also determines the maximum of students who are admitted to a certain program. In general, access requirements are a secondary school diploma (or leaving certificate) plus an entrance examination set by the higher education institution.

**Selection by institute**

Selection by institute is the opposite of the previous system because there is no central procedure. Institutes are free to set their own limits on the number of places available and to apply their own procedures for selecting students. However, there may be centrally determined criteria for setting limits in the case of some categories of student. Decentralized selection is applied in Germany and the United Kingdom.

In Germany, prospective students who have passed the maturity secondary school examinations are qualified for admission to every German university but universities are open to students only after they prove that they are entitled to be admitted to an institute for higher education. This is good for those whose educational qualifications or certificates are recognized as equivalent to those in Germany. If this is not the case, the student must undergo an “eligibility test” for which specialized preparatory institutions that are attached to higher education institutions are responsible.

By nationwide admission restrictions in Germany, 20 % of available places are awarded to applicants with best average grades on their upper secondary school-leaving certificate; a further 20 % are allotted according to the amount of time which has elapsed since the applicant first applied for a place in that programme (queueing quota) and the remaining 60 % are awarded within the framework of the

The data from the study by The Higher Education Information System (HIS) shows that the general dropout rate has decreased from 24% in 2004, to 20% in 2006.

**Unrestricted access**

The general rule for unrestricted access is that institutions accept all applicants with an upper secondary qualification into the Bachelor level. However, a numerus clausus may be set at national level or institute level with respect to specific domains such as medicine or engineering. In general, access at the Bachelor level is unrestricted in Belgium, Italy, the Netherlands and Switzerland. At the Master level almost all countries have selection procedures, with the selection being decentralized at the level of individual institutions.

For example, Belgium has an open access policy where students who have successfully completed secondary education have an automatic right to enter higher education, no entrance exams are organised, except for the study areas of medicine and dentistry at universities. Restrictions on numbers are confined to a small number of studies, such as medicine. About half of the Belgian universities offer comprehensive programs, including philosophy, arts, social sciences, economics, law, natural sciences, and medicine. All universities offer two levels (called cycles) of university education. Students obtain the Bachelor degree after three years and the Master degree after four or five years (or seven years for Medicine) of study. Most universities offer the third cycle leading to the diploma of specialized studies, the diploma of advanced studies, teaching qualification, or the doctorate degree for which a dissertation must be completed. The third cycle requires a minimum of one and up to three additional years of study (or more for the doctoral degree).

Professional and technical higher education pursued at non-university institutions of higher learning comprises the long type (four to five years), which equals an academic training, or the short type (two to three years), so-called Professional Bachelors, and prepares students entering professions in industry, commerce, arts, and the fields of paramedical maritime studies.

In Belgian universities, there is a dropout rate of about 40% – which is higher than in most other OECD countries – and about half of the dropouts continue in non-university institutions (Jacobs, van der Ploeg, 2006). In addition, more than half of all first-year university students fail their first annual exam. The average study time (excluding the effects of students prematurely leaving the institutions) is nearly 20% longer than the nominal period of study, suggesting few incentives for students to rapidly complete their studies (Hoj, 2007). For many years, most Belgian universities have provided supplementary activities (preparatory courses, tutorials, etc.) to the first-year study programs, for reducing economic, social and human costs in such a high level of failure in the first year at university (Superby, Vandamme, Mekens, 2005).

In the Netherlands, higher education is constituted by the universities (Bachelor and Master Studies) and universities of applied science (higher professional education, the highest level of vocational education offering Bachelor programs only). Only one level of secondary education grants access to universities, for universities of applied science this number is two. In general, students flow freely into university and universities of applied science. However, certain study programs have a numerus clausus (e.g. dentistry, (veterinary) medicine) and/or employ specific requirements (e.g. chosen subjects, GPA) in addition to the required secondary school diploma.

The CBS (Statistics Netherlands) calculated that 2/3 of the students who started a fulltime university study in 2001 and entered directly from secondary education graduated within six years. A total of 6% was known to have left university education without a diploma. From 4-year programs, dropout was lowest in Health and welfare and from 5-year programs in Agriculture, veterinary medicine, engineering and construction. In the seventh year still 26% of the students from the 2001 cohort were still enrolled at a university.

In 2007 the Netherlands universities formulated common goals to increase the success of students in the Bachelor phase by: strengthening the referring and binding function of the first Bachelor year; halving the dropout rate in the second and third Bachelor years; increasing the number of students that complete the Bachelor’s programme in four years; increasing the percentage of students that take on a larger curriculum than specified in the standard programme to 10% (VSNU, 2008).

**Data collection methods and dropout rates**

The dropout analysis is one of the main topics not only by the universities’ own statistical percentages, but in reports of various scientific studies. Proper organisation and management of university
studies undoubtedly would have to be reasoned by exploratory material, theoretical and empirical. In this context the ratio of the number of students who started and completed higher education studies is one of the indexes of effectiveness of university system. Having a wider view, acquisition of education corresponding determined standards is the basis of person’s socio-cultural integration and economic welfare as well as the condition of competitiveness of state’s economy in the context of other countries.

Analysis of scientific studies by Clements, Ligon & Paredes (2000) and practical activities confirm the assumption that European Union countries still lack research dedicated to investigate the problem of university dropout (problem of general education schools is more emphasized). Further, current methods of calculating and defining dropout rates show that there is a shortage of an adequate datacollection system for tracking dropout information accurately And in a unified way which would enable easy (inter)national comparison between institutes and/or domains. To examine the varying definitions of “higher education dropout rate”— for the present is one of newer tasks of education system. The methods of data collection and calculation, using which the presented data often differ by ten thousands, vary not only in different countries but also in the space of different institutions of the same country.

Mostly, dropout rates are presented by percentages of students who didn’t graduate from higher education after first year studies or didn’t graduate on studies time. Besides that, the dropout rates are calculated in various ways. In scientific literature (Kaufman, Alt, Chapman, 2004) three approaches to calculate dropout rates are provided:

- **Event rates** describe the percentage of students who dropout university each year without completing a higher education program.
- **Status rates** provide data on dropouts among all individuals in a specified status rates.
- **Cohort rates** measure what happens to a group of students over a period of time. Cohort rates measure the percentage of persons dropping out over longer periods of time and over multiple periods of time (over 2 years, 4 years, etc). Cohort rates require data from longitudinal collections.

**Results**

In the context of the S.T.E.P. project, in order to identify the need for preparatory courses dropout analysis has been performed in five universities (University of Amsterdam, Maastricht University, Leuven University, Siauliai University, Maria Curie Sklodowska University) in four European countries (Netherlands, Belgium, Lithuania and Poland). Data collection was problematic indicating that dropout statistics are not collected periodically, often older data is announced. Moreover, statistics are usually collected at the level of separate faculties using different methodological accesses.

At Leuven University (Belgium), Siauliai University (Lithuania) and Maria Curie Sklodowska University (Poland), dropout is mostly calculated by event rates (the cohort approach also is in use). For example, statistics “Student achievement rates for Leuven University (Academic year 2004-2005)” reveal, that in the academic year 2004/2005 around 50% of students entering the university didn’t pass the first year and about 29% never succeeded their studies. The dropout rate in Siauliai University in total is around 25% of which the largest part is taken by the first-year students due primarily to inadequate academic choices.

At Maastricht University, detailed dropout numbers are collected only by some faculties. Centralization efforts are made but at the time of writing only general numbers are collected at a central level. The following table shows the completion rates and dropout of the Faculty of Economics and Business administration (see Table 2).
Table 2: Completion rates and dropout in % for the Bachelor of the Faculty of Economics and Business Administration of Maastricht University.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>size of cohort</th>
<th>1st year study progress</th>
<th>Bachelor completion rate</th>
<th>Still engaged</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 year</td>
<td>2 years</td>
<td>3 years</td>
<td>4 years</td>
</tr>
<tr>
<td>2002</td>
<td>818</td>
<td>38.0</td>
<td>60.1</td>
<td>25.9</td>
<td>50.1</td>
</tr>
<tr>
<td>2003</td>
<td>814</td>
<td>42.4</td>
<td>59.8</td>
<td>31.4</td>
<td>52.1</td>
</tr>
<tr>
<td>2004</td>
<td>832</td>
<td>42.1</td>
<td>61.9</td>
<td>30.6</td>
<td>54.1</td>
</tr>
<tr>
<td>2005</td>
<td>817</td>
<td>40.5</td>
<td>59.7</td>
<td>31.9</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>831</td>
<td>45.2</td>
<td>66.2</td>
<td></td>
<td>67.5</td>
</tr>
<tr>
<td>2007</td>
<td>838</td>
<td>45.2</td>
<td></td>
<td></td>
<td>69.3</td>
</tr>
</tbody>
</table>

Table 3 presents data about the statistics of students' dropout according to the faculties in five reviewed universities (as available in annuals reports). Higher education dropout rates are presented by percentages of students who dropout university in current year.

Table 3: Higher Education Dropout: Statistical Data by Faculties

<table>
<thead>
<tr>
<th>Faculty</th>
<th>University</th>
<th>Maria Curie Skłodowska University, Academic Year 2006/2007 (%)</th>
<th>University of Amsterdam, Academic Year 1997 - 1999 (%)</th>
<th>Maastricht University, Year 2006 (%)</th>
<th>Leuven University, Academic Year 2004/2005 (never succeeded, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical, Engineering</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td>Mathematics and Informatics, Mathematics, Physics and Computer Sciences, Sciences</td>
<td>30</td>
<td>54</td>
<td>45</td>
<td>-</td>
<td>35</td>
</tr>
<tr>
<td>Social Sciences, Social &amp; Behaviour</td>
<td>7</td>
<td>-</td>
<td>37</td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td>Economics, Economics and Economics and Business Administration, Business and Economics</td>
<td>-</td>
<td>15</td>
<td>40</td>
<td>-</td>
<td>45</td>
</tr>
<tr>
<td>Education, Pedagogy and Psychology, Psychology and Educational Sciences</td>
<td>6</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>33</td>
</tr>
<tr>
<td>Law and Administration, Law</td>
<td>-</td>
<td>4</td>
<td>48</td>
<td>-</td>
<td>33</td>
</tr>
<tr>
<td>Natural Sciences, Biology and Earth Sciences, Chemistry</td>
<td>15</td>
<td>42/31</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Art</td>
<td>9</td>
<td>35</td>
<td>-</td>
<td>24</td>
<td>35</td>
</tr>
<tr>
<td>Humanities</td>
<td>6</td>
<td>18</td>
<td>31</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medicine / Dentistry / Pharmaceutical Sciences</td>
<td>-</td>
<td>-</td>
<td>22/23</td>
<td>-</td>
<td>17/16</td>
</tr>
<tr>
<td>Social Welfare, Kinesiology and Rehabilitation Sciences</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td>Bioscience Engineering</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>Philosophy and Sociology, Institute of Philosophy, Theology</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>42/47</td>
</tr>
</tbody>
</table>

At Siauliai University, the largest dropout rates by poor academic achievement are clearly in the Faculty of Technology, the Faculty of Mathematics and Informatics and the Faculty of Natural Sciences. Obviously, students' preparation for studies in the domain of technological-engineering study programs, mathematics and informatics as well as natural sciences (where the first year is related to general courses in mathematics and informatics) is insufficient which gives rise to the need of preparatory courses in these
domains. For Maria Curie Sklodowska University, statistical data on dropout in the academic year 2006/2007 also shows that the largest dropout rates are seen in Mathematics, Physics, Computer Sciences and Chemistry. At the University of Amsterdam (1997-1999 academic year), the highest dropout rates are seen in the Faculty of Humanities, Law and Administration, Economics and Business Administration, Mathematics and Informatics and the Faculty of Social Science. Statistical data on drop outs at Maastricht University in academic year 2007 shows that highest dropout rates are seen in the Faculty of Social Science and Art. In Belgian universities, there is a high dropout rate almost in all the faculties. It is evident, that bigger dropout rates are seen in Belgium and Netherlands, because of the reason, that this countries has an open access policy where students who have successfully completed secondary education have an automatic right to enter higher education, no entrance exams are organised. Statistical date, collected by the authors of the report, shows that highest drop-out rates in the analyzed countries (Netherlands, Belgium, Lithuania, Poland) are different. In most European Countries the biggest dropout is seen in Science study programs, in others - in Humanities sciences and Art. Obviously, that students’ preparation for study such as technological-engineering study programs, as well as humanities sciences studies is insufficient and imperative for preparatory courses.

Conclusions

The aim of this paper was to present and analyse details of university dropout in different European countries and to investigate which methodologies are used to calculate dropout rates. Further, study domains in which the highest dropout rates occur were identified to identify the domains for which preparatory education would be beneficial. The following will provide a general overview of the main findings.

Liberalization of study conditions has resulted in an increasing number of students at European institutes for higher education with each year; meanwhile the number of students who dropout from their studies has become one of the most urgent problems that is undesirable from personal, institutional and (inter)national perspective. In individual countries and individual programs, dropout rates are sometimes considerably higher making it an important factor for universities in the development of successful educational and management processes that improve teaching and learning.

Obtaining exact dropout rates is quite difficult; finding different reasons and motives behind dropout even more so. This is due to several reasons. First, the results on dropout in higher education of different countries have shown, that dropout rates are closely related to country-specific educational systems (e.g., admission regulations). Second, there is a difference between institutes in the collection and analysis of dropout data. Dropout data is collected at different time periods during the academic year, using different data collection methods and different methods to calculate the dropout rate. Third, there are differences in collecting dropout data within some universities where data is collected by individual faculties but is not treated systematically across the whole institute.

The results on dropout in higher education of different countries showed, that dropout rates are closely related to admission regulations to higher education. In European countries three kinds of selection procedures prevail: a numerus clausus at national level, selection by institute and unrestricted access. Research shows that a lack of proper consideration when choosing a study program is an important reason as a consequence leading to low academic motivation and canceling studies. The numerus clausus procedure further affects students’ attitudes towards studies and the organization process, meaning that if an applicant fails to enroll into their desirable study programm s/he forms a negative attitude towards the study organization process which may later result in his/her dropout. Offering professional information and development of a counseling system can offer a solution to this problem.

In most European Countries the biggest dropout is seen in Science study programs. The domains that face the highest dropout rates vary across countries. Results showed that for Siauliai University, the largest dropout rates by poor academic achievement are clearly in the Faculty of Technology, the Faculty of Mathematics and Informatics and the Faculty of Natural Sciences. For Maria Curie Sklodowska University in Poland these are Mathematics, Physics, Computer Sciences and Chemistry. In the Netherlands, data were available for two institutes. At the University of Amsterdam the faculties of Humanities, Law and Administration, Economics and Business Administration, Mathematics and Informatics and the Faculty of Social Science all face high dropout. For Maastricht University rates are highest in the Faculty of Social Science and Art In Belgian universities, there is a high dropout rate almost in all the faculties. It is evident, that bigger dropout rates are seen in Belgium and Netherlands, because these countries have an open access
policy where students who have successfully completed secondary education have an automatic right to enter higher education, no entrance exams are organised. In general it can be derived that based on the high dropout rates, preparation for study programs in the domain of technological-engineering as well as humanities may benefit highly from preparatory courses.

The analysis of dropout as presented in this paper showed that a comparative analysis is very complex, if possible at all with the data that is currently available. If we are creating one European higher education space, we should formulate common goals to depolarize definitions of “higher education dropout rate”, to unify methodologies in data collecting and calculating dropout rates.

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How to Achieve Transparency by Applying Learning Outcomes with Educational Design?

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Abstract: One of the obstacles for virtual mobility is the difficulty of mutual recognition of certificates. There have been different efforts to meet this challenge: content-based (syllabus), workload-oriented (ECTS), and qualification-oriented approaches (EQF/NQF). While content and workload are just input-based criteria which don’t provide valid information about a student’s real competences, the European and national qualification frameworks don’t allow for detailed recognition of single courses or other learning units of short duration. The shift to the new paradigm of learning outcomes is a very promising approach to a sustainable solution but also a multi-speed development within different countries and institutions. A small number of forerunners are followed by many who have just begun or are still waiting for the start. To support the majority of institutions which are in or before the first phase of the change process a twofold strategy is proposed – based on guidelines for writing and a repository of best practice learning outcomes.

Learning Outcomes in the context of the VIRQUAL project

The VIRQUAL project (virqual.up.pt) had been established to encourage and to improve virtual mobility (VM) among European students by implementing requirements of the European Qualification Framework. It is expected that through the results of this project network European HE and CE institutions will find guidance, case studies and tools to integrate Virtual Mobility in their practices, contributing to the construction of a realistic European Learning Space.

One of the obstacles for virtual mobility are the difficulties connected with mutual recognition of certificates. There have been different efforts to meet this challenge: content-based (syllabus), workload-oriented (ECTS), and qualification-oriented approaches (EQF/NQF). Content and workload on the one hand are input-based criteria and have proved to be insufficient for this purpose; they do not provide valid information about a student’s really existing competences. European and national qualifications frameworks on the other hand were designed for comparison of large educational cycles and thus don’t allow for detailed recognition of single courses or other learning units of short duration – which are central for virtual mobility.

A very promising approach is the adoption of learning outcomes instead of input-based criteria for educational planning and recognition purposes. Learning outcomes can be variably granulated, ranging from a single lesson to complete study programs. And, even more important, on a basic level they can be described in a universally valid way. To master the multiplication table is the very same competence all over the world. But, as we know from other experiences (e.g. with learning objects) standardised descriptions cannot successfully be achieved by a central or superior authority, but should be fulfilled in cooperation of as many involved institutions as possible – if the aim is to elaborate generally accepted descriptions.

Virtual mobility in particular and student’s mobility in general are no primary goals of the typical European university. Only distance teaching and dual mode institutions have an intrinsic interest in these topics. Thus the average university might not spontaneously recognise the added value of using learning outcomes for planning and promoting study programmes. At least this is one of the conclusions we have to draw from the results of a survey we have done among universities in German speaking countries (see below). Consequently one of the first steps to pursue the global goal “to encourage and to improve virtual mobility among European students” we want to answer the following questions:
How can the idea of shifting from an input-oriented to the outcome-based approach be promoted among European HE and CE institutions?

How can this paradigm shift be supported by a European initiative?

And, laying the ground for dealing with the questions mentioned above, what is the current situation at European universities with respect to the implementation of learning outcomes?

**The functions of learning outcomes in Higher Education**

“Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate after a completion of a process of learning” (EU, 2004), is one of the most widely accepted definitions of learning outcomes. This terminology also applies to the notion learning objectives which had become generally accepted within the last two or three decades. Why is it necessary now to use the term learning outcomes instead of objectives? The short answer is: This terminological shift signals the theoretical shift from teaching to learning which forms the basis of the up-to-date educational strategy as well as the bologna process. Stephen Adam phrases this correlation with the following words: “Learning objectives and aims are concerned with teaching and the teacher’s intentions whilst learning outcomes are concerned with learning.” (Adam, 2004)

Learning outcomes describe what a student has learned as a result of a period of study. This construct points into the past and is outstandingly applicable to fulfil the terminological requirements of assessment. However, for planning purposes we cannot rest on results of processes lying in the past but we have to design future processes. Therefore we also have to put the term “learning outcomes” into the projected future and so generate the term “intended learning outcomes” – abbreviated ILO. Intended learning outcomes can be defined on different levels and thus are applicable for all matters of certification.

A programme learning outcome is a statement of what the learner is expected to know, understand or be able to do on successful completion of the entire programme. (…)

A module learning outcome is a statement of what the learner is expected to be able to do on successful completion of the module in order to demonstrate their knowledge, understanding, skills and/or competences. (Bowe & Fitzmaurice, 2004, p.2)

For purposes of virtual mobility primarily module learning outcomes will be relevant because the definition of VM includes the integration of short term learning processes abroad into the study program of a sending institution.

**What can learning outcomes be used for?**

The applicability of learning outcomes is not limited to matters of mobility but expanded to the whole educational business. Adam (2008, p.8) titles chapter 3 of his paper with “The Place of Learning Outcomes in the Bologna Process” and describes 6 functions:

*Learning outcomes and qualifications frameworks:* (…) Their main role here is to provide explicit and transparent level descriptors and qualifications descriptors. (Adam, 2008, p.10)

*Learning outcomes and lifelong learning:* (…) In higher education lifelong learning is often confined to the recognition of non-formal and informal learning together with policies to widen participation via non-standard admission and the recognition of prior learning. It is clear that these areas often depend on the usage of learning outcomes as the means to identify and evaluate learning wherever it has taken place. (Adam, 2008, p.11)

*Learning outcomes, credits, workload and credit systems:* (…) Credits expressed in terms of learning outcomes are a powerful way to recognise and quantify learning achievement from different contexts; they also provide an effective structure for relating qualifications to each other. The addition of the learning outcomes dimension has the
potential to improve dramatically the effectiveness of ECTS as a true pan-European framework. (Adam, 2008, p.11)

Learning outcomes, mobility and recognition: (...) The whole area of academic and professional recognition is likely to be transformed by transparency that the adoption of learning outcomes brings to qualifications and qualifications frameworks. Improvements in recognition with simplified and accurate decision making must in turn facilitate mobility of students, staff and programmes of learning. (Adam, 2008, p.12)

Learning outcomes and curricula reform: (...) Learning outcomes are key tools in the shift towards student-centred learning as they focus attention on explicit and detailed statements of what students learn – the skills, understanding and abilities we seek to develop and then test. (Adam, 2008, p.12)

Learning outcomes and quality assurance: Quality assurance benefits from the adoption of learning outcomes via the resulting improvement in transparency and comparability of standards between and within qualifications. Outcomes-based qualifications should possess greater credibility and utility than traditional qualifications. Quality assurance plays an obvious and important role in creating the European Higher Education Area, increasing mutual trust and confidence between those in different educational systems. (Adam, 2008, p.13)

Central for the purposes of VM are the connections between learning outcomes on the one hand and qualification frameworks, credit systems and mobility & recognition on the other hand. But for strategic reasons also the three remaining topics will be relevant: lifelong learning, curricula reform (or design) and quality assurance. Curriculum design in particular could benefit to a very high degree from adoption of learning outcomes. Logically and psychologically each competence identified as learning outcome of a specific learning process transmutes into an enabling competence for other learning processes with continuative ILOs.

Thus transparency could also be improved for designers, teachers and students of a specific curriculum making clear in detail which learning outcomes / competences have to be already achieved when beginning to study for the next level(s) of competence. This is a big difference to the description of content a student has to have dealt with before being able to deal with continuative content. What a student learns when dealing with specific content can differ to a very high degree in range and quality. Let us return to the example of the multiplication table: it makes a big difference if a student knows how to multiply numbers (the operational laws of the process) or if he/she knows the results of 1x1 to 20x20 by heart.

(Virtual) Mobility depends on mutual trust

The question how the learning outcomes of studying abroad can be recognised is crucial for the promotion of (virtual) mobility. Content, workload (ECTS), and local assessment seem not to be sufficient descriptors to establish a high enough level of trust that would allow for automatic recognition of certificates gained abroad. This is, indeed, to some degree rational: not because some universities produce poor quality regarding the competences of their students (which might also be an argument). The crucial reason is the lack of information value. The statement: students had to deal with a specific content for a defined number of hours on the one hand, and the local assessment on the other hand do not provide a valid and – from the subjective viewpoint of a sending institution – trustable documentation of students competences. Thus bilateral agreements are needed.

In contrast to this insufficient situation the adoption of learning outcomes would provide sufficient information. By the description of intended learning outcomes according to the state of art (“On successful completion of this module the student will be able to …”) assessment criteria and modalities are more or less pre-defined. Learning outcomes are quasi the genetic code of education determining both, the rough design of teaching and assessment. If the ILOs cry for problem solving competences you cannot successfully teach them exclusively by lecturing or validly assess them exclusively by elementary multiple choice tests. These learning outcomes demand active learning respectively learning by doing on the one hand and practical forms of assessment on the other hand. To chose the precise design of the learning process and the assessment is still up to the individual institution and/or teacher. But the framework is fixed by intended learning outcomes.
From this point of view clear, sufficiently detailed, and – as far as possible – standardised descriptions of learning outcomes in combination with adequate assessment procedures can be assumed as one of the main promoters for (virtual) mobility with respect to both, students and institutions. Students would be enabled to make a pinpoint choice of educational offers which meet their needs perfectly and reliably. Additionally the administrative costs of recognition could be reduced to a minimum. Institutions on the other hand could rely on the certified competences achieved abroad and handle them in the same way as internally achieved ones – again with minimal administrative effort.

The solution seems to be rather clear and easy up to this point of consideration. However, its implementation all over Europe – and less would be nearly as good as nothing – could still shape as an enormous problem. It is the ambition of the work in SIG3 “E-learning and evaluation of Learning Outcomes of EQF” of the VIRQUAL project to add a significant contribution to its solution.

The shift to learning outcomes at European universities

The formal structure of study programmes (bachelor / master) as well as the learner centred and the outcomes oriented approach build the core of the Bologna process. The structure has been made obligatory by European – and in consequence – by national law. The adoption of learning outcomes on the contrary is in many countries matter of the decisions of individual universities. This situation lead to a “multi-speed Europe regarding higher education reform” (Adam, 2008, p.7).

Current situation in the European HE&CE system – a short overview

A very instructive and compact overview to the overall European situation is given by Stephen Adam and quoted here in extracts:

The most highly developed systems - that use learning outcomes as a basis of their qualifications frameworks, level descriptors, generic qualification descriptors, subject descriptors and at the level of individual modules - exist in Scotland and Eire. It is no coincidence that these are the first two countries to have successfully undertaken the Bologna self-certification process where their national qualifications frameworks were articulated against the overarching framework of the qualifications of the EHEA. (…)

In addition to Scotland and Eire, England, Wales and Northern Ireland have well established systems that have pioneered the higher education use of learning outcomes. Belgium, Croatia, Denmark, Estonia, Hungary, Italy, Moldova, Portugal, Romania, Spain, Sweden and Switzerland are making rapid progress towards a more comprehensive implementation of learning outcomes.

Progress on mainland Europe is often initially being achieved by national legislation. Such top-down measures need to be matched by bottom-up activity. (…) while many countries have begun to use credits for transfer and for accumulation, a much smaller number currently link credits with learning outcomes. The European Credit Transfer and Accumulation System (ECTS) clearly requires the use of learning outcomes, but progress is slow to date.

Overall, official reports indicate positive but slow progress in the national and institutional adoption and implementation of learning outcomes. (…) Such innovations, if to succeed at the first attempt, require careful and slow implementation. (Adam, 2008, p.9)

The specific situation in German speaking countries

For more detailed information we conducted a survey among universities in German speaking countries. By means of an e-mail based survey among vice rectors, vice presidents and other persons responsible for teaching at European HE institutions we tried to achieve both, to promote the idea of
learning outcomes-based planning and to get a picture of the current situation in this countries by asking the following questions:

A Does your university explicitly use learning outcomes (instead of learning objectives, content, etc.) as starting point for didactical planning of new or revised programmes and modules?

If yes:

B Are you obliged to do so by (national) law or other (national or other political) regulations?

C Do you have detailed instructions or guidelines for writing learning outcomes (comparable to attachment: DIT Learning Outcomes Guide)? (If yes, could you make them available for us?)

If no (for A):

D What do YOU take as starting point for didactical planning? (Learning objectives, content, anything else?)

E Are you planning to shift to learning outcomes within the next two years?

Sample and Return Rate
During the summer months in 2009 two thirds (N=92) of the vice rectors, prorectors, vice presidents and other persons responsible for teaching (on institutional level) in the German speaking countries Austria (N=21), Germany (N=70) and Switzerland (N=11) were personally contacted by e-mail. Eleven of them (12%) returned an answer. On one hand the return rate is rather poor, probably due to the holiday season. (Nearly as often as an answer we received a notice of absence.) On the other hand the information we could gather from these 11 universities is consistent with our expectations according to literature and first of all sufficient for drawing practical conclusions. Nevertheless the plan was (and still is) to contact all European countries and all HE institutions (universities, private universities, universities of applied sciences / “Fachhochschulen”, “Pädagogische Hochschulen). But this was not possible up to now due to capacity constraints.

Results
The answers of eleven members of university managers from Austria, Germany and Switzerland result in the following raw data:

Question A: University explicitly applies learning outcomes: 7 out of 11 (DE: 6 = 100%)
Question B: University is obliged to use learning outcomes: 3 out of 11
Question C: University has guidelines for writing learning outcomes: 3 out of 11
Question D: Alternatives to learning outcomes: content, objectives, qualifications, competences
Question E: Shift to learning outcomes within 2 years: 3 out of 4

Interpretation
Question (A) Use of learning outcomes: According to Adam (2008) the German speaking countries (except Switzerland) do not belong to the leading nations as respects the application of learning outcomes in HE institutions. This situation seems to change if we look at the results of our survey, particularly concerning Germany. Even if we admit that these results might not be representative (universities which are able to report positively could be higher motivated to reply than those only able to report a lack of development) this feedback seems to be significant: German universities – and to a lower degree also Austrian and Swiss universities – are beginning to deal with the shift to learning outcomes for purposes of curriculum design and didactical planning.

Question (B) Obligation to use learning outcomes: Even more interesting are the given reasons for this development. Fife out of the six German universities are not (do not feel) forced by law to apply learning outcomes. They react to the requirements of accreditation agencies. Thus their concern to compete on the academic education market seems to be a sufficient motivation for this cultural change that could be able to bring a lot of friction into the system.
Question (C) Guidelines for writing learning outcomes: This seems to be the most important result: the professional foundation of using learning outcomes for curriculum design and other didactical planning purposes is at the moment rather poor. Only three (of 11 answering) universities have or use specific guidelines for this purpose. And this material is in comparison e.g. to the “Guide to Writing Learning Outcomes” used at Dublin Institute of Technology (Bowe & Fitzmaurice, 2004) of moderate quality. Most notably, the terminology is partly too diffuse to discriminate between learning outcomes and traditional (teacher-centred) learning objectives.

For sure it is difficult to write such guidelines in an acceptable and useful manner for the individual target groups. However, it will be crucial to have easily usable tools and devices for fulfilling the complex and challenging tasks of curriculum designers and teachers - under the conditions of a paradigm shift.

Question (D) Traditionally used alternatives to learning outcomes: No at all surprising are the (traditionally) applied alternatives to learning outcomes for curriculum design and didactical planning: mainly content and objectives. Those universities using objectives can perhaps be motivated to shift to learning outcomes with much less effort than those still using content.

Question (E) Shift to learning outcomes within 2 years: Three of the four concerned universities (two from Austria, one from Switzerland) answered this question. The Austrian statements are heterogeneous. The University for Arts & Design in Linz claims more time and expresses strong scepticism against the new paradigm. On the other hand the University of Salzburg feels – mistakenly – obliged to apply learning outcomes rather immediately by the university law amendment from 18 August 2009.

Summary of the survey in German speaking countries

We find rather heterogeneous situations no matter if we compare countries or institutions. Even within one university the situation can be completely different in individual sub-divisions like faculties, departments, or institutes (at least at Austrian universities as we know from personal experience). This multi-speed development is not at all a surprise but a standard in the context of cultural change. As a matter of fact the paradigm shift to learning outcomes has to be considered as cultural change.

The adoption of learning outcomes needs a non-traditional way of thinking in educational contexts. For scientists – and university teachers are scientists – content (particularly their individual subject matter) traditionally builds the centre of their world. To move their subject matter out of the centre and to replace it by student’s learning outcomes might be experienced by university teachers in the same way as mankind suffered the cosmological mortification when Copernicus destroyed the (illusion of the) heliocentric system. Many institutions, managers and employees seem to be overstrained with this challenge. They need help, because successfully writing learning outcomes requires – beyond a new way of thinking – also new competences and a lot of experiences.

From our survey in German speaking countries we learned that many people (and institutions) do not begin to deal with the new paradigm before they are (or feel to be) obliged to do so: if not by law then by accreditation agencies. It seems to be just a minority that starts the respective change process by their own initiative, motivated by the insight and/or promise of future benefits and advantages. According to our experiences this applies primarily to people with a pedagogical or psychological background who had the opportunity to gain theoretical knowledge about the relevant topics. Scientists from other fields rarely had this option and thus often have a more difficult path to a new way of thinking and correspondingly acting. No doubt, individual coincidences can also play a significant role in the necessary change process; e.g. to have read a specific book, to have met a persuasive person, or to be part of an innovative team.

Nevertheless: wherever individual initiatives – be they significant or rudimental – can be firms up and supported by tools, devices, and consultancy it will be possible to improve speed, quality, and results of the necessary paradigm shift with the utmost probability.

How can the paradigm shift to learning outcomes be supported

According to the analysis of the current situation there emerge two main support strategies for the paradigm shift to learning outcomes:
Supporting the process (the art) of writing learning outcomes

Making learning outcomes available for re-use.

In both cases the principle is: “Do not to re-invent the wheel”.

Several institutions/universities have developed very useful guidelines on the one hand and/or written a lot of clear and detailed learning outcomes for many modules on the other hand. The basic concept of the VIRQUAL project for support strategies is to collect best practice examples of both, guidelines and learning outcomes (descriptions), to adapt and translate them and (authorisation by the authors provided) to make them available for other interested institutions in appropriate ways. Moreover a lot of dissemination and some research into acceptance, usability, and effects might be necessary.

**Strategy 1: Blueprints of guidelines for writing learning outcomes**

The Dublin Institute of Technology (DIT) has produced a “Guide to Writing Learning Outcomes” (Bowe & Fitzmaurice, 2004) we used as reference paper for our own survey (see p.4). This guide was written for the specific needs and situation of DIT but some parts of it will also fit to the specific needs and situation of many other institutions. On the other hand there are many examples of guidelines from other universities (e.g. Universität Graz, 2008; TU München, 2008) with different needs and situations. On the basis of the available material it is planned to

- elaborate a blueprint of guidelines for writing learning outcomes in English (optionally in several versions for different framing conditions)
- adopt and translate it for (all) European countries and
- disseminate it in adequate ways among the target groups (VIRQUAL website, via e-mail, personal contact, etc.)

**Strategy 2: Collection of best practice examples of learning outcomes**

Guidelines (see above) aim at improving the competence and the process of writing learning outcomes as important tools for designing curricula and – ultimately – the European Higher Education Area. In contrast a best practice collection of learning outcomes will improve the products on an international level and help to develop standardised learning outcomes for units, modules and programmes in a long term perspective.

The competences of a medical doctor will be the same in Paris, Marseille, Espoo, and Athens; at least to a very high degree. Basic skills in mathematics will be completely the same in all the cities named above as well as in different programmes like physics, psychology and economy. What usually makes the difference are the way these competences are described and the learning situations planned for gaining them.

Institutions and teachers should be enabled to concentrate on these tasks – and not be forced to spend time and effort on the individual formulation of the same identical learning outcomes again and again. Who comprehends that learning outcomes are the genetic code of education will stick to the creation of the optimal environmental influences to realise the inherent potentials – and will unhesitating leave the job of writing ILOs to others if he/she can get them in high quality and free of charge from other sources.

Therefore it is considered to implement a database for – professionally written – learning outcomes on a European basis where institutions can upload their products (in original language and English). Quality control will in the beginning be performed and/or organised by the VIRQUAL project and could later be executed by an advisory board consisting of representatives of participating universities.

**Summary and Outlook**

The paradigm shift to learning outcomes is a multi-speed development within European countries and institutions. Some countries on the one hand and some universities on the other hand are forerunners and have already implemented adequate processes of applying learning outcomes for designing curricula of study programs and modules. Others have just begun this process while the third group is still waiting for
the starting shot. Particularly these last group of HE&CE institutions are the target group for a learning outcomes-oriented support strategy to be developed and executed by the VIRQUAL project within the next two years.

Its central tools will be blueprints of guidelines for writing learning outcomes on the one hand and a collection of best practice examples of learning outcomes (ILO repository) on module level on the other hand. Both will be based on exploitation and refining / adopting of available products which will be made easily accessible for interested institutions and individuals mainly via VIRQUAL website (respectively other adequate tools after the end of the project period), personal contact and further means.

The ILO repository will be easily manageable in the beginning of its development when the challenge is to optimise the formulations, to find out which cultural adaptations have to be done for different countries or institutions and to translate the elaborated learning outcomes into other languages (at least English). But if full coverage of all study programs in the European higher education area is required – and in a far future potentially achieved – we will have to handle estimated between 10.000 and 20.000 learning outcomes on module level. On course level the number would be four to six time higher. Such quantities are not manageable without a strong topical structure of high usability and ultimately with a coding system ready for machinable data processing.

The aim of this paper is primarily to discuss the plausibility and the expected acceptance of this initiative. Thus I want to ask you four short and clear questions:

1. Would you like to contribute to the guideline blueprints, and would your institution give you the permission to do so?
2. Would you use available guideline blueprints and would your institution accept that?
3. Would you like to contribute to the ILO repository and would your institution give you the permission to do so?
4. Would you borrow available ILOs and would your institution accept that?

Endnotes

(1) The use of information and communication technologies (ICT) to obtain the same benefits as one would have with physical mobility but without the need to travel.
(2) In my opinion “intended learning outcomes” are terminologically fully identical with the “operationalised learning objectives” of former decades. But I fully agree with Adam and other authors, e.g. Gronlund (2000, p.5) to prefer the term “learning outcomes” for both, assessment and planning of learning processes because of its impact in terms of psychology of perception.

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Assessment of Blended Learning and the Use of Constructivist Approach in Management Information System Course

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Abstract: In the course of intensive penetration of information and communication technologies, undoubtedly more attention is paid to the appropriate use of computer technologies in education process. Higher education schools in order to ensure wide choice opportunities for the students must keep pace with the tempo of today’s life and offer not only traditional teaching methods but modern and innovative ones as well such as distance or blended ways of learning that enable the students to study successfully not only attending the lectures but also at home or in work places. Moreover, in this context the role of a lecturer changes proceeding from knowledge conveyor to cooperation in creation of knowledge. Therefore, it is obvious that appropriate preparation of a module for working in a blended way requires the lecturer much efforts and diverse, not only directly related to the content of the module knowledge, abilities and competences.

As we explore the use of blended learning, it is important that we assess and evaluate its effectiveness. In addition to assessing the learning outcomes, the learning process should also be assessed. In this article we will present the results of the research of the attitudes of students of Master studies in management programme (branch of Public Administration) in Šiauliai University that reflect the evaluation of the module Management Information Systems studied in a blended way.

Introduction

Distance education has become a familiar and effective element of higher education and it continues to rapidly expand. It helps to implement strategic goals of the system of education, i.e. to create learning possibilities to all members of society, to create a more effective teaching and learning process, as well as to ensure more flexible organization of teaching and learning activities. The use of ICT in education allows the creation of different teaching and learning scenarios, and the transfer of teaching and learning process to virtual learning environment. Pedagogical theories highly agree on viewing lectures that serve only to transmit information to students as not being very effective in the long run (Salmon, 2000). Evidence shows that neither traditional lecturing nor pure e-learning suffice to prepare students adequately for their future profession (Motschnig-Pitrik et al, 2002).

Blended learning is a flexible approach to course design that supports the blending of different times and places for learning, offering some of the conveniences of fully online courses without the complete loss of face-to-face contact. According to Colis and Moonen (2001), blended learning is a hybrid of traditional face-to-face and online learning so that instruction occurs both in the classroom and online and where the online component becomes a natural extension of traditional classroom learning. Many variations of the blended model exist. Blended learning, the combination of traditional face-to-face teaching methods with authentic on-line learning activities, has the potential to transform student learning experiences and outcomes. In spite of this advantage, university teachers often find it difficult to adopt new online techniques, in part because in practices of Lithuanian educational institutions it is still more supported traditional approaches.

Such a flexible teaching/learning method helps the students to acquire knowledge and skills that are necessary for successful studying at the university receding neither from their works nor geographical place ensuring the support of independent learning as well as planning of students’ time (Bromme, Hesse, & Spada, 2005; Jonassen & Kwon, 2001). The researches show that information technologies create powerful tools that help to learn together, cooperating (Bryant, Khale, & Schafer, 2005; Schellens & Valcke, 2005). Application of a blended learning method also influences changes of pedagogical and didactical models (proceeding from face-to-face teaching to virtual). Such learning models as problem based learning, Project based learning become especially important. Speaking about “online” courses we
must refer to four additional criteria: 1) Firstly, using the word “online” we speak about the internet. Attachment to learning time and space disappears for the students and the possibilities to communicate and work in a team without referring to students’ geographical position are created. Obviously, continuous internet access also causes necessity to form instructions or a method that would enable the students to study at convenient for them time (Tempelaar, Renties, Rehm, Dijkstra, Arts & Blok, 2006). 2) Secondly, every student is unique and individual, having different knowledge experiences, learning styles, and study progress (Tempelaar, Gijseelaers, Schim van der Loeff, & Nijhuis, 2007). Therefore, Virtual Learning Environment (VLE) must be adjusted to achieve individualised learning progress (Doignon & Falmagne, 1999). Possible individual learning ways adjusted to every person studying in a distant way must be foreseen. 3) Thirdly, communication/interaction is one of the most influencing elements not only in “online” studies but also using other educational methods, since communication/interaction stimulates motivation to learn (Hmelo-Silver, 2004; Schellens & Valcke, 2005; Vrasidas & Zembylas, 2003). Motivation may be increased through several factors: through clear indications, continuous communication of lecturer-student, student-student, and overall destruction of isolation. The other way to increase motivation is assignment of more responsibility for the student in planning and distribution of learning process.

An online course structured as a sequence of online lectures or textbook-based reading assignments followed by traditional assessments represents a passive form of learning that is teacher-centered and better aligned with the more traditional form of higher education. A constructivist learning environment, on the other hand, is one that is learner-centered, where the focus is on learning rather than teaching, and where active learning and cooperation through discussion take place. This view is consistent with that of Barr and Tagg (1995) who described a shift of emphasis in higher education from one of providing instruction (the teaching paradigm) to one of producing learning (the learning paradigm). Teaching at a distance is not just about using technology, it is also about perfecting a pedagogical approach for effective online learning.

**The shift from instructional to constructivist approach**

The constructivist revolution has brought new conceptions of learning and teaching (Mayer, 2003; Marshall, 1996; Phillips, 1998; Steffe & Gale, 1995; Chin & Williams, 2006; Du et al, 2005; Perkins, 2005; Jonassen et al, 1999). Constructivism is a philosophy of learning based on the premise that knowledge is constructed by the individual through his or her interactions with the environment. It has its roots in the constructivist movement of cognitive psychology, which holds that individuals gradually build their own understanding of the world through experience, maturation, and interaction with the environment, to include other individuals (Rorty (1991), Vygotsky (1978), Piaget (1977)). Thus, from the constructivist viewpoint, the learner is an active processor of information. This is in sharp contrast to behaviorism, for example, in which the learner is viewed as a passive recipient of information.

Applying constructivist theory to online learning would suggest the need to move beyond the transmission of information (presenting texts and diagrams on screen) to creating environments where students are required to interact with the material and each other in an exploration of data that enables them to build their own understanding through experience.

A more pragmatic view of constructivism is to maintain that knowledge is the product of many learner-centered processes, to include the social process of communication and negotiation (i.e., the social construction of reality). The implications of constructivism for a learning environment include using curricula customized to the students’ prior knowledge, the tailoring of teaching strategies to student backgrounds and responses, and employing open-ended questions that promote extensive dialogue among learners. Questioning becomes the major means by which students are helped to construct meaning. However, according to Brooks and Brooks (1995), the constructivist approach is more than just activities. In not treating students as passive learners, more respect is shown to students as learners and as human beings. It is very important for the instructor to be aware of initial student misunderstandings to provide the kinds of experiences that will allow the student to learn.

Jonassen (1994) suggested that constructivism should be applied to distance education and proposed a constructivist design model for online learning that included the following guidelines: Focus on knowledge construction, not reproduction. . .Present authentic tasks. . .[that] provide real world case-based learning environments,. . .Foster reflective practice, and enable context and content dependent
knowledge construction,. . .Support collaborative construction of knowledge through social negotiation, not competition among learners for recognition (p. 35).

This constructivist approach to online learning is consistent with the paradigm shift that Barr and Tagg (1995) suggested is taking place in higher education. They reported that institutions of higher education are thinking less about providing instruction (i.e., the teaching paradigm) and more about producing learning (i.e., the learning paradigm).

Table 1: Elements of emphasis in higher education traditional and constructivist learning environments.

<table>
<thead>
<tr>
<th>TRADITIONAL</th>
<th>CONSTRUCTIVIST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional emphasis</strong></td>
<td></td>
</tr>
<tr>
<td>Teaching, knowledge reproduction, independent learning, competition.</td>
<td>Learning, knowledge construction, collaboration, reflection.</td>
</tr>
<tr>
<td><strong>Classroom activities</strong></td>
<td></td>
</tr>
<tr>
<td>Teacher-centered, direct instruction, didactic, individual work.</td>
<td>Learner-centered, Socratic, authentic, individual and group work.</td>
</tr>
<tr>
<td><strong>Instructor roles</strong></td>
<td></td>
</tr>
<tr>
<td>Expert, source of understanding, lecturer.</td>
<td>Collaborator, tutor, facilitator, encourager, community builder.</td>
</tr>
<tr>
<td><strong>Student roles</strong></td>
<td></td>
</tr>
<tr>
<td>Passive, listener, consumer of knowledge, note taker.</td>
<td>Active, collaborator, constructor of knowledge, self-monitoring.</td>
</tr>
<tr>
<td><strong>Assessments</strong></td>
<td></td>
</tr>
<tr>
<td>Fact retention.</td>
<td>Authentic knowledge application, portfolios, projects, performances.</td>
</tr>
</tbody>
</table>


Table 1 provides a summary of the differences in emphasis between traditional and constructivist higher education learning environments. There is room for traditional pedagogy, such as use of lectures with discussion, in a constructivist learning environment.

E-learning is a combination of content and instructional methods delivered via a computer and designed to build knowledge and skills. According to Jonassen (2000), such technologies are cognitive tools that assist learners to elaborate on what they are thinking and to engage in meaningful learning. Within the context of constructivism, he suggested that learners use such technologies as intellectual partners to (a) articulate what they know; (b) reflect on what they have learned; (c) support the internal negotiation of meaning making; (d) construct personal representations of meaning; and (e) support intentional, mindful thinking.

Since learners interpret new information on the basis of their existing knowledge, constructivist pedagogy is based on students' previous conceptions and beliefs about the topics to be studied. It emphasises understanding things rather than merely memorising and reproducing information and relies on social interaction and collaboration in the making of meaning. Teaching is not about transmitting knowledge but about helping students to construct knowledge actively by assigning them tasks that foster this process. Moving from the knowledge-transmitting paradigm of learning towards constructivist instruction also requires fundamental changes in assessment procedures (Jonassen, 1991; Entwistle 1987; Biggs 1994).

Consequently, students can demonstrate content mastery by doing what they learned and demonstrate competency through the use of work-related portfolios and projects. This assessment model is consistent with the strategies identified by Vrasidas and Glass (2002) to reduce plagiarism in online courses by creating assignments that are more difficult to plagiarize by requiring students to (a) use their own experiences, (b) apply ideas to their own or at least to real-world contexts, (c) work collaboratively with their peers, and (d) negotiate the assessment process with the instructor. In constructivist learning environments, where the emphasis is on collaboration, relationships, inquiry, and invention, overreliance on traditional tests that emphasize factual recall is not consistent with the nature of the learning that takes place in these environments (Salomon & Perkins, 1998).
Students should be assessed by a combination of participation in online discussions, submitted tests, portfolios, and individual and group projects and performances, most of which will be submitted directly to the instructor by e-mail attachment. Additionally, Henderson, Rada, and Chen (1997) reported research results that suggest peer evaluation to be an effective technique for online assessments. The timing and content of the instructor’s feedback to students takes on added importance in an online environment where members of the learning community are separated from each other. From a constructivist viewpoint, the key imperative is to use feedback to (a) guide the students in their future actions so that they can more effectively explore data and (b) to help them make sense of their experience in order that the schema they construct are informed by logic and reflection.

**Methodology of the research**

In order to diagnose respondents’ attitudes towards module studies organized in a blended way, a quantitative research method has been chosen – questioning using a closed type questionnaire. The research tool has been composed referring to analysed scientific literature (Marshall, 1996; Phillips, 1998; Steffe & Gale, 1995; Chin & Williams, 2006; Du et al, 2005; Perkins, 2005; Jonassen et al, 1999; Hmelo-Silver, 2004; Schellens & Valcke, 2005; Vrasidas & Zembylas, 2003) and researchers’ participating in this research personal, professional, and work experience.

Social-demographic variables’ block is used to find out respondents’ gender, age, stage, form and year they study. Social-demographic characteristics may be important analyzing respondents’ attitudes, approaches to the selected researched object.

The main part of the questionnaire contains the questions related to the research problem. The latter part consists of three groups of indicators: a) evaluation of accessibility of blended learning (4 questions); b) evaluation of preparation of module of blended learning (9 questions); c) organisation of cooperation, team work, blended learning, use of online environment, peer-assessment opportunities, etc. (35 statements).

In this article we will present the results of the research of the attitudes of students of Master studies in management programme (branch of Public Administration) in Šiauliai University that reflect the evaluation of the module Management Information Systems studied in a blended way.

For data processing SPSS (Statistical Package for Social Sciences) 17 software has been used. Besides usual descriptive statistical methods, multidimensional statistical method – factorial analysis has been used. According to V. Čekanavičius and G. Murauskas (2004), the main advantage of factorial analysis is that it allows changing the set of features characterizing the observed object by the set of several factors. In case of our research, factorial analysis has been used to highlight the structure of intuitively formed latent variables of the tool.

**Research results**

**Expression of respondents’ opinion about the accessibility of blended learning**

In order to find out respondents’ opinion about accessibility of the module Management Information Systems through information communication technologies the following questions have been presented: Have you had problems using internet access?, Where did you usually study module’s internet material?, How much time per week averagely did you devote to work with module’s internet material?, Have you used an opportunity to consult interactively with group mates, the lecturer? Percentage expressions of respondents’ answers to above formulated questions are presented in table 2.
Data presented in table 2 indicates that more than 75 % of the respondents during studies did not have any problems with internet access. However, 5.2 % of the respondents, who stated that they had encountered some serious problems with internet access as well as with module studies, cause worry. It means that organizing blended studies we should discuss in advance with the students situations of similar type and foresee specific actions to solve these problems. The research has shown that a great part of the studying persons (80.5 %) stated that they studied module’s internet material at home. Studies of various modules organized in a blended way should be based on that the students could study theoretical module’s material at convenient time and appropriate place. In the particular case this principle is almost properly implemented. Almost 12 % of the respondents indicated that they studied module’s internet material at work. We may consider that this opportunity has been discussed with the employer, employers understand employees’ needs and agree that employees should develop their competences not only at the time free from work. It is obvious that employees agree with the conception of Lifelong Learning and tend to contribute implementing it in the particular case.

Expression of respondents’ opinion about preparation of blended learning module, its efficiency, and quality of conveyance

In the course of intensive penetration of information and communication technologies to various life spheres, undoubtedly more attention is paid to the appropriate use of computer technologies in education process. Higher education schools in order to ensure wide choice opportunities of the students must keep pace with the tempo of today’s life and offer not only traditional teaching methods but modern and innovative ones as well such as distance or blended ways of learning that enable students to study successfully not only attending the lectures but also at home or in work places. Moreover, in this context the role of a lecturer changes proceeding from knowledge conveyor to cooperation in creation of knowledge. Therefore, it is obvious that appropriate preparation of a module for working in a blended way requires the lecturer much efforts and diverse, not only directly related to the content of the module knowledge, abilities, and competences.

Trying to find out the expression of respondents’ opinion about preparation of module’s material, the questionnaire contained closed type questions if theoretical module’s material was presented in a clear and understandable way, if the researched had to use additionally indicated traditional literary sources, if presented interactive practical and individual work tasks helped to assimilate better module’s material, if there was enough time to perform the tasks when accounting in an interactive way, etc. Percentage expressions of respondents’ answers to the above formulated questions are presented in table 3.
Table 3: Expression of respondents’ opinion about module’s suitability and preparation for blended learning (N=77).

<table>
<thead>
<tr>
<th>Questions-indicators</th>
<th>Evaluation scale</th>
<th>No (%)</th>
<th>Partly no (%)</th>
<th>Partly yes (%)</th>
<th>Yes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was theoretical material presented in a clear and understandable way?</td>
<td></td>
<td>0</td>
<td>1.3</td>
<td>51.3</td>
<td>47.4</td>
</tr>
<tr>
<td>Have you used additionally indicated traditional literary sources and links to other internet information sources?</td>
<td></td>
<td>45.4</td>
<td>48.1</td>
<td>2.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Have interactively presented practical and individual work tasks helped you to assimilate module’s material better?</td>
<td></td>
<td>1.3</td>
<td>2.6</td>
<td>46.7</td>
<td>49.4</td>
</tr>
<tr>
<td>Was an interactive way to account for the assimilated material (tests, essays, etc) convenient for You?</td>
<td></td>
<td>0</td>
<td>0</td>
<td>23.4</td>
<td>76.6</td>
</tr>
<tr>
<td>Was it enough time for You to perform the tasks when accounting in an interactive way?</td>
<td></td>
<td>1.3</td>
<td>7.8</td>
<td>41.5</td>
<td>49.4</td>
</tr>
<tr>
<td>Would you like the blended learning to be applied to other study modules?</td>
<td></td>
<td>0</td>
<td>2.6</td>
<td>24.7</td>
<td>72.7</td>
</tr>
<tr>
<td>Was in your opinion the application of blended learning for the studies of this module useful?</td>
<td></td>
<td>1.3</td>
<td>1.3</td>
<td>35.1</td>
<td>62.3</td>
</tr>
</tbody>
</table>

Table 3 presents generalized percentage expressions of variables of respondents’ opinion about module’s suitability and readiness for blended learning. Evaluating the statements of this questions’ block we may state that two questions-statements have been evaluated most favorably i.e. interactive accounting for the assimilated module’s material is convenient for the respondents (76.6 %) and the respondents would like other study programme’s modules to be organized in a blended way (72.7 %). 62.3 % of the respondents think that the method of blended learning used for this module’s studies was useful. It is obvious that organisation of studies using the method of interactive blended learning gains positive evaluation of the students and may be considered as the goal in the study process to apply innovative study methods wider.

Besides these questions, the respondents were asked to evaluate in ten-point system (where 1 means very bad and 10 – excellent) the usefulness of the module and quality of module’s conveyance in the context of all Management programme of Master studies. The average of evaluation of module’s usefulness is 8,55 points (mode – 9, standard deviation – 0,9), and the average of evaluation of quality of module’s conveyance is 8,43 points (mode – 8, standard deviation – 0,91). These assessments of descriptive statistics evidence that the respondents evaluate the module itself and the quality of its conveyance rather highly and the structure of their opinion is smooth.

Generalizing we may state that expectations of the majority of the students have been justified by the blended learning method chosen for the module Management Information Systems, when traditional classes are combined with distance learning and, according to the respondents, studies of this module are useful and necessary to gain Master qualification degree in management.

**Application of innovative methods when organizing blended studies: results of factorial analysis**

In order to find out respondents’ opinion about the use of application of innovative methods when organizing studies in a blended way, a 35 question block has been composed. Using factorial analysis we tried to reveal the consistent patterns of the structure of investigated block. The results of factorial analysis of the investigated problem are presented in table 4. During factorial analysis, 35 statements were reduced to the structure of 8 factors. In principle, all variables grouped in the factors meaningfully. Not low meanings of correlative coefficients in the context of all factors (0.43 ≤ L ≤ 0.85) show a sufficient relationship of construct’s statements with extracted factors. Descriptive validity (dissipation) of factors varies from 11.54 % to 4.95 % (totally 68.43 % of dissipation has been explained). Kaiser-Meyer-Olkin (KMO) coefficient, which in this case is also sufficient (0.64) indicates if matrix of the variables suits for factorial analysis. Sufficient measure of internal consistency of discrete factors (subscales) – Cronbach alpha coefficient (F1 factor – 0.83, F2 factor – 0.82, F3 factor – 0.84, F4 factor – 0.72, F5 factor – 0.67, F6 factor – 0.63, F7 factor – 0.68 and F8 factor – 0.56) indicates that excluded factors are not formed out of
random, having nothing in common statements but have homogeneous elements. Therefore, the presented
indexes of statements’ scale satisfy methodological norms of construct’s reliability and factorial control.

Table 4: Results of factorial analysis of respondents’ opinion about application of innovative methods in
the plane of the module organized in a blended way (N = 77, KMO = 0.64, Total Variance Explained = 68.43 %).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Statements</th>
<th>L</th>
<th>N</th>
<th>Cronbach α</th>
<th>% of Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Questions of final assessment (test of exam) were clear</td>
<td>0.81</td>
<td>7</td>
<td>0.83</td>
<td>11.54</td>
</tr>
<tr>
<td></td>
<td>I evaluate positively the order of virtual accountings, exams.</td>
<td>0.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tests’ assessment was objective</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I positively evaluate the structure of module’s material (thematic layout, consistency, clearness)</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instructions of performance of tasks were clear</td>
<td>0.64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I think an opportunity to work in an appropriate place at appropriate time motivated me to study this module</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I think an opportunity to work in my own pace motivated me to study this module</td>
<td>0.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>Group members helped us to apply what we have learnt not only in the presented tasks but in other situations as well.</td>
<td>0.85</td>
<td>4</td>
<td>0.82</td>
<td>9.54</td>
</tr>
<tr>
<td></td>
<td>Group members interactively enthusiastically (willingly) consulted each other</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group members stimulated each other to participate in virtual discussions</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I think cooperating with other participants I have learnt more than I would have learnt working individually</td>
<td>0.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Combining learning individually in distant environment with face-to-face meetings with the lecturer was effective and let us assimilate knowledge better</td>
<td>0.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Through module’s interactive environment I received the main, necessary for me, technical/organisational help related to the subject’s content</td>
<td>0.64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am satisfied with scientific and methodological level of the lectures</td>
<td>0.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assignments/tasks let me check what I do know and what I do not know yet</td>
<td>0.60</td>
<td>8</td>
<td>0.84</td>
<td>8.75</td>
</tr>
<tr>
<td></td>
<td>I suppose that assimilation of this module will help me in the future to comprehend the processes of modern society</td>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Through module’s interactive environment I received main, necessary for me material, related to the subject’s content</td>
<td>0.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am satisfied with lecturer’s preparation to cooperate and consult in an interactive way</td>
<td>0.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have noticed that learning in a distant environment is not as formal and structured as traditional learning in classrooms</td>
<td>0.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>During module’s studies I have improved the competences of data presentation</td>
<td>0.81</td>
<td>5</td>
<td>0.72</td>
<td>7.61</td>
</tr>
<tr>
<td></td>
<td>During module’s studies I have improved the competences of data analysis and interpretation</td>
<td>0.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>During module’s studies I have improved my intercultural competences (experience of other countries)</td>
<td>0.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>During module’s studies we have opportunities to construct knowledge, abilities ourselves, to perform tasks that corresponded my preparation, aims and I liked</td>
<td>0.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>During module’s studies I have encountered the tasks that require practical, real activities’ skills</td>
<td>0.48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Studying this module I developed critical thinking</td>
<td>0.82</td>
<td>4</td>
<td>0.67</td>
<td>7.30</td>
</tr>
<tr>
<td></td>
<td>Studying this module I obtained more experience of</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Statements</td>
<td>L</td>
<td>N</td>
<td>Cronbach α</td>
<td>% of Variance</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>problem learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I communicated by e-mail with the lecturer and other students</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>It was fun to communicate and cooperate interactively with other participants of the module, the lecturer</td>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>I have participated in online discussions</td>
<td>0.78</td>
<td>2</td>
<td>0.63</td>
<td>5.52</td>
</tr>
<tr>
<td></td>
<td>I have participated in online forums</td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>Constant contact with the lecturer while working in a distant environment was very important</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All necessary newest information was presented clearly and on time</td>
<td>0.50</td>
<td>3</td>
<td>0.68</td>
<td>5.33</td>
</tr>
<tr>
<td></td>
<td>Interactive cooperation facilitated understanding of subject’s content</td>
<td>0.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F8</td>
<td>I have performed the evaluation of colleagues’ completed tasks</td>
<td>0.81</td>
<td>2</td>
<td>0.56</td>
<td>4.95</td>
</tr>
<tr>
<td></td>
<td>I enjoyed evaluating colleagues’ completed tasks</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The first factor (F1) we may conditionally call Evaluation of Blended Learning Interactive Environment, that reflects respondents’ attitude towards the advantages of learning of interactive way emphasizing appropriate organisation and evaluation of study process and creation of favorable study environment. The respondents favorably evaluate the opportunities of studies’ mobility i.e. an opportunity to study at the time convenient for them, at an appropriate place, at convenient for them pace. We may state that it is especially important for the students who work at the time free from studies.

The second factor (F2), which we conditionally named Group Work / Communication covers the statements that explain how the researched assess team work opportunities when cooperating inside the group. The research has proved that communication and cooperation of the participants of education process is an inseparable part of study process that helps not to grow apart or grow away from each other but to share opinions, stimulate to communicate, consult each other, discuss difficulties that appeared while performing the tasks, etc.

Naturally, properly organized studies depend upon lecturer’s professionalism, therefore, the third factor (F3) consisting of the statements that illustrate lecturer-organizer’s ability to properly manage module’s studies prepared in a blended way, we have designated Lecturer’s Professionalism Organizing Studies in a Blended Way. It is obvious that lecturer’s functions in the studies organized in a blended way change in comparison with traditional studies. In this case the most important lecturer’s task is not only dissemination of knowledge but the ability to organize studies not formally but flexibly, stimulating to study independently, to communicate, evaluate, etc.

Higher education studies are inseparable from development of students’ scientific-research competences. Statements reflecting students’ opinion about development of scientific-research competences (competences of data analysis, interpretation, presentation, etc.) during the studies composed the factor (F4) that we called Expression of Student’s Scientific-Research Competences

The fifth factor (F5) we conditionally designated Innovative Methods in the Context of Cooperation since the statements constituting it directly reflect the aspects of communication, cooperation, critical thinking and problem teaching. Application of innovative methods is oriented to competence-based learning when students are stimulated to participate actively in (self)education process in order to develop competences, using various new methods combined with particular personal needs.

The sixth factor (F6) is entitled as Asynchronous Collaboration. This factor directly reflects respondents’ relation with the module organized in a blended way and their participation in virtual online forums and discussions. This selection of innovative methods corresponding constructivist learning paradigm when the participants of the process have an opportunity interactively to change thoughts, ideas, to suggest, discuss, etc., becomes an inseparable part of modern higher education.

Not less important is the seventh factor (F7) called Security of Feedback. The statements composing the factor reflect an opportunity of the students and the students and the lecturer to contact...
constantly in case of solution of the problems that appear to both parts, to receive answers to important questions at any time.

The eighth factor (F8) was conditionally designated *Peer Assessment On-line*, since it consists of the statements indicating direct students’ possibility to assess colleagues’ tasks interactively. In modern education system besides traditional assessment of knowledge and abilities the new attitude to assessment – self-assessment or Peer assessment is more often emphasized. The latter ways of assessment form assumptions to develop the competences of reflecting and analytical thinking.

Generalizing the results of factorial analysis of statements’ scale of respondents’ opinion about the module *Management Information Systems* organized in a blended way and knowing that the names of obtained factors were designated subjectively, i.e. referring to the formulations of statements composing the factor and that have the biggest interrelation and semantic sense, we may state that factorial analysis allowed to disclose meaningfully latent structure of researched construct that directly reflects the expression of respondents’ opinion in the context of application of innovative education methods.

**Figure 1:** The rating of averages of obtained factors of respondents’ opinion about application of innovative methods in a blended way (N=77).

Figure 1 presents the rating of averages of extracted factors of respondents’ opinion about application of innovative methods in blended studies where assessment of statements was carried out in a five-point scale: 1 reflects assessment “definitely no”, 2 – “probably no”, 3 – “don’t know”, 4 – “probably yes”, 5 – “definitely yes”. The found tendency is reflected by horizontal column diagrams (see Figure 1), starting with the factor that received the lowest ratings and completing with the factor that got the highest ratings of averages. The highest rating was reached by the factor F3 (*Lecturer’s Professionalism Organizing Studies in a Blended Way*) which actually reflects lecturer’s competences, the lowest rating was reached by the factor F6 (*Asynchronic Collaboration*) that reflects respondents’ opportunity to participate in virtual forums and discussions. We may suppose that in higher education system where blended learning is performing the first steps, according to the respondents, it is more relevant professional and subject lecturer’s preparation and ability to organize in a blended way, involving the more elements of interactive cooperation, to express positive attitude to opportunities and ways to study at convenient time, pace and place, positively evaluating possibilities to get information, to consult *here and now*, to develop scientific-research competences. However, the research has highlighted that group work, cooperation, intercommunication, and colleagues’ evaluation still are not understood as innovative study methods that development reflects aims and tendencies of modern higher education.
Conclusions

Distance education is widely used in Europe and it is getting more and more popular in Lithuania. It helps to implement strategic goals of the system of education, i.e. to create learning possibilities to all members of society, to create a more effective teaching and learning process, as well as to ensure more flexible organization of teaching and learning activities. The use of ICT in education allows the creation of different teaching and learning scenarios, and the transfer of teaching and learning process to virtual learning environment. Blended learning is a flexible approach to course design that supports the blending of different times and places for learning, offering some of the conveniences of fully online courses without the complete loss of face-to-face contact.

Applying constructivist theory to online learning would suggest the need to move beyond the transmission of information (presenting texts and diagrams on screen) to creating environments where students are required to interact with the material and each other in an exploration of data that enables them to build their own understanding through experience.

Situation shows that traditional instructional approach is still mainly used in teaching and learning educational settings in Lithuania. Tutor assessment is still evaluated by students themselves as more valid, reliable and transparent than other forms of assessment (portfolio-, self-, peer assessment) what not only provides an evidence of prevailing traditional instructional practices, but implies necessity of transition to knowledge construction approach.

In the expression of respondents’ opinion there is a clear tendency reflecting the fact that studies organized in a blended way satisfied expectations of the majority of the students. Obviously, the selected blended learning way when traditional classes are combined with distant learning ensuring interactive interaction of participants of education process is an inseparable goal of effective and qualitative organisation of studies.

Factorial analysis allowed disclosing meaningfully latent structure of researched construct that directly reflects the expression of respondents’ opinion in the context of application of innovative education methods. The structure that was formed during factorial analysis clearly reflects the main aspects of education process organized in a blended way, that are oriented to the assessment of interactive interaction and environment, group work and communication, new role of a lecturer, feedback.

The research has confirmed that in higher education system where blended learning is performing the first steps, according to the respondents, it is more relevant professional and subject lecturer’s preparation and ability to organize in a blended way, involving the more elements of interactive interaction, to express positive attitude to opportunities and ways to study at convenient time, pace and place, positively evaluating possibilities to get information, to consult here and now, to develop scientific-research competences. However, the research has highlighted that group work, cooperation, intercommunication, and colleagues’ evaluation still are not understood as innovative study methods that development reflects aims and tendencies of modern higher education.

References


Fact-oriented Knowledge Structuring Tools and Metrics

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Abstract: In this paper we will illustrate the application of the fact-oriented approach as a knowledge structuring methodology for 21st century business communication. As a business case we will use the example of a company that has decided to offshore knowledge intensive business processes to a country like Malaysia or India. We will show how a fact-oriented knowledge structuring methodology can help companies to work ‘smarter’ and we will plea for the incorporation of such a knowledge structuring methodology as a communication enhancing and productivity increasing tool in University level business education, e.g. in undergraduate programs in business schools and within MBA programs

Introduction

In today’s economy, businesses are continuously scanning their environment and the global arena in order to determine where they can manufacture products and/or deliver services in an economic optimal way. In the recent past this ‘sourcing’ optimization, mainly focused on the potential of outsourcing ‘discrete’ manufacturing operations to ‘low-wage’ countries that had huge ‘labour pools’. This phenomenon has made China, the ‘manufacturing hub’ of the world in the beginning of the 21st century. In the past decade, companies have extended their ‘sourcing’ optimization process, to include ‘knowledge and service processes’ as well. Many organizations have been shifting their call-center operations and other ‘knowledge’ services to countries like Malaysia and India.

The outsourcing of knowledge service business processes, however, is a process that involves many different ‘stakeholders’ and therefore it is of outmost importance, that the communication between different parties in this process will be optimal.

In this paper we will introduce a ‘knowledge structuring approach’ that will help organizations in establishing ‘semantic homogenity’. Secondly, we will show how this fact-oriented knowledge structuring approach can be used to define metrics for determining ‘knowledge service’ complexity. We conclude this paper with a plea to incorporate such a fact-oriented knowledge structuring approach within the undergraduate educational programs of modern business schools.

Related work

Earlier work in which a fact-oriented knowledge structuring is applied on service-oriented architectures can be found in [1, 2], the application of a fact-oriented knowledge structuring methodology as a tool for instructional design and assessment can be found in [3-9].

Deriving the Knowledge Structure of a Business Domain

In most, if not all cases in which communication takes place, a verbalizable knowledge source is a document that often is incomplete, informal, ambiguous, possibly redundant and possibly inconsistent. As a result of applying the fact-oriented knowledge structuring methodology [7, 10] the possible ambiguous, incomplete and inconsistent communication document can be translated the following elements (also known as the knowledge reference model (KRM)):

1. Definitions and naming conventions for concepts used in domain sentences
2. Knowledge domain sentences
3. Knowledge domain fact types including sentence group templates
4. Population state (transition) constraints for the knowledge domain
5. Derivation rules that specify how specific domain sentences can be derived from other domain sentences.
Rules that specify what fact instances can be inserted, updated or deleted.

Event rules that specify when a fact is derived from other facts or when a fact must be inserted, updated or deleted.

The fact-oriented knowledge structuring methodology specifies how we can transform an informal, mostly incomplete, mostly undetermined, possibly redundant and possibly inconsistent description of domain knowledge into types 1 through 7 of the KRM. In section 3 we will give a sample of the results of applying the knowledge extracting procedure on an example of outsourced ‘knowledge services.’

The ABC company’s carrier selection business process

ABC is a business that operates a number of ‘brick-and-mortar’ stores. Although the company does have an internet retail-website, it sometimes receives order request for deliveries via mail, e-mail or fax, outside the sales region it serves and in some cases even outside the country it operates in, and sometimes it receives ‘overseas’ order requests. Especially for the latter order category, ABC can make an additional profit by shipping the order using the cheapest carrier at any given point in time. It turns out to be beneficial for ABC, to ‘outsource’ the carrier selection process to a third-party, in this case a service delivery organization (SDO) based offshore, e.g. India or Malaysia.

In the literature a number of definitions for ontology can be found: “the definition of the basic terms and relations comprising the vocabulary of a topic area” [11], “an ontology is a description of the concepts and relationships for an agent or a community of agents.” [12], “shared understanding of a domain that can be communicated between people and application systems.” [13]. “an ontology is a formal conceptualization of a real world, sharing a common understanding of this real world.”[14]. Burton-Jones et al. [15] distinguish four types of material ontologies: application 2, domain 3, generic 4 and representation 5 ontologies.

We will start the presentation of our fact-oriented knowledge reference model by providing a list of structured concept definitions [16, 17]. This list of structured concept definitions, should facilitate the comprehension of knowledge domain sentences and comprise the business domain ontology [18]. In addition to the ‘business concepts’ that need a precise definition it is important to add for every ‘business concept’ an accompanying naming convention, that defines under which assumptions a name from a specified name class can identify an instance of such a concept among the union of instances of the concept.

The list of concept definitions is the cornerstone of the fact-oriented knowledge structuring methodology because it is here where the ‘ontology’ of the business domain is captured. The list of concept definitions is basically a semantic agreement between all stakeholders in the communication. If we inspect table 1 we clearly see how the semantics of business concepts and naming conventions are made explicit.

For example, the domain concept: delivery type might seem trivial at first and we might be tempted to consider it to be part of a generic ontology which would exclude it from the list of concept definitions. It is, however, a convention at the ABC company to characterize a delivery type by the maximum value of all of the dimensions of a delivery package. In other companies, the convention could have been different, e.g. it might have been the total weight. So in this case the third-party that is going to perform the carrier selection knowledge business process, will have to implement the specific definitions of the concepts.

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2 Application ontologies specify definitions needed for a particular application [15].
3 Domain ontologies specify conceptualizations specific to a domain [15].
4 Generic ontologies specify conceptualizations generic to several domains [15].
5 Representation ontologies specify conceptualizations that underlie knowledge representation formalisms[15].
### List of concept definitions

**Table 1. List of concept definitions for the ABC company**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organization</strong></td>
<td>A business entity that delivers services and/or goods to customers and/or other business entities.</td>
</tr>
<tr>
<td><strong>Organization code</strong></td>
<td>A name from the <em>organization code</em> name class that can be used to identify an [organization] among the set of [organization]s.</td>
</tr>
<tr>
<td><strong>Service requesting organization (SRO)</strong></td>
<td>An [organization] that potentially can request a service from a third party organization.</td>
</tr>
<tr>
<td><strong>Service delivery organization (SDO)</strong></td>
<td>A [service delivery organization] that delivers a service to a [SRO]</td>
</tr>
<tr>
<td><strong>Cargo</strong></td>
<td>A product shipment from a [SRO] to a customer</td>
</tr>
<tr>
<td><strong>Dimension</strong></td>
<td>Size of [cargo] as length * width * height</td>
</tr>
<tr>
<td><strong>Dimension code</strong></td>
<td>A name from the <em>dimension code</em> name class that can be used to identify a [dimension] among the set of [dimension]s.</td>
</tr>
<tr>
<td><strong># of meters</strong></td>
<td>A name from the two-decimal number name class that can be used to identify a [size] among the set of [size]s.</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>Depicts the extent in cubic meters of a three-[dimension]-al package</td>
</tr>
<tr>
<td><strong># of cubic meters</strong></td>
<td>A name from the two-decimal number name class that can be used to identify a [volume] among the set of [volume]s.</td>
</tr>
<tr>
<td><strong>Delivery type</strong></td>
<td>A generally agreed upon type of delivery by a [service requesting organization] and a service registry organization or broker that is characterized by a maximum [dimension]</td>
</tr>
<tr>
<td><strong>Delivery type code</strong></td>
<td>A name from the delivery type code name class that can be used to identify a [delivery type] among the set of [delivery type]s.</td>
</tr>
<tr>
<td><strong>Contract base</strong></td>
<td>Type of commitment between a [service delivery organization] and a [SRO]</td>
</tr>
<tr>
<td><strong>Contract base code</strong></td>
<td>A name from the <em>contract base code</em> name class that can be used to identify a [contract base] among the set of [contract base]s.</td>
</tr>
<tr>
<td><strong>‘Per transaction’ contract base</strong></td>
<td>A specific value for a [contract base code] that means that a contract between a [SDO] and a [SRO] change per transaction on the discretion of a [SRO].</td>
</tr>
<tr>
<td><strong>‘Weekly renewal’ contract base</strong></td>
<td>A specific value for a [contract base code] that means that a contract between a [SDO] and a [SRO] can change per week on the discretion of a [SRO].</td>
</tr>
<tr>
<td><strong>is shipped by</strong></td>
<td>Depicts that a package is transported from an originator’s door to a receiver’s door</td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td>A request to ship a package to a customer</td>
</tr>
<tr>
<td><strong>Order code</strong></td>
<td>A name from the <em>order code</em> name class that can be used to identify a [order code] among the set of [order code]s.</td>
</tr>
<tr>
<td><strong>Carrier</strong></td>
<td>A third party logistics organization that ships packages for an [order] from a [SRO] to a client of the [SRO]</td>
</tr>
<tr>
<td><strong>Carrier name</strong></td>
<td>A name from the <em>carrier name</em> name class that can be used to identify a [carrier] among the set of [carriers]s that exist in the world.</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>Depicts a specific day</td>
</tr>
<tr>
<td><strong>Date code</strong></td>
<td>A name from the <em>date code</em> name class that can be used to identify a [date] among the set of [date]s.</td>
</tr>
</tbody>
</table>
Ground Facts

The second element in a knowledge reference model are the ground facts that must be represented as natural language sentences. An example of ground facts in the carrier selection domain of the ABC company are the following:

‘The order with ordercode 23456 of service requesting organization having organization code 34567 has a cargo dimension having a size for which the width is 3 meters, the length is 1 meter and the height is 2 meters’

‘The order with ordercode 23456 of service requesting organization having organization code 34567 has a volume of 6 cubic meters’

‘The delivery type with delivery type code large has a maximum dimension having a size for which the width is 3 meters, the length is 3 meter and the height is 3 meters’

‘The delivery type with delivery type code large is carried out by service delivery organization having organization code 873895 having a potential contract base with contract base code weekly renewal’

‘The order with ordercode 23456 of service requesting organization having organization code 34567 is shipped by the carrier having carrier code DHL’

‘The order with ordercode 23456 of service requesting organization having organization code 34567 has an ultimate delivery date having date code 2008-31-01’

In combination with the domain ontology (as made explicit in the list of concept definitions) the natural language sentences should reflect the true meaning of the communication and therefore should provide information to all parties that are involved. The ground facts as expressed in this section, are represented in their ‘rich format’. Initially verbalizations can be captured in a semantically ‘poor’ formats as follows:

‘The order 23456 of service requesting organization 34567 has a cargo dimension of 3 *1*2

‘The order 23456 of 34567 has a volume of 6 cubic meters’

‘The delivery type large has a maximum dimension having a size of 3 meters by 3 meters by 3 meters’

Fact types and fact type readings, population state (transition)

constraints and derivation rules for the knowledge domain

The third important element in the fact-oriented reference model is the set of fact types for the application subject area. After we have defined all relevant (non-trivial) concept definitions, we can derive the fact types that exist in the application domain. Fact types, basically are semantic relationships between domain concepts. For example, the relationship between the concept of delivery type and the height, width and length is of the type:

<delivery type> has a maximum dimension <width><length><height>.

We note that an instance of such a relationship can be verbalized as a a natural language sentence as follows (by putting individual names into the place-holders; < >);

‘The delivery type ‘B’ has a maximum dimension of ‘0.5 meter’ * ‘0.8 meter’ * ‘1.0 meter’

‘The delivery type ‘C’ has a maximum dimension of ‘1.5 meter’ * ‘0.8 meter’ * ‘1.0 meter’

The fourth important element in our fact-oriented knowledge reference model are the population constraints. In case a standard between the ABC company and it’s offshore service broker has been
implemented, in which it is agreed upon that: for any (predefined) delivery type at most one maximum dimension can exist, this can be shown as a uniqueness constraint of fact type \( F_{\text{t1}} \) that covers the role \( R_{\text{1}} \).

In addition to the business rules that can be expressed as population state constraints, we can add business rules that can derive ‘new’ fact instances from ‘old’ fact instances. An example of such a derivation rule can be applied for fact type \( F_{\text{t4}} \). We assume that a volume is the multiplication of the three dimensions figures that are modeled in fact type \( F_{\text{t2}}/F_{\text{t5}} \). This derivation rule can be modeled as derivation rule \( d_{\text{r1}} \) in figure 1 in which formula: \( F_{\text{t4}}.R_{\text{2}} = F_{\text{t5}}.r_{\text{1}}*F_{\text{t5}}.r_{\text{2}}*F_{\text{t5}}.r_{\text{3}} \) is contained. We note that in a service oriented architecture, derivation rules play an important role because the ABC company ‘outsources’ the execution and management of these rules to the third party in Malaysia or India. It’s therefore, paramount to incorporate the definition of these derivation- and exchange processes into the list of concept definitions.

| Process: Calculate Volume | A process that has a result: a rough indicator of the cubic [volume] of a package which is determined by multiplying its width, height and length. |
| Process: Add order | A transaction in which the [order] and the [dimension] and [delivery date] of the [order] are added to the information system. |
| Process: Determine carrier for order | This process leads to the selection of a specific [SDO] for the shipment of an [order] under the best possible conditions for [delivery time] and [shipment price] |

**Define** Order has Volume (cubic meters) as Order has cargo Dimension and There exist a dimension for which the width is Size\(_{1}\) and the length is Size\(_{2}\) and the height is Size\(_{3}\) and Volume= Size\(_{1}\) * Size\(_{2}\) * Size\(_{3}\) 

*Figure 1*: Complete conceptual schema for ABC company (in combination with table 1)
Fact-oriented Knowledge reference Model of the service delivery organization

In this section we will look at a specific ‘knowledge service’ of a third party that provides carrier selection services for the ABC company. One of the main processes within this knowledge service is the up-to-date acquisition of carrier data regarding latest offers, in terms of shipment conditions, and prices for each delivery type and possibly delivery (sub)-types depending upon each individual carrier. This web-service organization has as objective to match ABC with carriers normally for a small fee per transaction. This implies that key concepts for these web-based service transactions need to be harmonized (as can be checked for example in the list of concept definitions in tables 1 and 2, for the concept delivery type and carrier). On the other hand, promotional concepts and other rating schemes can be introduced on the fly, at any time by a carrier. We note that a ‘snapshot’ of delivery types for every carrier that is considered by a carrier-selection third party will be modeled as a populations of fact type Ft1 in the conceptual schema of the carrier selection SDO in figure 2. In table 2 we have provided the extended list of concept definitions for this knowledge service of a service delivery organization in which the definitions of the fact generating processes are incorporated.

Table 2. List of concept definitions for off-shored carrier selection business process

<table>
<thead>
<tr>
<th>Concept Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier</td>
</tr>
<tr>
<td>Carrier name</td>
</tr>
<tr>
<td>Local delivery type</td>
</tr>
<tr>
<td>Carrier delivery type</td>
</tr>
<tr>
<td>Period length in days</td>
</tr>
<tr>
<td>Natural number</td>
</tr>
<tr>
<td>Money amount</td>
</tr>
<tr>
<td>Dollars</td>
</tr>
<tr>
<td>Promotional price</td>
</tr>
<tr>
<td>Standard price</td>
</tr>
<tr>
<td>Maximum dimension</td>
</tr>
<tr>
<td>Maximum delivery period</td>
</tr>
<tr>
<td>Year</td>
</tr>
<tr>
<td>a.d.</td>
</tr>
<tr>
<td>Week</td>
</tr>
<tr>
<td>Weekcode</td>
</tr>
<tr>
<td>Process: Classify service offering</td>
</tr>
<tr>
<td>Process: Add service offering delivery length</td>
</tr>
<tr>
<td>Process: Add service offering standard price</td>
</tr>
<tr>
<td>Process: Add service offering promotional price</td>
</tr>
</tbody>
</table>
In figure 2 we have given the complete knowledge reference model for the example carrier selection process within the UoD of the offshore organization.

So, if we inspect the knowledge reference model for the offshore service provider in figure 2, we see that business process mainly scans and interprets carrier service offerings, and as a result will ‘label’ these offerings and subsequently classify them, in the terminology, that was established between the ABC company and the offshore organization. In the running example of this article, we have limited ourselves to only depict a few relevant fact types that will be used in practice. In a real-life knowledge reference model a few thousand concept definitions and possibly 100’s of fact types might actually be used in the communication between a company and the offshore service provider.

**Fact-oriented Knowledge Structure Metrics**

When the relative amount of informal comment and non-verbalizable knowledge in such a knowledge field is large we can consider the knowledge field to be of the ‘phenomenological’ type. This normally points at knowledge fields that are beginning to develop and in which no clearly agreed upon relevant concepts and their definitions exist. When the relative amount of informal comment and non-verbalizable knowledge of the subject matter, on the other hand, is small, the knowledge domain can be considered relatively structured, this means that basic domain concepts are agreed upon and their definitions are known. Furthermore, semantic relationships between those concepts exist and are known to
the extent that they can be verbalized. In the latter types of knowledge domains, it is possible that more complex rules, laws, derivation rules and event rules can be defined. The implication for the practice of defining, designing and eventually outsourcing of business processes using these metrics is very relevant.

We will now give a linear model (see equation (1)) that can be used for determining the size and complexity of an application domain.

$$SCM = (a \cdot DEF) + (b \cdot FT) + (\sum (c_j \cdot PSC_j)) + (d \cdot PTC) + (e \cdot GC) + (f \cdot DR) + (g \cdot ER). \quad (1)$$

Where SCM is a ‘size and complexity’ metric of an application domain where a, b, c_j, d, e, f, and g, respectively, are weight factors for the number of definitions in the list of definitions, the number of fact types, the number of population constraints of type PSC_j, the number of state transition constraints, the number of general population constraints, the number of derivation rules, and the number of event rules, in the application knowledge structure (diagram). Finally, DEF, FT, PSC_j, PTC, GC, DR, and ER are the total number of definitions, the total number of fact types, the total number of constraints, the total number of state transition constraints, the total number of general population constraints, the total number of derivation rules and the total number of event rules, respectively, in the application knowledge structure.

### Table 3. Sample data for linear model based on example knowledge reference models

<table>
<thead>
<tr>
<th>Variable\subject</th>
<th>ABC company</th>
<th>Offshore service</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEF</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>FT</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>PSC1 (uniqueness)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>PSC2 (mandatory role)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PSC2 (value)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>DR</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### Conclusions

In this article we have shown how companies when faced with the outsourcing decision of ‘knowledge service business processes’ can benefit from a fact-oriented knowledge-structuring methodology to establish semantic operability. In addition, we have shown that we can define a complexity metric for an application domain. This can be used also to establish service-level agreements between a company (For example ABC) and the offshore service providers in terms of the semantic complexity of an application subject area.

In terms of the content of educational programs for future managers, that need to operate in a globalized economy in which they most likely, will be faced with numerous outsourcing decisions in their career, we strongly advise that colleges and universities will incorporate some type of knowledge structuring methodology into their curricula, in order to provide their future graduates with the necessary tools to ‘structure’ knowledge intensive service processes.

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Promoting social presence through metaphors: a case study

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Abstract: To date there is no consensus definition of the construct of social presence. In this study this construct is approached from a social identity perspective and recognised as an essential component of the virtual and blended collaborative learning processes. Socio-cultural and social identity theory give support to interpret the development of a course in a teacher education program. A particular triple metaphorical proposal was carried through during the course as a shared leitmotif for the creation of community identity. Participants’ strategies to create and maintain social presence as individuals’ actions that contribute to the creation of a community feeling in such a way that the learning process is emotionally supported are analysed.

Theoretical background

Social presence is a construct initially imported and adapted from social psychology into the field of computer supported collaborative learning (CSCL) (So, 2009). Early definitions present some important differences; for instance, Gunawardena and Zittle (1997) defined social presence as “the degree with which a person is perceived as a ‘real person’ in mediated communication” (p.9); Rourke, Anderson, Garrison and Archer (1999) put the responsibility on the subject by defining social presence as “the ability of learners to project themselves socially and affectively into a community of inquiry” (p.50), whereas Tu and Melaasac (2002) tend to a different, subjective focus when defining the concept of social presence as “a measure of the feeling of community that a learner experiences in an online environment” [all italics added by author] (p.131). These different definitions are not merely nuances but highlight the lack of consensus about this concept. Indeed, Tu (2002) regrets the lack of appropriate instruments for the measurement of social presence. Early studies, he claims, mainly used post-hoc semantic differential questionnaires focused at grasping participants’ satisfaction, based on the dimensions ‘personal-impersonal’, ‘sensitive-insensitive’, ‘warm-cold’, ‘sociable-unsociable’. Another frequent strategy for studying social presence has been through content analysis of the participants’ contributions, in such studies social presence is mostly identified with off-task communication. Social presence has been equalled also with students’ satisfaction and learning post-hoc perception (Richardson & Swan, 2003). Swan and Shih (2005) contributed to the field with qualitative data that allowed the identification of different personal attitudes towards online participation and hence different perceptions of social presence and learning in online discussions.

Most of the previous studies have focused on online whole class discussions, or at least big group discussions. But a different situation shows up when considering small group collaborative learning with different sorts of complex activities expected as group products. In that case, it seems necessary to rethink the concept of social presence from a different perspective. Social identity theory provides indeed this different look (Hogg, Abrams, Otten, & Hinkle, 2004) at the concept of social presence. There are two main ways of approaching the study of social presence, following Rogers and Lea (2005): a ‘traditional’ way, from which the abovementioned works depart, which intends to equal online social presence with the perception of qualities of face to face conversations; from such a perspective, attempts are made to emulate face to face situations as closely as possible in virtual contexts, such as the experimental introduction of web-videoconferencing tools (Giesbers, Rinties, Gijselaers, Segers, and Tempelaar, 2009), in the unconfirmed assumption that the actual perception of the other’s facial expressions and voice while conferencing should enhance participants’ satisfaction, considered in turn basic post-hoc indicator of social presence. This wrong assumption is also grounded on the idea that computer mediated communication is per se less likely to enable the transmission of emotions and feelings than face-to-face exchanges; nevertheless, once more, research does not confirm this (Derks, Bos, & Von Grumbkow, 2007; Derks, Fischer, & Bos, 2008).

In contrast with this perspective on social presence, focused indeed on the individual as a member of a pre-existing group, the concept of social identity focuses on the group identity as perceived and constructed by the individuals, that is, the group itself is a representation in the subjects’ minds, and the group identity allows a fruitful group dynamics as long as the individuals in the group feel identified with
shared group purposes and norms (Hogg et al. 2004; Rogers & Lea, 2005). From this perspective, social identity supporting social presence is not necessarily promoted by the most sophisticated technological devices, on the contrary, sometimes simple tools such as a text-based asynchronous forum space may suffice, since social identity is not grounded on physical perceptions of the others, but on common goals and norms that lead the individuals to feel the identification with a group representation. Caspi and Blau (2008) provide a recent comparative study on the complementary potential of these different approaches to the concept of social presence.

In the present study, social presence is understood as the sum of individuals’ actions that contribute to the creation of a community feeling in such a way that the learning process is emotionally supported. From a socio-cultural perspective, I presume that the human being is a social subject, and learning takes place in social contexts, promoted by social interaction. It is in the community that the human being can learn, and such a community is defined by a shared interest, a shared goal, and last but not least, a shared activity (Kaptelinin & Nardi, 2006). All three aspects are relevant pre-requisites; the absence of any of them makes the community fall apart, if ever it was constituted. From that perspective social presence is not a phenomenon to be identified only post-hoc by means of determining the participants’ satisfaction, but in the very development of the activity. Social presence can neither be equalled merely with participants’ satisfaction and learning perception as an end result, but must consider the refocus of attention onto the learning process. Social presence, in summary, cannot be reduced to off-task chatting and ‘warming-up’ or ‘ice-breaker’ activities, but must be relocated as highly task-related conversation (Colomina, Rochera, Naranjo, Remesal, & Mayordomo, 2007). Having said that, the challenge remains as to what indicators may help us understand the creation and development of social presence, and which processes and strategies do we, as educators, have at hand to promote it. This challenge is even greater in the context of blended learning, where the use of virtual tools usually is considered a mere complementary element to the face-to-face development of the course. Special teaching strategies need to be undertaken indeed in blended contexts, if one desires to make a rich use of technological devices, overcoming the basic content-learner relationship and promoting teacher-learner and learner-learner interactions.

The study I present is an attempt of facing such challenges in a teacher education course. I consider the potential of metaphors to build and sustain group identity and cohesion. This didactical strategy has already been tested in previous innovative courses, like for instance De Simone, Lou, and Schmid, (2001), and Delfino and Manca (2007). In this experience the main strategy was to propose a general metaphor, a ship, to be shared and followed throughout the course; this ship was taken as a metaphor of three different meanings: first, there was the idea of assimilating the efforts of raising a child with the process of constructing and later floating a ship, based on a poem by a renown national poet; second, the idea of a ship cruise as a long learning journey during the whole course; and third, the idea of a particular big ship as representative of the most frightening course in the degree, namely Educational Psychology. In other words, the triple metaphor was grounded in three different meanings which referred to vocational, metacognitive, and emotional aspects of the learning process of becoming a teacher.

**Method**

A case study was conducted along one academic year (Stake, 1994; Yin, 2006; Friesen, 2009). Diverse sorts of data were gathered. First, the participants’ logs as automatically gathered by the online learning platform (moodle) during the whole course, from Sept. 16th 2008 until June 30th 2009; second, participants’ contributions to the different forum spaces in the course (two general class forums and two private small group forums); third, students’ interviews at the start and at the end of the course; fourth, an end questionnaire for evaluation of the course by the students, both with a quantitative evaluation section and a set of open questions; and finally, a questionnaire of routine external evaluation by the institution. In this paper only results related with some of these data (final ad hoc questionnaire, students’ logs, students’ forum postings, and students’ interviewes) are exposed.

**Participants and context**

One hundred and twelve pre-service student teachers took part in a course on Educational Psychology. The course went over two semesters in a blended format. The students were in two different groups -morning and afternoon shift with thirty five and seventy seven students respectively; they worked in teams of four or five students within a collaborative learning and problem-based instructional program.
Altogether there were twenty four teams of students. The average age of the students was 21, ranging from 18 to 38, and 90% were female, which is a fairly representative gender proportion for teacher education programs.

The course design was based on collaborative problem based learning, and organised in six different instructional units along two semesters, each of them lasting about six weeks with face-to-face meetings twice a week. The course was complemented with a virtual platform (moodle), which had a particular ad hoc design. A triple metaphoric proposal was presented to the students: first, a poem by G.Celaya equalling the construction of a ship with raising and educating a child; second, the course as a particular cruise, envisioned as a joined learning journey; third, the cruise undertaken on a specific big transoceanic vessel as representative of the most frightening course in the career for the students, namely, this course on Educational Psychology. This ship metaphor has been previously used in other online and blended courses but with a different structure and meanings (De Simone, Lou, & Schmid, 2001; Delfino, Manca, & Persico, 2006)

The virtual classroom was, according to this metaphoric proposal, organised and fashioned in a ship-cruise-like way. Every space in the classroom was named either as a part of this ship or of the cruise. For instance, the news forum as recalled ‘The Wind Rose’; the whole class forum reserved for spontaneous discussions which everyone in the class could start was renamed ‘The Main Deck’; accordingly, every small group of students had a particular ‘Cabin’ for free and private use and a ‘Machine Room’ for teacher-feedback and learner deep reflection purposes; the different units of the programs were ‘Harbours’ to be consecutively visited during the cruise. Norms of use of each space were placed conveniently to be known and shared by all participants.

The students were expected to hand in a group assignment for each instructional unit and three times along the course they had to take an individual examination consisting of both multiple choice and open questions.

Data and analysis

In the final questionnaire, the students were asked: “In your opinion, which students contributed most to the maintenance of the course? What was their particular contribution?” and “In your opinion, which students could have participated more along the course, and what did you particularly miss of them?” Each student could choose five persons in the course, both for the positive and the negative perception question. The two most positively picked students were selected for further analysis of their online behaviour along the course. The two most ‘missed’ students were also closer analysed to provide contrast to the previous ones. These data should provide information about the most influential students in the class and some likely reasons for their leading role. In order to study these participants’ online behaviour two kinds of data were analysed: the automatic log files as collected by the online platform (moodle), and their forum contributions.

For analysing the participants’ postings, I considered the following basic descriptive categories: the virtual space in which the contribution was made (either general classroom space or small group’s forum), the addressee of the contribution (either the general collective class, or some specific person or set of persons), the content of the contribution (either on-task –both content or management related- or off-task), and finally a genre perspective was taken for the analysis of the participants’ contributions (Friesen, 2009) giving attention to the formal epistolary structure: heading-salutation/body of the message/final salutation. According to this perspective, it is assumed that the human being adopts ‘old and well-known’ genres in order to cope with the challenges of new cultural practices. In the case of asynchronous computer mediated communication, the epistolary genre is the closest choice to be taken and it is by the recognition of cultural genres that subjects reckon the ‘social character’ of computer mediated communication, particularly in this case of lacking face-to-face cues.

In addition, the strategies of the students for sharing strong emotions related to the learning experience were also captured and classified (Derks, Fischer, & Bos, 2008). Finally, the small groups were interviewed at the beginning and at the end of the course in order to get information about their particular group identity within the big group-class. In deed, the final interview was not initially planned but was eventually done as a response to a particular phenomenon observed during the course which will be presented in the results section.
Results

Results of the interpretive analyses of students' participation will be presented in this section, focusing on: students' strategies for sharing and handling emotions of fear and angst in front of the course assessment requirements; students' differentiated participation depending on roles played within the big group and the small team in relation with the development of student identities within the group and how these identities were recognised by the other participants; students' online collaboration strategies along the course aimed at a collaborative study experience.

Students’ perception of social identity of the class: outranging and missed students

Table 1 presents the participation profile of the two most positively elected and the two most missed students. It can be clearly observed there that the positively recognized students had a much higher participation quote, that is, they were more frequently present in the virtual space, both by proposing new discussions and by responding to the ones started by others.

Table 1: Participation of the positive and negative picked students.

<table>
<thead>
<tr>
<th>Student (pseudonyms)</th>
<th>% of elections by classmates</th>
<th>Messages written</th>
<th>Discussion opening postings</th>
<th>Discussions opened in whole class' space (314)</th>
<th>Discussions opened in small group’s space</th>
<th>Response postings (total)</th>
<th>Readings (total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive election</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mary</td>
<td>44%</td>
<td>302</td>
<td>51</td>
<td>20 (6.4%)</td>
<td>31</td>
<td>255</td>
<td>1,686</td>
</tr>
<tr>
<td>Vera</td>
<td>40%</td>
<td>52</td>
<td>10</td>
<td>9 (1.6%)</td>
<td>1</td>
<td>42</td>
<td>813</td>
</tr>
<tr>
<td>Negative election</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanna</td>
<td>17%</td>
<td>16</td>
<td>4</td>
<td>2 (0.6%)</td>
<td>2</td>
<td>12</td>
<td>140</td>
</tr>
<tr>
<td>Betty</td>
<td>23%</td>
<td>17</td>
<td>1</td>
<td>1 (0.3%)</td>
<td>0</td>
<td>16</td>
<td>304</td>
</tr>
</tbody>
</table>

Beyond the quantitative election, qualitative data were collected as to the reason for election. Four categories for positive election were found in a bottom-up, inductive analysis of the students’ open comments on their election. The students ranged out for: a) contributing to the classmates’ learning – solving doubts, posing questions- directly linked to the course contents; b) contributing with information (documents, links,...) that went beyond the contents worked, and thus challenged the participants; c) providing personal experiences and motivational comments; d) being particularly humorous in their communicative style. Table 2 shows the results of evaluations received by the two most salient students.

Table 2. Qualitative evaluation of most positively recognized students by classmates.

<table>
<thead>
<tr>
<th>Student (pseudonyms)</th>
<th>Contributing to learning within course boundaries</th>
<th>Contributing to learning beyond course program</th>
<th>Contributing with experience sharing and motivational comments</th>
<th>Contributing by humorous communicative style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary</td>
<td>35.13%</td>
<td>21.62%</td>
<td>37.83%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Vera</td>
<td>50%</td>
<td>0%</td>
<td>31.25%</td>
<td>18.75%</td>
</tr>
</tbody>
</table>

In contrast, the two more ‘missed’ students were considered so because of their low participation both in general spaces and in small group spaces. Indeed, one of these students self-designated her as having participated in a poor way along the course.

A closer look at the two most salient students (see Table 3) shows that, despite the small group organisation, both students were very active in the general class forum. Indeed, both were predominantly active in the general space. In second place, both were addressing their postings to the big collective more frequently than to particular individuals or set of individuals; third, the students participated with on-task postings, and practically two-thirds of them presented a complete or partial epistolary structure. Moreover, their non-epistolary messages concentrate in short spans of time, in periods in which the students coincided...
spontaneously, and thus, the distribution was only in space but hardly in time. In other words, the forum tool turned into a chat by the actual use that the participants made of it.

Table 3. Posting style of the most salient students.

<table>
<thead>
<tr>
<th>Student</th>
<th>Space</th>
<th>Addressee</th>
<th>Content</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary</td>
<td>73% (whole class)</td>
<td>45% (individual)</td>
<td>14% (off-task)</td>
<td>47% (complete)</td>
</tr>
<tr>
<td></td>
<td>27% (small group)</td>
<td>55% (collective)</td>
<td>86% (on-task)</td>
<td>23% (partial)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>55% (complete)</td>
<td>30% (not epistolary)</td>
</tr>
<tr>
<td>Vera</td>
<td>80.76% (whole class)</td>
<td>17.30% (individual)</td>
<td>25% (off-task)</td>
<td>55.77% (complete)</td>
</tr>
<tr>
<td></td>
<td>19.23% (small group)</td>
<td>82.70% (collective)</td>
<td>75% (on-task)</td>
<td>15.38% (partial)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28.84% (not epistolary)</td>
</tr>
</tbody>
</table>

Students’ strategies to expose and share strong emotions during the course

Computer mediated communication was very poor in stylistic options in its early years. Nowadays, however, the advances of technology has contributed to a great development of the virtual tools and so currently it is possible to apply (typo-) graphical strategies in order to circumvent the ‘emotionless’ medium. The interpretative analysis of students’ contributions allowed identifying two main strategies of transmitting learning-related emotions between participants. On the one hand, they used typographical formats such as: writing style –bold, underlying, italics-, colour, size, and different letter types, special signs –questions and exclamation marks. On the other, there were graphical components, such as emoticons, pictures and photographs, all of them inserted in the postings when the participants considered it convenient, but mostly close in time to each of the examinations during the course: before the examination they expressed fear and anxiety, after the examination they expressed anxiety, joy and pride.

A different phenomenon that occurred in the course was the transformation of the forum into a ‘pseudo-chat space’: a great part of the students coincided in time for preparing the individual examinations. Students shared doubts, and proposed each other questions, assuming in turns the teacher role of giving hints and evaluating their classmates’ answers. In such situations they were able to express their anxiety before the exam, This chat-like forum experienced a clear evolution along the course: the first time it was triggered by the teacher, who proposed sample test questions, the second time the students spontaneously asked for repeating the experience, the third time, it was the students themselves starting and leading the shared study process.

Small group identities within the whole class group

An unexpected phenomenon during the course was that right from the early weeks the students spontaneously decided to search for particular names for their groups, inspired by the ship metaphor. Soon they had names such as “The Black Pearl”, “The Seashells”, “Five Surd Mermaids”, “The Flying Dutchman”, “The White Star Company”, just to mention a few. The interview at the beginning of the course revealed that working in groups was experienced as the most important challenge in the career; most of the students responded in the sense of the following excerpt:

“In my case, rather than learning how to work in groups, the biggest challenge has been to “overcome the fear” of working in group, because my prior experiences were not very good, there was always one person who showed more dedication than the rest, while the others showed little interest, and this made all the efforts a little pointless. Fortunately, I have met a brilliant group, and although we are all very different from each other, we have at least one thing in common: we are all self-demanding. Although group work needs more time, it is worth if the results are satisfactory”
At the end of the course a second interview was held in order to grasp the reasons for the different names the students had selected and what they meant to them. Far from being hazardous, each of the names had a very specific purpose and responded to strong identity feelings, partly related to the initial proposed ship metaphor, and also related with the students’ first emotional reactions when starting the program, such as the case of “The White Star Company”, in which not only a first reaction of fear and anxiety can be observed in the next two excerpts of members of the group, but also a change towards self-confidence and trust:

“Our group’s name comes from the company that built the Titanic –and which was responsible for its sinking. This name was like a symbol of our fear of wrecking in this impressive cruise, but eventually, I think we all expect to safely arrive to harbour and we see that it’s possible” (TWSC, member 1)

“It was an ironic way to tackle the course, we saw it as full of icebergs in the way, ready to let us sink, and like the Titanic, pull us to the ocean ground. I think it illustrates perfectly the fear we had at the beginning of the year. Yes, the word is FEAR. But let’s not forget a detail: we compared ourselves with the Titanic, a huge and luxurious vessel but full of defects, made out of bad quality materials, in addition to a deficient and too fast construction process, with the most tragic consequences that we all know. Indeed, the stuff we are made of is of an excellent quality, although we still have some little shortcomings, but always ready to be corrected, and yet, it took us some time to understand that we have a solid structure, and we have lots of good points to arrive to the destiny harbour. We have found some iceberg, indeed, we touched it, and it made some few scratches. But the crew and the passengers can be relaxed while they enjoy the dinner in the restaurant. The name has helped us to feel like a team. We are very proud of being White Stars!” (TWSC, member 2)

Conclusion

The results presented here are but a first approximation to the whole amount of data collected in this case study. In a certain way, these first results let me end with more questions than I had at the beginning of the study. The ship metaphor has been used already in at least two known cases. But there are several differences between the case reported here and the previous experiences. First of all, this study was blended, as opposed to the virtual experience reported by De Simone and colleagues (De Simone et al. 2001). In a blended program, the challenge of achieving a rich and satisfactory use of the virtual tools is bigger: the advantages of technology are not obvious when the time and space distribution are not given. Therefore, in blended situations, the effort has to be directed to making the virtual tools genuinely useful for learning purposes, otherwise, the most likely thing to happen is that students only get to them to download course materials, conferring it a merely information repository status. This wanted to be specifically avoided in this course. A second important difference between this experience and De Simone’s is that in their case “the metaphor of a Ship was used to foster students’ sense of belonging to a larger community and to provide a framework for role assignment, identity, and responsibility. This approach also supports the goals of cooperative learning” (p.86). In a similar way the metaphor was used by Delfino and colleagues (Delfino et al. 2006). In the case I report here, the ship metaphor was dressed with two additional meanings shared by the students that added two strong motivational factors to the proposal: first, a vocational component –comparing the construction of a ship with the educational profession-, and an emotional component –referring to the known fear that students have in front of the most abstract and most theoretically demanding course in their career –as Educational Psychology is.

Results also refer to the eminent role of two particular students along the course, as evaluated by their own classmates. Analysis of their contribution profiles and contents reveal that their intervention was very frequent along the course, both in small and big group spaces, and mostly respecting an epistolary style in which the participants were addressed in personalized way, thus contributing to the recognition of the ‘human behind the screen’, on the one hand, and to the construction of group identity, on the other. Undoubtedly, more work is needed here now, for instance to compare these students’ contributions with the ones which were most frequently selected as ‘missed class mates’. Also, both students were female, which
means that it would be desirable to analyse whether this epistolary style is in some way gender-related or not. Another important result is the use of different strategies to share both positive and negative emotions during the learning process, which underline the ability of subjects to overcome ‘communicative constrains’ of the virtual context, making the concept of social presence limited by the computer medium as opposed to rich face-to-face communication an ‘outdated’ prejudice. Instead, these results support the study of social presence from a social-identity perspective.

References


PDA’s as potential boundary objects in the transition between health care education and work practices

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Clinical practice can be perceived as a dynamic working and learning environment with a lot of different actors and continuous processes of decision-making in personal health care. During their education co-assistants are introduced to this practice by means of internships. Although these internships are intended to be part of their education, in reality the daily work is demanding in terms of the hands-on effort and quality of the services expected from them. Consequently, this leaves little time for reflection and questioning and as such for contextualizing and embedding theoretical knowledge in practice, and vice versa, for consolidating skills learned and knowledge created during practice.

We consider the personal digital assistant or PDA to be a possible tool to support the transition between college and work, due to its portable and personalized nature. The proliferation of mobile technologies has already given rise to the use of PDAs by professionals in clinical practice. In line with this development we witness a growing series of medical literature, clinical guidelines and decision-making tools available for PDAs. Recently, we see that PDAs are also recognized as potential educational tools in medical practice. However, studies on PDAs as learning tools still focus strongly on financial, logistical and technical issues, while neglecting pedagogical considerations (e.g. Treadwell, 2006). We argue that PDAs should not be seen merely as supportive tools within work or higher medical education, but as potential ‘boundary objects’ (Star, 1989) that can bridge college and work practices (Tuomi-Gröhn & Engeström, 2003). They can support the transition from college to work by offering access to college resources during work (e.g. diagnostic tools or experts), and vice versa, support the transition from work to college by allowing to record interactions, questions, and reflections during work practice as a basis for reflection and educational use.

The purpose of this study is to investigate the potential of PDAs as boundary objects with respect to supporting co-assistants in work based learning. The question central to our study is in what ways can PDAs function as boundary objects to support work based learning activities of co-assistants?

The aim of this paper is twofold. First, we want to conceptualize PDAs as potential boundary objects in supporting work based learning activities. Second, we want to explore the potential of PDAs as boundary objects in the concrete case of co-assistants conducting an internship in health care. We conducted a small-scale study of five co-assistants who were provided with a PDA for three months during their internship. By means of interviews and logs, we explored if and how certain work and learning activities are undertaken by means of a PDA. Parallel to this small-scale study we distributed a questionnaire to 20 co-assistants to see if and how these activities are currently conducted by co-assistants that have no PDA available. Combining the results shows how PDA’s can support the mutual reinforcement of work and college practices in the learning processes of co-assistants.
Cultural conventions and the Virtual Learning Environment

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Abstract: Culture influences usability, and usability has influence on learning in a Virtual Learning Environment. When offering ‘e-Learning distance degree programs’ one has to take in account the cultural background of the student population. A mismatch between the culture for which the Virtual Learning Environment was designed and the students can severely influence the students learning experience.

Introduction

Students that choose to study and live abroad are often immersed in the culture of the country they choose to study in. As “individuals generally act in ways that correspond to cultural influences and expectations” (Berry, 1997, p. 6) cultural adjustment is however needed. This adaptation process, in cross-cultural psychology called acculturation, normally consists of five stages: Conflict, Confusion, Exploration, Familiarization and Acceptance (Walker & Lê, 1999). Placed in a new and dominant culture (Arends-Tóth & van de Vijver, 2001; Berry, 1997), the student will have to adapt to the new situation.

More and more universities are adding ‘e-Learning distance degree programs’ to their portfolio, and want to take their education global. Students engaged in these programs at the most will come into contact with a different culture by studying and using the digital program material (e.g. books, videos, Virtual Learning Environment (VLE) etc.) and by virtual interaction with their tutor and fellow students. The students are not emerged in a different dominant culture physically, and thus no true acculturation has to take place.

A User Interface (UI) is, at least potentially, loaded with cultural, learned conventions (Norman, 2004). Misinterpretation of these conventions by users may lead to severe problems. And students whose culture closely fits the one for which the VLE was intended have a clear advantage over those with a different cultural background.

In this paper a model for the influence of cultural background on usability and learning is suggested.

A model for culture, usability and learning

While there consists a body of literature about the internationalization of UI’s, which partly includes culture and usability (for instance Del Galdo & Nielsen, 1996) it focuses either on specific aspects of culture (a favorite seems to be Script) or on a more holistic level, without coming to a defined model. Therefore in this section a model for the relation between culture and usability is to be created. Furthermore this literature does not focus on culture and usability in a VLE, missing the link from culture to usability to learning.

Mental Program and Physical Ability

Personality, culture and human nature make up a human-being’s mental program (Hofstede, 2003). Hofstede (2003) describes our mental program as a pyramid (see Figure ), moving from a universal base to a program specific to the individual.
Both the user and the designer of an artifact have a mental program. For a designer the first frame of reference is his/her own personality. To overcome personality biases a good designer uses conventions; some almost globally accepted; for instance Hyperlinks on WebPages are light blue and underlined.

Besides a mental program users and designer are also influenced by their physical abilities. Someone who for some reason misses an arm will find it harder to for instance press the control button while clicking with the mouse, someone who has one of the several types of colorblindness’s may find it hard to distinguish between certain elements on a computer screen.

**Perceived affordance, intended affordance and usability**

Affordances refer to the perceived and actual properties of an artifact, mainly the properties which determine how the artifact can be used (Norman, 1998). Affordances are aspects of both the user and the artifact (Gaver, 1991; Hutchby, 2001). “Water surfaces do not have the affordance of walk-on-ability for a lion or a crocodile, but they do for an insect waterboatman” (Hutchby, 2001, p. 448).

According to Norman (1998) an object, or artifact, has ‘perceived affordances’ and ‘real affordances’, while perceived affordances point to the suggestions about how it can be used, real affordances point to the true use or potential for action of an object.

Affordances and usability are related, or as Gaver puts it: “when the apparent affordances of an artifact matches its intended use, the artifact is easy to operate. When apparent affordances suggest different actions than those for which the object is designed, errors are common and signs are necessary.” (Gaver, 1991, p. 80).

Both the perceived and real affordance thus depends on both the user and the object. The perception of perceived affordances depends on the user’s “culture, social setting, experience and intentions” (Gaver, 1991, p. 81).

**Usability and learning**

Usability influences the student’s perception of a VLE. This perception effects – and is effected by – the way students manage to work with the environment, and thus influences their learning (Diercks-O’Brien, 2000; Gijbels, van de Watering, & Dochy, 2005; Gijbels, van de Watering, Dochy, & van den Bossche, 2006; Segers & Dochy, 2001).

An instructional interface should contain easily recognizable affordances, directing the learner to the information or tools that facilitate the instructional goals of the environment (Lohr, 2000). An effective, usable, interface allows the user to focus on the instructional content itself rather than on how to access this content (Lohr, 2000). While many parallels exist between interface design for tasks and for instruction it remains important to remember “[t]he outcome of a learning experience is often not reflected in the interface environment, but in the learner's mind.” (Lohr, 2000, p. 163)

As shown by Isen and others a positive affect can positively influence cognitive processes (Isen, Daubman, & Nowicki, 1987). An unusable interface causes frustration, a negative affect, and will have negative influence cognitive processes.
The model for culture and usability

Combining the above leads to the suggested model in Figure 6. In this model the Designer represents both the designers of the software or software packs used as well as the designer of the learning content.

Figure 6: a model for culture and usability

A bit more on culture

There are many models explaining the dimension of culture, such as Stewart & Bennett’s model of Objective and Subjective culture (Stewart & Bennett, 1991). In this paper Hofstede’s extension (Hofstede, 2003) of Trompenaars onion model (Trompenaars & Hampden-Turner, 1997) will be used.

Figure 7: The Onion model (reproduced from Hofstede (2003))

Hofstede describes symbols as “words, gesture, pictures or objects that carry a particular meaning which is only recognized by those who share the culture.” (Hofstede, 2003, p. 7). Heroes represent persons “who
possess characteristics which are highly prized in a culture” (Hofstede, 2003, p. 8). Rituals are collective activities deemed socially essential, and together with Symbols and Heroes form the practices of a culture.

Values are the core of a culture, they are “broad tendencies to prefer certain states of affairs over others” (Hofstede, 2003, p. 8). Values are learned implicitly by children, and are firmly in place by the age of ten. Whilst symbols are most easily changeable (it is easy to develop new and to replace old ones), deeper in the onion it is difficult to change..

Examples of Cultural Conventions in the VLE

We will now look at some examples of Cultural Conventions in the VLE. We have put out a questionnaire to some students, unfortunately we had no response. We therefore have to look on our own account at EleUM (Electronic learning environment at Maastricht University, a Blackboard based VLE). Because of this most examples will not go beyond the Symbolic level.

Home
A house is often used the represent going home, aka going back to the landing page, on a website. In Blackboard a rather typical western house is used, see Figure 8. The symbolic seems hard to miss, but imagine you have lived your whole life in an apartment building, in a city with only high-rise or you have lived your whole life in a traditional Japanese village, would the symbolic still be so striking?

Help
The second Icon in Figure 8 is the question mark as used in the Latin writing system. In some right-to-left oriented writing systems the question mark is mirrored, ؟ instead of ؟, however still recognizable as a question mark. In Armenian, however, a question mark looks rather different, see Figure 9; would someone from Armenia recognize the symbolic of the question mark?

Sorting order
A basic convention problem occurs when creating an alphabetical ordered list, even when writing in the Latin alphabet there is a difference in alphabet order rules. Some examples include:

- Ch; a separate letter in among other languages Czech and Polish. In Czech Ch in the alphabet comes between the H and the I (Omniglot, 2009)
- Å; is the 29th letter in the Danish and Norwegian alphabet and the 26th in the Swedish (Omniglot, 2009)
- Ë; is a separate letter in for instance Albanian ordered after the E (Omniglot, 2009), in other languages such as German and French it is treated as the normal E

There are many more examples. One might expect the Dutch digraph IJ as an example here, however use in the Netherlands (not to mention Flanders) differs. Officially the IJ are two separate letters.
(although both capitalized when needed), thus in dictionaries words beginning with IJ are placed under I. However, in some other reference works (such as a phonebook and some encyclopedias) the IJ is read and ordered as the letter Y (Genootschap Onze Taal, 2009).

**Thumbs Up**

An example of a western cultural convention can be found in the Polaris discussion board software, Figure 10. To show their agreement with a post, users can click below a ‘Thumbs Up’ icon. In the western world this is a clear sign of agreement, however in, for instance, Iran this is a very foul gesture (Archer, 1997).

**Folder**

Blackboard uses a convention to which all computer users have grown accustomed. The Folder icon, such as displayed in Figure 11, is similar to the one used in Microsoft Windows and Apple MacOs. The tabbed Folder icon is, however, a symbol from the USA (Marcus, 1996), tabbed folders almost exclusively used in offices in North America.

**Aesthetics**

Tranctinsky, Katz & Ikar (2000), among others, have shown that the perceived aesthetic nature of a user interface and the perceived usability, even after initial contact, are related. What is perceived as aesthetic differs greatly between cultures, thus so does the perceived usability of a user interface. While we do not pinpoint a certain aspect of the Blackboard environment in Maastricht as being unaesthetic from a certain cultural perspective, we assume there are parts which are unaesthetic from some cultural perspectives. Factors in aesthetics include color, shape, font and layout.

**Discussion**

Assuming culture influences usability and that usability influences learning are well researched facts. Combining these notions should lead to some concerns. “Can we offer one learning environment across cultures?” and “Will there be a disadvantaged minority if we do so?” are questions which certainly require answers. To truly answer these question further research into the effects of culture on learning outcomes in a virtual learning environment, is needed.

There are some easy steps we can already take to make our electronic learning environment more usable to students from different cultural backgrounds, some are given here:

1) Follow existing conventions; while we talked about the dangers of some cultural conventions, it is good to follow existing web conventions in your VLE. It is likely that students, no matter what their cultural background is, already came into contact with these conventions or will come in to contact with them in the future. An example: links should be blue and underlined.

2) Use the same conventions, within al online resources: for situations where no clear web standard exists it is important to use the same convention within al online resources. This
way students only have to learn one convention. An example: use the same icon for
Home
3) Standardize Navigation: make sure that the same information can be found under
the same button in each and every course. For example in EleUM the button Course
Information should contain general information about a course, e.g. the number of
credits, objectives of the course etc., while the button Course Material should contain
the material of the course, for instance a reader and assignments.

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linguistic corrections.
One day I’ll fly away.....

Online acculturation at Delft University of Technology

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Abstract: Delft University of Technology (DUT) welcomes each year about 600 international MSc students. To prepare them for their study in Delft, DUT started in 2009 an Online Summer Programme (OSP) for international MSc students. This first OSP was a pilot and part of a national project on acculturation, financed by the National Action Plan E-learning (NAP). The OSP aimed at preparing students for collaboration in multicultural teams, gaining insight in Delft educational system and starting to build a social network. Students worked online from their homeland in small teams on assignments, supervised by e-coaches. This paper describes the set-up of the OSP and the results of the evaluation among students and e-coaches. The results show that the applied online concept is highly appreciated and seems to be an effective way to prepare international students for a study at DUT.

Introduction

An increasing amount of international students choose to follow a Bachelor- or Master-programme at a Dutch institute for higher education (Ministry of OCW, 2005). This development is considered positive, given the internationalisation goals institutes for higher education have formulated, such as increased student/staff mobility. With increasing intake of international students classes become more heterogeneous regarding prior knowledge, cultural background, and educational systems, bearing on the design of the international classroom. The heterogeneity causes problems like study-delay, high amount of drop-outs, and poorly functioning international classroom.

To overcome these problems it seems important to prepare international students for their study in the Netherlands. Therefore, a national project on acculturation, financed by the National Action Plan E-learning (NAP), was started in 2008, aiming to prepare international students while still at home by means of an online learning programme. Acculturation, the process in which groups of people with different cultural backgrounds adapt to each others culture, is the central focus of the project. Nine Dutch institutes for higher education participate, including Nuffic, the organisation for international co-operation in higher education in the Netherlands, with an advisory role. A repository with learning materials on acculturation is jointly set up and every institute carries out their own acculturation pilot, of which the results are shared among participants and added to the repository. In the end the materials will be made available for all institutes for higher education in the Netherlands.

Each year, Delft University of Technology (DUT) welcomes about 600 new international students starting an MSc programme. Most of them are surprised about the way Dutch professors and students interact, the lack of hierarchy between lecturers and students, the vaguely formulated assignments, the large amount of teamwork and the direct way in which their Dutch peer students communicate. Dutch students fear they will be slowed down by international students and they will be hampered to achieve the results they desire, due to having to take into account different ways of approaching the learning material (Klaassen & Snippe, 1998). This particular attitude of home students has been reported by both Australian and UK Universities (Volet, 1997, Ledwith et all, 1998). Indeed both local and international students do not spontaneously mix, but rather prefer to study in monocultural educational settings (Quintrell & Westwood, 1994). Due to the cultural differences and reluctance to socially interact, difficulties arise in the international classroom especially when students have to collaborate in multicultural teams (internal evaluation TU Delft, 2007). Intercultural teamwork in itself creates further difficulties in terms of communication problems, unpredictability, low team cohesion, mistrust, stress and eventually poor results (Payne, 2005). Therefore, the tendency of both international and home students to socialise primarily in their own group, requires a shift in attitude towards responsible behaviour towards species of other origins than their own.
Since 1997 DUT offers international students a Summer School Programme at the campus to get used to the educational culture, to experience collaborating in multicultural teams and to build a social network. The programme became the victim of its own success and many positive evaluations. In 2008 this Summer School Programme was shortened from four weeks to one week and became mandatory for all international MSc students. The new introduction programme had a very tight time schedule and almost eliminated the entire teamwork learning objectives. To compensate for the missing teamwork skills, and also to bring forward the preparation period for internationals students, DUT developed an online summer programme (OSP). The OSP has been adjusted in terms of content to the introduction week coordinated by the international office on campus. Moreover, many information sharing sessions within the national acculturation project allowed us to choose the best possible set up.

In the next sections we will describe the set-up and rationale of the Online Summer Programme and we will discuss the results of the evaluation among students and the e-coaches. Finally we will answer the central question: What is the added value of the OSP for international students to prepare online for a study at Delft University of Technology?

The set-up and rationale of the OSP pilot

The OSP aimed at preparing international students online for (a) working together in intercultural project teams, (b) becoming acquainted to the technical assignments at DUT, (c) becoming acquainted to the Dutch educational system and more specific to the educational system at DUT, and (d) creating a social network students can rely on during their studies.

Our main points of departure were the eclectic design approach and constructive student-centred learning. The eclectic design paradigm (McLoughlin, 1999) states that the presence of multicultural realities represented through the students force the designer to create assignments which allow for variability and flexibility with respect to the learning material and which reflect the input of the multicultural values present. In line with the acculturation principle it is especially this notion of different approaches to learning which become valuable assets to this type of online learning. The learning and knowledge creation in a network environment is generated by the possibility of accessing a diverse blend of opinions/experiences and information sources (McLoughlin & Lee, 2008). Consequently, multicultural teams were composed, which were to finish three open assignments supported for in a web-based learning environment comprising relevant information, serving both our aims and design principles.

Teams

The Online Summer Programme took place between the 2nd and 14th of July 2009. Two faculties joined the programme: the faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS) and the faculty of Technology, Policy and Management (TPM), which means that only students who registered for a study at those two faculties could attend the OSP. Being a pilot, we limited the amount of students to 40. Participation was free of charge and on a voluntary basis. Within a short time 40 students signed in. In the end 39 students started the OSP: one student left the Programme for personal reasons.

Eight teams were composed of five international students each, having as far as possible different cultural backgrounds, but planning to study at the same faculty. Literature suggests that too much differences in the background of the students causes detrimental team communication patterns (Bouncken & Winkler, 2008). It allowed students to work on a technical assignment of their faculty and become familiar with each other before they would meet in Delft. Teams were moderated by DUT MSc students of different nationalities selected as e-coach for both the online programme and the introduction programme on campus. Each team was moderated by one pilot e-coach and a co-pilot e-coach. The e-coaches were supervised by the OSP project manager who had access to all communication of the eight teams. All e-coaches attended a one-days training to prepare for their role in the OSP. The training focused on creating a safe environment, online teambuilding, motivating student participation, moderating collaborative learning, and being culturally sensitive. E-coaches were e.g. particularly instructed to speak up about language barriers and to stimulate participants not to feel ashamed about their level of English language proficiency. E-coaches were expected to spend two hours a day per team and this proved to be correct.

Web-learning environment

To support the online learning process we made use of the website for international students, managed by the International Office at DUT. This website already contained valuable information for
coming international students. Within this site we created a separate section for the OSP participants, in which online communication was facilitated by two forums, one for all participants and one per team. Furthermore, the website included links to all kinds of organisations delivering information about the Dutch culture, the educational system, and facts about the Dutch population. Additionally, some video’s of DUT lecturers were made available to the students in which the lecturers share their experiences with multicultural teams in DUT MSc-courses.

Assignments

The assignments were divided into three parts: 1) assignments on team development and cultural backgrounds of the team members, 2) technical matters and 3) specific aspects of DUT educational culture. Furthermore, at the end of the OSP students had to do an overall assignment with respect to reflection on the team process.

Part one: assignment on working in intercultural teams

This assignment consisted of a questionnaire the participants had to fill out about their attitude towards teaching and learning, derived from the Hofstede dimensions (Hofstede, 2005), and an article on different stages in group development (Tuckman, 1965) they had to read. Then students had to write an essay about their expectations regarding teamwork, using their individual and team members score on the questionnaire and the information from the article. The essays were shared and discussed among the participants and e-coaches. The e-coaches needed to encourage some students to share the results and had conversations about the fact that collaboration in intercultural teams is a very common way to learn at DUT.

Part two: assignments on technological matters

Representative technological assignments drawn up by the participating faculties were given to the students (see figure 1 for an example). Out of six each team had to choose two assignments. The objective was to familiarise students with the type of technological questions dealt with at DUT. Feedback on outcomes was provided by the e-coaches.

Biofuels - solution or problem?

Biofuels are considered to be a valuable option to reduce the CO2 emissions of automobiles in Western countries. Important resources are soja, sugarcane and palm oil, mostly frowned upon in developing countries. But how about the competition with food production and the prices for staple crops on the world food market? Analyse the situation, make a conceptual or causal model of the situation and assess the possible contribution of biofuels to CO2 reduction and the possible impacts on food production in developing countries.

Figure 1: An example of a question for OSP teams

Part three: design assignment on educational culture

For the design assignment each team could choose one out of three options:

(a) to design a plan for a faculty of technology of a Dutch university; created by two teams,

(b) to make a series of multiple choice questions about the Dutch and DUT culture; finished by three teams,

(c) to design a game about the Dutch and DUT educational culture; accomplished by two teams.

One team failed to make this design assignment, due to lack of time. The multiple choice questions designed and the game designed will be used for international MSc students who will arrive in 2010 at DUT.

Overall assignment: five words about your team and team-process

At the end of the OSP participants were stimulated to reflect on the collaboration process and to choose five words per team to describe their OSP experience and share it with the entire OSP population. Almost all team members of each team participated. Some examples:

Team one: appreciative, understanding, co-operative, team spirit and responsible;
Team two: vibrant, dedication, punctual, coordination and helpful;
Team three: cooperation, friendliness, responsibility, harmony and vibrant.

**Team awards**

Finally, each student and e-coach was invited to vote for the best design via an online poll. E-coaches and programme leader voted for the best collaborating team. Both teams were awarded with a price to be received at the introduction week.

**Evaluation**

At the closure of the OSP the programme was evaluated by means of evaluation questionnaires for both participants and e-coaches. Two months later an evaluation meeting took place. The feedback is going to be used to upgrade the programme in 2010. In this section the response rate, reliability and type of questions will be discussed. In the following section the evaluation results will be dealt with.

**Questionnaires for participants and e-coaches**

At the end of the OSP the 38 students and 6 e-coaches have been approached by the programme leader with a request to fill in an evaluative questionnaire including 66 questions for the students and 35 questions for the e-coaches scored on a 5 point Likert Scale from 1 (not at all) to 5 (very much so). Questions concerned the reason to participate in the OSP, whether the expectations were met, and assessment of the assignments, learning objectives, teamwork, e-coaches, e-learning environment and academic integration issues. Student responses were returned to the researcher via e-mail to make sure students remained anonymous to the programme leader and e-coaches. The response rate for students was 76% (N = 28) of which 12 women, 15 men and one unknown. The response rate for e-coaches was 100%. Reliability of the student questionnaire amounted to Cronbach's alpha .97. Differentiation between the respective answers was relatively small. Yet the standard deviation are on average for a small group bigger than one, thus we are assuming the response is relevant and to the point. Reliability for the e-coach questionnaire was not established as a mere 6 e-coaches filled out this form.

The background of the participants consisted of different nationalities and the amount of working experiences varied from 0 to 5 years. The dominant participating student nationalities were Indian 43% of the response, Chinese 29% of the response, another 37% represented countries such as Ghana, Indonesia, USA, Iran, Nepal, Nigeria and Mexico. With respect to work we found 12 persons did not work before enrolling in the Master Programme and the OSP and 16 persons worked 1 to more than 3 years.

Upon arrival in the Netherlands an evaluation meeting was held to inform students of the evaluation questionnaire results. Additionally, we tried to evaluate the impact of the OSP on their first experiences after having arrived in the Netherlands.

**Evaluation results: objectives met**

The OSP was announced to the students with a letter of invitation to participate. In this letter the objectives of the OSP were stated. These were (as mentioned in the Introduction of this paper): to prepare international students online for working together in intercultural project teams, becoming acquainted to the technical assignments at DUT, becoming acquainted to the educational system at DUT and of the Netherlands, and starting to build a social network students can rely on during their studies. In this questionnaire students were asked which of these objectives were the most important reason to participate in the OSP. The table below (Table 1) indicates the main reasons to participate. The percentage is an aggregate representation of those students who agreed very much or very much so with the stated question. In the most right hand column, one finds the mean and standard deviation linked to the specific questions. For all tables included in the results section this format has been adapted.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Very much/very much so*</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Type of assignment</td>
<td>82%</td>
<td>4.25 (0.97)</td>
</tr>
<tr>
<td>2. Get to know DUT culture</td>
<td>64%</td>
<td>4.00 (1.12)</td>
</tr>
<tr>
<td>3. Making friends</td>
<td>65%</td>
<td>3.86 (1.11)</td>
</tr>
<tr>
<td>4. Get to know Dutch culture</td>
<td>54%</td>
<td>3.64 (1.13)</td>
</tr>
</tbody>
</table>

* Point 4 and 5 at a Likert Scale
Most of the students participated to become acquainted with the technical assignments of DUT, second were getting to know DUT culture, making friends and least important was to know Dutch culture. Successively, students were asked whether the reasons they participated in the OSP had been met. In the table below (Table 2) the response is found on the questions whether or not the expectations have been fulfilled during the OSP. All statements should be read as e.g. ‘I became familiar with the type of assignments dealt with at DUT’.

Table 2: Detailed overview main reasons to participate the OSP

<table>
<thead>
<tr>
<th>Type of assignments</th>
<th>Very much/very much so*</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of assignments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• More familiar with type of assignments</td>
<td>61%</td>
<td>3.18(1.56)</td>
</tr>
<tr>
<td>• Know how to deal with assignments</td>
<td>50%</td>
<td>3.46(1.10)</td>
</tr>
<tr>
<td><strong>Getting to know DUT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Relevant preparation for DUT</td>
<td>57%</td>
<td>3.61(1.07)</td>
</tr>
<tr>
<td>• Insight/understanding of DUT education</td>
<td>67%</td>
<td>3.73(0.70)</td>
</tr>
<tr>
<td><strong>Friends</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• I have made friends</td>
<td>54%</td>
<td>3.57(1.14)</td>
</tr>
<tr>
<td>• I have built up a social network</td>
<td>29%</td>
<td>2.82(1.06)</td>
</tr>
<tr>
<td><strong>Getting to know Dutch culture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dutch educational system</td>
<td>58%</td>
<td>3.75(0.92)</td>
</tr>
<tr>
<td>• Student/teacher relationship</td>
<td>54%</td>
<td>3.39(1.20)</td>
</tr>
<tr>
<td>• Dutch values</td>
<td>54%</td>
<td>3.57(1.00)</td>
</tr>
<tr>
<td>• Implicit expectations of the educational culture</td>
<td>67%</td>
<td>3.68(0.98)</td>
</tr>
<tr>
<td><strong>Impact of differences between Netherlands and home country</strong></td>
<td>82%</td>
<td>3.96(1.10)</td>
</tr>
</tbody>
</table>

* Point 4 and 5 at a Likert Scale

In general one can state that the OSP objectives have been met satisfactorily. Specifically, the awareness of the impact of differences in educational system between the Netherlands and the home country have become very clear, followed by the implicit expectation of the educational culture and the link to having obtained insight in DUT education. In terms of acculturation to the institution the OSP was a success according to student perceptions. One of the students in the evaluation meeting phrased it as follows:

Before I registered for the OSP I wasn’t sure I would be able to work in an international group or to speak/write the language at a sufficient level of proficiency. After the OSP I knew I could do it, and I went with confidence to the Netherlands.

Interesting is under the heading of friends to note that student felt they made friends, especially male students made more friends than females. Yet students also felt they did not build up a social network they thought they could rely on. However, in the evaluation meeting students related to us that:

• Arriving in the Netherlands and meeting the OSP team members (participants) felt as if I saw old friends I knew very well.
• As we had one another, it felt like coming home to an old place instead of going to a whole new country.

This would suggest ties were much stronger than students themselves anticipated at the moment of filling out the questionnaire from their homeland and before arrival in the Netherlands.

Assignments

The assignments have been evaluated satisfactorily (see Figure 3). The intercultural assignment was most interesting and most clearly described. The design assignment was the most relevant and fun.
assignment on technology was the most challenging. On the whole it seems as if we found a well balanced mix between the nature of assignments.

Most students complained however about the high workload and pressing deadlines. Yet as students became more familiar with the way of working, the workload decreased and deadlines became less stressful. Clearly, students needed some time to adapt to the new situation. Nonetheless students in the evaluation meeting pointed out that some of the students needed to travel for visa papers for 4 days in the middle of the OSP not being able to contribute. Another student had to go on a field trip for work and was unable to have an internet connection. Apparently, practical issues are more difficult to overcome when the duration of the OSP is so short. Catching up for some of the students became impossible.

**E-coaches**

The e-coaches one the whole were assessed as being excellent (see Table 3). As two e-coaches dealt with two teams it was also possible to see the impact of group dynamics on the overall assessment of the e-coach. Several dilemma's were breached by the e-coaches, such as motivation, team-size, understanding teamwork and conflicts.

E-coaches expressed their concerns in terms of how to keep students motivated and online, especially at moments of inertia (Gersick, 1988), while their only means of interaction is a discussion forum and e-mail exchange. The challenge of not having face to face contact made it particularly difficult when team conflicts arose. Other teams managed by developing new ways of working by means of different web tools such as skype and g-mail. The question is whether chat boxes or video-conferencing will help overcome motivation difficulties more easily.

Another issue of interest was the group-size. Due to unfortunate circumstances at home one student dropped out and left the team. The crippled teams were extremely difficult to motivate to continue their work.

Teamwork as working method was also difficult to grasp for some students and difficult to explain for the team e-coach. The e-coaches observed for some students it was difficult to collaborate in terms of discussing core-issues, reaching agreement, division of tasks and keeping communication lines short. Also the role of the e-coach as facilitator and not as team-leader was for OSP students a difficult concept to grasp.

Finally, it showed from the evaluations that teams, which managed to go through the first two phases of teamwork (storming and norming) in terms of Tuckman (1965), in general were more able to reach consensus by agreement and were more satisfied about the functioning of the team. This finding is corroborated by Watson et. All (1993) and Kirchmeyer (1993), who found that once multicultural groups settled down they outperformed mono-lingual groups, because they would discuss more different perspectives on a problem task and come up with more relevant alternatives.

Less optimal functioning teams reverted to decisions by majority of vote or forcing the e-coach to take the decisions. Overt conflicts in the latter two cases were felt to be underground by the e-coach and
were difficult to get a hold on or to deal with. Contrary, to this experience the well-functioning teams seemed to have more overt conflict, but were much better able to deal with it and come up with a 'good' result.

Table 3: Assessment of the e-coaches in the OSP*

<table>
<thead>
<tr>
<th></th>
<th>Team 1 Mean</th>
<th>Team 2 Mean</th>
<th>Team 3 Mean</th>
<th>Team 4 Mean</th>
<th>Team 5 Mean</th>
<th>Team 6 Mean</th>
<th>Team 7 Mean</th>
<th>Overall Mean</th>
<th>SD**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderator</td>
<td>4.0</td>
<td>3.3</td>
<td>4.8</td>
<td>4.8</td>
<td>4.5</td>
<td>4.5</td>
<td>4.8</td>
<td>4.5</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Feedback</td>
<td>4.2</td>
<td>3.8</td>
<td>5.0</td>
<td>4.5</td>
<td>5.0</td>
<td>4.5</td>
<td>4.8</td>
<td>4.6</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Intercultural</td>
<td>4.0</td>
<td>3.0</td>
<td>4.8</td>
<td>3.5</td>
<td>4.0</td>
<td>3.5</td>
<td>4.6</td>
<td>4.1</td>
<td>(1.2)</td>
</tr>
<tr>
<td>sensitive</td>
<td>4.2</td>
<td>3.3</td>
<td>4.8</td>
<td>5.0</td>
<td>4.5</td>
<td>5.0</td>
<td>5.0</td>
<td>4.6</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Enthusiastic</td>
<td>4.5</td>
<td>3.3</td>
<td>4.8</td>
<td>5.0</td>
<td>4.5</td>
<td>5.0</td>
<td>5.0</td>
<td>4.6</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Supportive</td>
<td>4.5</td>
<td>3.3</td>
<td>4.8</td>
<td>5.0</td>
<td>4.5</td>
<td>5.0</td>
<td>5.0</td>
<td>4.6</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Dutch way of</td>
<td>3.3</td>
<td>3.0</td>
<td>4.3</td>
<td>3.8</td>
<td>3.5</td>
<td>5.0</td>
<td>4.6</td>
<td>4.0</td>
<td>(1.3)</td>
</tr>
<tr>
<td>learning</td>
<td>3.5</td>
<td>3.0</td>
<td>4.0</td>
<td>3.0</td>
<td>4.5</td>
<td>3.5</td>
<td>4.6</td>
<td>3.7</td>
<td>(1.3)</td>
</tr>
<tr>
<td>Transfer</td>
<td>3.0</td>
<td>3.3</td>
<td>5.0</td>
<td>4.8</td>
<td>4.5</td>
<td>4.5</td>
<td>3.8</td>
<td>4.1</td>
<td>(1.6)</td>
</tr>
<tr>
<td>Participation</td>
<td>4.3</td>
<td>3.3</td>
<td>5.0</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
<td>3.8</td>
<td>4.3</td>
<td>(1.3)</td>
</tr>
</tbody>
</table>

* Team 8 did not respond
** Note Standard deviation are only shown over the entire group, due to small numbers within teams.

Discussion

Did the OSP provide added value to the students? Derived from these evaluation results and shared experiences we may cautiously say yes:

- Students became aware of their personal learning paradigms and the differences they would encounter in Delft
- Students learned to collaborate in intercultural teams
- Students dealt with open and flexible problem assignments that may be expected at Delft University of technology
- Students had more faith in their coming to Delft, and made a good start building up a social network.

Yet not all students equally benefitted due to local circumstances, being discouraged by the challenges they faced and possibly the lack of face to face contact in crucial moments.

In the future we may have to consider whether the perceived effects can also be traced to increased academic integration into the respective faculties and better student learning results. Moreover, the major task is to involve more Dutch students and stimulate them to learn to be open to different perspectives/alternative solutions to increase learning results.

Next summer we will repeat the OSP with more participants and more faculties to be involved (5 faculties already agreed to participate). In broad outlines the design will be similar, although some adjustments will be carried out such as:

- a need analysis of the participating students;
- faculty linked e-coaches who are able to provide more feedback on technical assignments;
- exploration of the involvement of a faculty mentor who will remain mentor once the student is in the Netherlands;
- more available materials on the web-site to demonstrate the Dutch and other cultural perspectives;
- and assessment of academic study progress over time.

Endnote
Background of the e-coaches were: India (1), Greece (1), Serbia (1) and the Netherlands (3). There were three male and three female e-coaches.

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Adding Personal Value to international students’ success

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Abstract: In this article we describe how we develop and use several IT tools in the process of recruitment and preparation of international students at our Faculty. We describe the background of our approach, the effects and our lessons learned.

Introduction

Study success is an issue that gets a lot of attention in higher education, partly driven by the life long learning agenda of the government with its focus on employability and social inclusion of individual learners, partly by the quest for quality and productivity of educational and administrative processes within universities. Along with this attention for study success, internationalisation is a relatively new dimension in the range of challenges and opportunities for universities these days. A growing number of international students travel around in the international learning space, as degree students or as part of exchange programmes.

In this paper we report on some of the work that is done in the context of the ISO project, funded by SURF, the platform organisation for IT in Higher Education in the Netherlands. In this project Leiden University, Free University of Amsterdam, The Royal Tropical Institute in the Netherlands and the University of Groningen work together to improve international students’ services during their full life cycle from prospective to alumnus. In this paper we focus on the application of newly developed IT tools at the Faculty of Economics and Business of the University of Groningen.

There is an increasing body of literature on students' experiences that emphasizes the importance of good preparation in relation to study success. So it is important from both the perspective of individual students and the organisation to work on this topic. Since the students of today and tomorrow mainly focus on the internet as their source for information and interaction, the application of new IT tools is a logical step.

Context and approach

The University of Groningen is a classical and comprehensive research university in the northern part of the Netherlands, with over 25,000 students. More than 20 percent of these students (6200) study at the Faculty of Economics and Business (FEB), that offers bachelor and master programmes and also has a PhD school. Most of the programmes are in English and a growing number of students from abroad come to study at FEB, in some of the programmes over 20 percent.

The ambition of the Faculty is to stimulate the influx of internationals students up to 30 percent to be able to provide a stimulating and international environment for staff and students. Although we see that international students show a better performance in terms of study results and retention rates than Dutch students, it is clear that, to some extent, they need their own specific approach in terms of services and preparation facilities.

In our view student recruitment and preparation of students needs to be handled in a balanced way. Recruitment and communication must be honest and clear in order to help students to make a good study choice and to prepare themselves properly; on the other hand good preparation facilities can be an essential element of marketing and branding the Faculty and the university.

It is of great importance to make clear to students what they can expect from us and what we expect from them. This is what we try to work out in our mission and our corporate statement “Adding Personal Value”

Adding personal value is:

- our promise: studying and working at our Faculty will contribute directly to your personal development;
A requirement for successful participation: we ask students and staff members to contribute to our knowledge community and we acknowledge them for that.

Learning for life: students, alumni and staff members of our Faculty are well-prepared to contribute to science and society.

Figure 1 shows a schematic translation of our applications/admissions funnel. For every step in the recruitment process we try to increase our contact with the target group. From this funnel we have abstracted two major phases in recruiting new students. In phase 1 we try to generate interest in our programmes. We end this phase when they are accepted.

Now a new phase begins, which we call the conversion period. Of course we want the accepted students to come to Groningen and if they do, we feel that their preparation process should start at this point in time. By inviting students actively to put energy in their preparation, we show that we are happy and ready to receive them. We hope that this will be an extra stimulus for them to decide for our university. For both phases we have developed a website that provides important information about studying and living in Groningen.

We think student involvement is an important part of service development and that it can facilitate the acculturation process. That’s why our Faculty invites students to participate actively in the activities that are described below. The Faculty has developed several IT tools that helps us informing and recruiting prospective students. It helps us to:

- manage their expectations about studying and living in the Netherlands
- make them choose Groningen as their next destination to study
- give our current international students (which we call Student Ambassadors) an active voice within our organisation and, moreover, an important role in attracting new students.

Student Ambassadors project

The Faculty of Economics and Business invites its current international students to play an important role in improving its own organisation. Therefore we work together with our Student Ambassadors. Student Ambassadors are a group of enthusiastic students that not only gives us feedback about our organisation, but we can use them also for promoting activities (for instance campus visits or information fairs) as well as maintaining their own website about Groningen. On this website they share their view on living and studying in Groningen. Student Ambassadors can be used to enhance a good
personal and repetitive contact between the Faculty and the prospective students. Prospective students prefer to hear from current students how they experience studying and living in Groningen. This way our international students can participate actively to obtain our goals.

**What have we done?**

To recruit more prospective international students, the University of Groningen has taken IT initiatives for the different recruitment phases (described in figure 1). As described above our Student Ambassadors run their own platform, a website made by our current international students for prospective international students which can be found at FEB-international.com [1]. To keep in contact with our prospective students after they are admitted, we send them a newsletter [2a] that invites them to go to their personalised webpage [2b]: choosesgroningen.nl. There, we provide information about the Netherlands, the Dutch culture, Groningen as a city and of course studying in Groningen.

As you can see in figure 2, the conversion period is a critical phase that partly overlaps with the promotion period. In this phase it is our goal to increase our catch-rate by more personal attention to our accepted prospective students. This is where they are invited to visit choosesgroningen.nl.

![Figure 2: Time schedule for our promotion and conversion](image)

1: **FEB-international.com – students posting their experiences of Groningen**

At FEB-international.com (see figure 3) our Student Ambassadors share their studying and living experience in the Netherlands. Our Student Ambassadors are a motivated, enthusiastic group of students, from many different cultures and on this website they share information about accommodation, public transport, social activities etc. They “believe that Groningen is a great place to study and live and we would like to give everyone the opportunity to experience this.” The Student Ambassadors maintain and update this website regularly. It gives them an active voice within our organisation. The Faculty promotes this website actively in her communication to prospective students.
2a: Personalised newsletter + 2b choosesgroningen.nl

After a student has been admitted to our university, a critical period has arrived (see also figure 3). The accepted student probably has been approved to other universities as well. Of course it is our wish that these students will choose Groningen as their next study destination. To receive this goal the student receives a newsletter from our university (see screenshot in figure 4) with an invitation to visit her/his own webpage, for instance: xiang-ning.choosesgroningen.nl.
From the newsletter, the prospective student can enter to her/his personal website. In figure 5 we have taken Eduardo from Brazil as an example. From the newsletter Eduardo clicks on eduardo.choosesgroningen.nl. Without having to login, the website recognises Eduardo (‘Hello Eduardo’). Within this website we have used his Brazilian nationality on the world map, where Brazil and the Netherlands are represented with their national flags. On this website Eduardo finds information about visa application, accommodation, health insurance and the introduction period to our website. Besides that, we link to FEB-international.com, where they can ask our Student Ambassadors for advice.
Figure 5: Screenshot of eduardo.choosesgroningen.nl

What are the effects?

1: Effects of FEB-international.com

At the moment we have 20 Student Ambassadors. Together they fill and update the website. From all around the world prospective students visit at this website. Especially in the period before they arrive in the Netherlands a lot of prospective students want to read more about Groningen. Figure 6 shows where 1875 visitors from 70 countries came from in a ten week period.
Figure 6: Visitors of FEB-international.com

Most page views are from the Netherlands and Germany, followed by China and Romania. From 14 June (launch of FEB-international.com) until 1 September 2009 1875 visitor entered the website (see figure 7).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Netherlands</td>
<td>655</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>379</td>
</tr>
<tr>
<td>3</td>
<td>China</td>
<td>154</td>
</tr>
<tr>
<td>4</td>
<td>Romania</td>
<td>76</td>
</tr>
<tr>
<td>5</td>
<td>Czech Republic</td>
<td>49</td>
</tr>
<tr>
<td>6</td>
<td>Bulgaria</td>
<td>40</td>
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<tr>
<td>7</td>
<td>United Kingdom</td>
<td>24</td>
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<tr>
<td>8</td>
<td>Indonesia</td>
<td>22</td>
</tr>
<tr>
<td>9</td>
<td>Greece</td>
<td>28</td>
</tr>
<tr>
<td>10</td>
<td>Turkey</td>
<td>27</td>
</tr>
</tbody>
</table>

Figure 7: Page views FEB-international.com between 14 June – 1 September 2009

As figure 1 described earlier, we want our students to participate actively in informing and recruiting new students. A website like FEB-international.com helps us to build a community within and outside the Faculty. With its personal approach it fits perfectly in our Adding Personal Value campaign where students are contributing to our knowledge community.

2a: Effects of personalised newsletter + 2b choosesgroningen.nl

In eleven mailings we have sent out 815 invitation newsletters. We started these mailings in May. One of the first lessons we can learn from our evaluation: the quicker we respond, the more students read our newsletter and follow their personal link to the website.

From all over the world our prospective students visited their personal website. Especially information about the Faculty introduction and the topic of housing had the students’ interest. Figure 8 shows that they are very eager to get more information. For instance, Gumala from Indonesia visited her personal website 29 times.
According to the qualitative feedback provided by the international students and the web statistics we gathered, the implementation of the new IT tools seems to be helpful in supporting both the recruitment and preparation processes. Also the larger influx of international students, seems to indicate that we are on the right track. Of course it is difficult to judge if this is really the case, since a large amount of factors impact the students’ decisions where to study and also many factors determine their preparedness. An other important element of our project is that we have gathered more first hand management information from the students’ experiences.

Future development will be in line with our philosophy to actively involve international students in virtual and real life services. In this way we hope to create a stronger personal link between the students and the institution. We are confident that students can really add their personal value to support and recruitment processes. Both to their own benefits and that of the organisation.

Acknowledgments

This project was funded and supported by the SURF Foundation in the Netherlands www.surffoundation.nl

Figure 8: Visitors of choosesgroningen.nl (14 July – 31 August 2009)
Keynote 2

Learner performance in multimedia learning environments: Inquiry learning and a comparison of instructional approaches

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With the arrival of new theoretical insights in education, the concept of meaningful learning has received renewed attention. Meaningful learning refers to the idea that learners gain a deep and good understanding of the subject matter. In addition, it results in the ability to transfer and apply this knowledge to new situations. Meaningful learning is connected to the idea of learning as a knowledge construction process. This means that learners should try to make sense of the information offered by selecting relevant aspects of the presented material, organizing that relevant information into a coherent mental representation, and integrating it with other information and prior knowledge. As a consequence, instructional approaches that elicit these learning processes are expected to be more successful in promoting meaningful learning than instructional approaches that do not. One approach that claims to lead to meaningful learning is inquiry learning. In this presentation, several learning environments in which the idea of inquiry learning is implemented are presented. Furthermore, two studies are discussed in which inquiry learning is compared to three other representatives of modern views on learning (hypermedia learning, observational learning, and self-explanation based learning). The four instructional approaches implemented in computer-based learning environments were compared on learning outcomes and learning processes. Each approach advocates active processing of the learning material; differences were expected in the learning processes they elicit and the corresponding knowledge. The first study shows that the two instructional approaches asking learners to generate (parts of) the subject matter, either by self-explanations or by conducting experiments in inquiry learning, were more effective than the two approaches not asking for this (hypermedia and observational learning), but this also resulted in less efficient learning. The second study shows that self-explanation based learning and inquiry learning in comparison to the other two approaches leads to: (a) more learning processes in total, (b) more transformative processes, and (c) more elaboration processes.