Learning and Living Technologies: A Longitudinal Study of First-Year Students' Frequency and Competence in the Use of ICT

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(Received XX Month Year; final version received XX Month Year)

This paper presents results from a longitudinal survey of first year students' time spent on living and learning technologies at university, their frequency of using specific learning technologies and their competence with these tools. Data were analysed from two similar surveys at the start and at the end of the academic year for students studying 14 different courses in five different universities (four place-based and one distance-learning) in England. The younger students used information and communication technologies (ICT) for social and leisure purposes more frequently than older students. The older students were more likely to use it for study. The frequency of using ICT was related to students' perceived competence in the tool. University mode of study also influenced how students appropriated their ICT time. These results might have an impact on the repurposing of living technologies for use as learning technologies.

Net Generation, Learning Technologies, Living Technologies, Gender, Distance-Learning

Introduction

In recent years, a body of empirical studies about student experiences of e-learning has started to emerge (e.g. Brown & Czerniewicz, 2008; Jones, Ramanau, Cross & Healing, 2010; Kennedy, Judd, Churchward, Gray & Krause, 2008; Kennedy et al., 2006; Salaway, Caruso, & Nelson, 2008). Much of this work was intended to find out more about how Digital Natives (Prensky, 2001a; 2001b) or Net Generation aged students (Tapscott, 1998) used various e-learning tools and technologies in their studies and in their lives more generally. Net Generation aged students are generally described as being born during the early to mid 1980s and are exposed to the ubiquitous use of information and communication technologies (ICT) both at school and at home (Oblinger & Oblinger, 2005; Prensky, 2001a; 2001b). Research studies suggest that whilst there may be age related differences concerning perceptions and experiences of technology-mediated learning, other demographic characteristics, such as gender (Selwyn, 2008) and academic discipline (Kennedy et al., 2008) may also be important.

Qualitative work in this and related areas stresses the importance of accounting for the broader social milieu, life-stage (Dutton, Helsper, & Gerber, 2009; Ito et al., 2008) and the diversity of types of media uses across cohorts of young people (Green & Hannon, 2007). To account for this broader social milieu, an emerging discussion in the literature has been to distinguish between 'living' and 'learning' technologies (Kennedy et al., 2008). We define living technologies as those technologies that young people choose to use in their everyday lives mainly for their social lives and for leisure purposes for example social networking sites, computer games, mobile (cell) phones (Bennett, Maton and Kervin, 2008; Corrin, Bennett and Lockyer, 2010; Prensky, 2001a). On the other hand, we define learning technologies as those technologies that students use primarily for study purposes which may include office-oriented software, certain uses of Web 2.0, networked learning and virtual learning environments (Corrin et al, 2010, Kumar, 2010). There may be some overlap between living and learning technologies for example where living technologies such as blogs and wikis may be also used for learning technologies (Corrin et al, 2010; Kumar, 2010).

Prensky (2001a; 2001b) argues that the Net Generation aged students are *distinctly* different from older students in their learning because of their constant and frequent use of living technologies. A potential strength of this argument is that the frequent use of living technologies may suggest that students (both young and old) can easily transfer their repertoire of digital media skills (Nicholson, Macleod, & Haywood, 2005) to gain an understanding and competence in learning technologies. Munro, Huff, Marcolin and Compeau (1997) found in a study of business users' competence with computer software was correlated to the frequency of usage. They argued that the ability of the user to creatively apply computer software skills was significantly correlated to frequency of usage. This might imply that students who are competent in living technologies will be able to transfer their

digital skills and become more competent in learning technologies. However, it is uncertain whether the younger students' competence in learning technologies would be *distinctly* different from the older students as there is debate by some researchers (e.g. Kennedy et al., 2008; Kirkwood & Price, 2005) whether the transfer of skills is automatic.

Study Context and Aims

This paper hopes to clarify issues related to this uncertainty. The paper is a product of the second stage of a two-year exploratory study funded by the Economic and Social Research Council (ESRC) in the UK which investigated first year students' changing experiences of digital and networked technologies studying on 14 courses in different subject areas at five different universities in England. One of the universities was a purely distance learning institution, while the other four were place-based institutions. The findings of the first stage of the study are reported elsewhere (see Jones & Ramanau, 2009a; 2009b; Jones et al., 2010).

Our stance in approaching our research is similar to Bennett et al (2009), in that, we do not see a distinct Net Generation divide between the younger and older students, but we do acknowledge that there may be age related differences (e.g. Jones et al, 2010; Jones and Hosein, 2010). Thus, our motivating question for this paper is:

Does the frequent usage of living technologies by Net Generation aged students' provide an advantage to them over the older students when it comes to using learning technologies at university?

To answer this question, the broader social indicators of gender, age, nationality and university mode also need to be accounted for. The reasons for this is that the results of the first phase of the study showed that gender, age (Net Generation aged or non-Net Generation aged), university mode (distance learning or place-based) (see Jones et al., 2010) and nationality proved to be important determinants of student ICT use (see Ramanau, Hosein

and Jones, 2010). Net Generation aged students were considered to be those aged 25 years of age and under (i.e. those born in 1983 or later) and the non-Net Generation aged students as those aged 26 years of age and older. Nationality here refers to whether the students were 'Home' students, that is, from the UK or 'International' students which included EU and non-EU students.

The paper uses data from two standardised self-report questionnaires administered to a sample of students in the beginning (autumn 2008, referred to as Survey 2 in this paper) and the end (spring 2009, Survey 3) of the academic year in either online or in a paper format. Both questionnaires were similar and included several sections that looked at different facets of students' experiences of digital and networked technologies including demographic information about the participants, their access to technology, frequency of media use, competence with ICT and attitudes to e-learning at university. Based on the data collected, this paper aims to:

Aim 1. To determine the frequency that students were using learning technologies and living technologies
Aim 2. To determine how frequently students were using specific learning technologies at the beginning and the end of the academic year
Aim 3. To determine students' competence in the use of these specific learning technologies at the beginning and the end of the academic year
Aim 4. To ascertain whether changes in the frequency of use of learning technologies were related to changes in reported competence in the use of the specific learning technologies

Sample Characteristics

The response rates for Surveys 2 and 3 were 43% (1093 responses) and 28% (713 responses) respectively. This paper looks at a subset of both of these surveys; the 369 students who were clearly identified as having answered both Surveys 2 and 3 (see Table 1). These students were used to track their changing use and competence of learning technologies. Within this subset sample, there were more students who were Net Generation aged students (92%), female (61%), from place-based universities (96%) and UK students

(78%). This subset had a similar demographic and social profile to all the students who answered Surveys 2 and 3 (see Ramanau et al, 2010).

(Insert Table 1 about here)

To investigate Aim 1, the paper uses two questions from Survey 3 which measured the self-reported daily ICT usage for social and leisure purposes, and study purposes. These are listed as questionnaire items *a* and *b* in Table 2. These questions slightly differed from Survey 2, where students were asked about their expected use of ICT. ICT that was being used for social and leisure purposes were considered as living technologies whilst those being used for study purposes as learning technologies. Students were asked to choose from a pre-selected list of a range times. The pre-selected time ranges for Survey 3 were recoded from its original codes (see Ramanau et al, 2010 for more details). The new recoded ranges were less than 1 hour (hr), 1 to less than 2 hrs, 2 to 3 hrs and more than 3 hrs. Using these categories, an estimated average time was determined for each student by using the mid-point of the range. This meant that for either social life and leisure, or for study purposes the maximum average daily time a student could have used ICT was estimated at 3.5 hours.

(Insert Table 2 about here)

The second aim investigated the frequency of use for specific learning technologies. This was investigated by looking at the students' usage frequencies in the past month for 10 learning technologies. These ten learning technologies also included cross-over living technologies such as blogs. An example of the frequency question asked is presented as *c* in Table 2. The frequency of use was self-reported on a five-point Likert scale from 1 (Never) to 5 (Very Often). In a similar fashion, the investigation of the third aim was facilitated by using questionnaire item *d* (an example) in Table 2 which looked at the competence of students in using ten the learning technologies. Competence was measured on a 5-point Likert scale from 1 (Not Really Competent) to 5 (Very Competent). Finally, to fulfil the last aim, this paper

looks at whether the change in frequency of students' learning technologies' use from Surveys 2 to 3 (i.e. the longitudinal data) related to a change in their self-reported degree of competence with respect to the ten learning technologies. This aim used both questionnaire items *c* and *d* in Table 2.

Results

Learning and Living Technologies Time Usage

Repeated measures analysis of variance (ANOVA) was used to analyse the actual time spent on social and leisure purposes (living technologies) and study (learning technologies) on a daily basis by students when taking into account the main effects of gender, nationality, university mode and age groups. The small sample size meant that looking at any interaction effect was not possible; hence a customised model was utilised which had only the main effects.

Overall, students were spending significantly more time ($F(1,360) = 3.98$, $p = 0.05$, $\eta_p^2 = 0.01$) on learning technologies (2.2 hrs) than on living technologies (1.8 hrs). Table 3 presents the means from the repeated-measures ANOVA for the four social and demographic groups on living and learning technologies.

(Insert Table 3 about here)

As expected, the results showed that the Net Generation aged students spent significantly more time on living technologies ($F(1,360) = 14.63$, $p < 0.01$, $\eta_p^2 = 0.04$) than the older students (2.2 vs 1.4 hrs). However, both the Net Generation aged and the older students spent almost the same time on learning technologies (2.0 vs 2.4 hrs). Besides age, gender and university mode affected the time spent on living and learning technologies. Male students spent more time on living technologies (2.0) than female students (1.5) ($F(1,360) = 16.69$, $p < 0.01$, $\eta_p^2 = 0.04$) but both genders spent similar time on learning technologies (males: 2.2 hrs and females: 2.2 hrs). Students from place-based universities spent more time

on living technologies ($F(1,360) = 4.30$, $p = 0.04$, $\eta_p^2 = 0.01$) than those students at the distance-learning institution (2.1 vs 1.5 hrs); the time spent on learning technologies were similar for both institutions (2.4 vs 2.0 hrs).

Specific Learning Technologies: Frequencies and Competences

A MANOVA was conducted to determine the students' usage frequencies and competences of the ten learning technologies at the beginning of the academic year (Survey 2) and the end of the academic year (Survey 3). The demographic and social variables of age group, university mode, gender and nationality were included in the model only as main effects. The overall mean frequencies and competences for the ten learning technologies in Surveys 2 and 3 are presented in Table 4.

(Insert Table 4 about here)

Generally, students were high frequent users (>4.0 on the Likert scale) of email, search engines and word processing programmes but low frequent users (<2.5) of editing digital audio, digital video and maintaining a blog or website. Their competence in these learning technologies follow a similar pattern to their frequency of use, where students rated themselves as being highly competent (>4.0) in using email, search engines and word processing programmes. On the other hand, they rated themselves as having low competence (<2.5) in editing digital audio, editing digital video and maintaining a blog or website.

At the beginning of the year (Survey 2), both the younger and older students had similar usage for the ten technologies, however, their competencies varied ($F(10,344) = 4.10$, $p < 0.01$, $\eta_p^2 = 0.11$). Younger students rated themselves as being more competent than the older students in maintaining their own blog site (2.8 vs 2.1; $F(1,353) = 5.60$, $p = 0.02$, $\eta_p^2 = 0.02$), using a search engine (4.8 vs 4.5; $F(1,353) = 7.08$, $p < 0.01$, $\eta_p^2 = 0.02$), using a word processing programme (4.7 vs 4.5; $F(1,353) = 5.75$, $p = 0.02$, $\eta_p^2 = 0.02$), using a presentation programme (3.8 vs 2.8; $F(1,353) = 27.79$, $p < 0.01$, $\eta_p^2 = 0.07$) and using a spreadsheet

programme (3.7 vs 3.1; $F(1,353) = 8.16$, $p < 0.01$, $\eta_p^2 = 0.02$). However, the partial effect size (η_p^2) is small (Cohen's criteria for small is around 0.10); therefore, there is not a large or distinct difference between the age groups. It is however also noted that within this paper, there is not a distinct difference between any of the other demographic and social groups as their partial effect sizes are also small.

After one academic year, the usage on nine learning technologies for both age groups remained the same except for library resources where the univariate statistic ($F(1,356) = 7.76$, $p < 0.01$, $\eta_p^2 = 0.02$) suggests that the older students were using this more frequently than the Net Generation aged students (3.9 vs 3.3). The competencies between the two age groups at the end of the year was still significantly different ($F(10,344) = 3.88$, $p < 0.01$, $\eta_p^2 = 0.10$). The younger students however only reported more competence in using a web search engine (4.7 vs 4.5), word processing programmes (4.8 vs 4.7) and presentation software (4.0 vs 3.2).

Gender, nationality and university mode also influenced the usage and competences of these ten learning technologies. Generally, male students reported higher usage and competence than female students in editing digital audio ($F(1,344) = 42.73$, $p < 0.01$, $\eta_p^2 = 0.11$), editing video ($F(1,344) = 31.71$, $p < 0.01$, $\eta_p^2 = 0.08$) and using spreadsheet programmes ($F(1,344) = 29.47$, $p < 0.01$, $\eta_p^2 = 0.08$) in both Surveys 2 and 3. International students reported a higher usage and competence than Home students in maintaining a blog or website ($F(1,344) = 11.72$, $p < 0.01$, $\eta_p^2 = 0.03$), editing digital audio ($F(1,344) = 6.76$, $p < 0.01$, $\eta_p^2 = 0.02$), editing digital video ($F(1,344) = 4.12$, $p < 0.01$, $\eta_p^2 = 0.02$) and accessing library resources ($F(1,344) = 20.79$, $p < 0.01$, $\eta_p^2 = 0.06$) at both the beginning and the end of the academic year. Students in place-based universities also reported more competence ($F(1,344) = 11.21$, $p < 0.01$, $\eta_p^2 = 0.03$) in using presentation software than the students at distance-learning institutions throughout the year. Detailed information on this data can be provided by contacting the main author.

Relationship between Frequency and Competence

This section investigates the final aim. Firstly, correlations were performed between the frequency and the competence for the ten learning technologies for both Surveys 2 and 3 to determine if there were any association between the two. It was found that frequency had a weak but highly significant positive relationship to competence for all ten technologies (all $p < 0.01$ and r ranged from 0.4 to 0.6 except for use of email and word processors, which were both 0.2). That is, as students' usage of the learning technology increased so too did their self-reported competence. These weak correlations may indicate an indirect relationship between frequency and competence.

To further investigate whether an increase in usage of a learning technology is related to students being more competent in that learning technology, the change in the frequency of using the learning technology and the change in competence of using the learning technology was calculated. This was the difference between a student's two self-reported frequency scores (or competence scores) in Surveys 2 and 3. To test to what extent the change in frequency of use of the learning technology was related to the change in its competence; the change in competence was regressed against change in frequency along with their demographic characteristics including gender (male = 1, female = 2), age group (net generation/younger students = 1, non-net generation/ older students = 2), university mode (place-based = 1, distance-learning = 2) and nationality (home = 1, international = 2). A step-wise regression was used to find the best model.

First of all, any increase in competency when increasing usage frequency of any learning technology was not influenced by the students' gender, that is, if both a male and female student used a learning technology to the same extent, their competence in the learning technology would increase by the same amount. Except for email, if students increased their usage in the learning technologies then a corresponding increase in their competence of these technologies was noted (see Table 5). Perhaps, an increased frequency

did not impact on the competence of sending and receiving email because it was already at the ceiling for competence (4.8 out of 5 on the Likert scale).

International students were more likely to slightly increase their reported competence in sending or responding to email over the year ($\beta = 0.11$) than UK students. The reason for this is uncertain but perhaps they learnt more email functionality such as attaching documents or pictures to communicate with family and friends in their home country.

(Insert Table 5 about here)

Some technologies such as word processing ($\beta = 0.18$) and web search engines ($\beta = 0.15$) seem to already be at a ceiling of competence for students because any increase in their frequency of use was associated with little change in their competence. For example, a one point increase on the Likert scale in the frequency of using the word processors would only be associated with a 0.18 point increase in competence on the Likert scale. Students who were at place-based universities were associated with gaining slightly more competence than the distance learning students even if both increased their frequency to the same extent ($\beta = -0.11$). It is uncertain as to why distance-learning students did not report gaining as much competence for the same increase in frequency of use. A possible reason is that distance-learning students usually depend on the information resources supplied by the institution (e.g. books, course materials) and as a consequence their change in competence in searching the web is judged as poorer than the students at the place-based institutions.

For the other two office software applications; spreadsheets ($\beta = 0.28$) and for presentations ($\beta = 0.26$), students reported modest increases in competence by increasing their usage of both of these packages. However, international students ($\beta = 0.11$) were slightly more likely to be associated with a gain in competence if they had increased their usage of spreadsheets and presentation software over the year. For example, based on a repeated measures ANOVA which employed a customised model using the social and

demographic groupings as main effects, international students were found to increase their competence in spreadsheets from 3.2 to 3.8 ($p<0.01$) whilst the Home students remained fairly consistent (3.5 to 3.6) over the year. Further, the frequency of using spreadsheets by the Home students was fairly consistent (3.4 to 3.5) from Surveys 2 to 3, but international students increased their frequency from 3.6 to 4.4 ($p<0.01$). The reason for this may be due to the sample. The majority of the international students in the sample were taking financial/ accounting classes which may account for the self-reported increase use and competence in spreadsheets.

Furthermore, students who were from the older generation were more likely gain some benefit (i.e. competence) from using the presentation software than the Net Generation aged students if they increased their frequency of use. However, it should be noted that the reason for this may be because the Net Generation aged students were already quite proficient in presentation software in comparison to the older students. The older students significantly increased their competency of using presentation software (2.8 to 3.4, $p<0.01$) but this increase led to a reported competence that was still lower than the younger students (3.8 to 4.0).

When students increased their time spent on editing digital audio ($\beta = 0.36$), digital video ($\beta = 0.34$), editing a digital photo ($\beta = 0.36$) or maintaining a blog or website ($\beta = 0.34$), there were more moderate increases in their competence. Perhaps, the reason for this is that the competence for these students using these technologies for study purposes was generally low. Furthermore, distance learning students seemed to benefit slightly more than the place-based students from increasing their frequency in editing digital audio ($\beta = 0.11$).

The change in frequency of use for most learning technologies together with other demographic factors explained less than 15% of the variance (R^2) in the change of competence, except for the access to the library where the model accounted for 27% of the

variance. The change in frequency for the access to the library online was a good predictor for the change in competence ($\beta = 0.50$). Therefore, for this particular learning technology, increasing frequency of use had a stronger relationship with the students' increased competency, that is, the more they students used the library resources, the more competent they became with it (or vice versa). This is an interesting finding because this is the only learning technology in this list that the students would almost certainly have encountered for the first time at university. The other learning technologies could have been used before entering university. Interestingly, students' ages did not play a part on their increased frequency or increased competence when encountering, this first time technology of library resources. That is, no matter what their ages, if the student increased their usage frequency, their competence would also increase.

Similarly, to the findings for the web search engine, students from the place-based institutions gained slightly more competence than the distance-learning students when they increased their use of the library resources ($\beta = -0.11$). It appears that the students from the distance-learning institution reported a lower competence with any searching tool (library resources or web search engine).

Discussion

The results of this study shed more light on patterns of student use of living and learning technologies and how these varied across age groups, gender, nationality and university mode. The longitudinal nature of data collection helped to identify over an academic year, the students' frequency of using living and learning technologies, their frequency and competence of using specific learning technologies and the impact of this frequency on their competence of using the learning technologies. The paper used both ANOVAs and MANOVAs for the analysis of paper. Appropriate tests were conducted to determine whether there were any violations of the ANOVA and MANOVA assumptions as there were small

sample group sizes. This was one of the reasons why a main effects model was used. There were homogeneity of variance violations however MANOVAs and ANOVAs are quite robust against these violations but some caution should still be taken in the interpretation of the results.

Aim 1: Learning and Living Technologies Extent of Use

The first important conclusion is that students use learning technologies more often than living technologies on an average day, albeit only 0.4 hours, regardless of age. Kumar (2010) and Corrin et al (2010) reported that the Net Generation-aged students usage of living technologies (e.g. Web 2.0, games etc) as learning technologies were quite poor. Our findings suggest that whilst their reports showed that living technologies were not being frequently used as learning technologies, younger students were using what they considered as learning technologies more frequently than their living technologies. Whilst the younger students may have been immersed in living technologies when growing up, it seems that their university lives requires them to be equally immersed in their learning technologies. Further, the Net Generation aged students spent more time using living technologies than the older students but they spent *similar* time on the learning technologies. In fact, whilst not statistically significant older students were using their learning technologies 0.4 hours more each day.

Students in place-based universities tended to use more living technologies than the distance-learning students. It is possible that the good connectivity levels and relative ease of access to a wide range of online resources help to create a social milieu that fosters and encourages social and leisure uses of ICTs at place-based universities. At the same time, it appears as if something in the circumstances affecting students at the distance-learning university inclined them to spend less time using living and learning technologies. As the distance-learning students are usually part-time (over 95%), these students may well have other commitments. Thus the nature of ICT use among distance learners, particularly those of

the Net Generation aged group studying in a part-time context, merits further investigation. In either case it would indicate a need for further work to examine the nature of different types of technology uses.

These findings may suggest that caution needs to be taken by educational providers who try to utilise living technologies as learning technologies in order to engage students in course materials. Younger students may see this as an encroachment into their recreation and resent the educational provider for taking over their space unless the technology can seamlessly be integrated and be seen by the students as a hybrid of a recreational and study tool. On the other hand, older students might think that any living technology that has been utilised as a waste of their time as it may not reflect what they perceive as a learning technology.

Aims 2 and 3: Frequency and Competence of Learning Technologies

At the start of their academic year, students, regardless of their age, were using learning technologies to the same extent or frequency. This is to be expected because as noted in the previous section, there does not appear to be any pattern between students' frequent use of living technologies to their frequent use of learning technologies. Frequencies of using a learning technology either increased or remained the same across the two age groups except for one learning technology, the library resources. In this case, the older students used this resource far more than the Net Generation aged students. However, this did not mean they had become more competent in this tool. In fact, the reported competency levels for using library online resources were similar regardless of age, although competence had increased on average for all students from the beginning of the year to the end of year. The important point to note here is that both age groups encountered this learning technology at the same time and the Net Generation aged students did not appear to have any distinct advantage over the older students when it came to their competency in the technology.

There were however five learning technologies that the Net Generation aged students were far more competent in than the older students at the start of the year which included typical office software. These reported competencies were most probably a product of the school system. By the end of the year, the competence that the younger students had in these five learning technologies was reduced to three learning technologies. It seems that the older students are capable of closing the advantage gap that the Net-Generation aged students have by previously using these learning technologies. The Net Generation or Digital natives theses might lead one to expect this gap to widen but our evidence supports Kirkwood and Price (2005) who argue that younger students are not able to transfer their skills automatically.

Aim 4: Relationship of frequency and competence

Finally as with any technology, it appears that the frequency of using a learning technology plays a part in how competent students are at using them. This paper noted that for students whose competency did not reach a ceiling (such as email); an increase in frequency was related to an increase in competence. Net Generation aged students did not have any advantage and the older group of students were more likely to increase their competence in presentation software the more frequently they used it. Furthermore it seems that students who were first time users of a learning technology have a faster increase in competence the more frequently they use it as evidenced by students accessing library resources online. Of course this may be dependent on the difficulty level of the technology. Further research is needed to assess whether the repurposing of living technologies by educators into learning technologies makes the student more competent in its first time use when compared to a separately designed learning technology.

Concluding Remarks

The results presented here are in accordance with results from the first phase of our research and research conducted by other authors (Jones et al., 2010; Kennedy et al., 2008).

Furthermore it is clear that age is not a simple predictor of technology use and that in some cases age does not affect particular occurrences of technology use in the ways the Net Generation and Digital Natives theses suggest. The theory that there is a distinct difference in the ICT competence of Net Generation aged students with technology does not seem to hold when it comes to using learning technologies. Any competency differences between the younger and older students are quite small and do not demonstrate a distinct advantage. The younger students' perceived competence in learning technologies are mostly related to office software applications which they were likely to have been introduced to in school rather than having a natural aptitude or ability for technology use as suggested by Tapscott and Prensky. The younger students' advantage of being competent in these learning technologies tends to diminish as the academic year progresses and the older students become more competent.

Further research work should examine whether these differences continue into the students' second and third year or completely disappear. Self-reported questionnaire data on learning experiences particularly in terms of ICT use do not always yield reliable results (Douwes, de Krakera, & Blattera, 2007), so data from other qualitative (interviews, observations etc.) and quantitative (e.g. activity logs) methods would be useful in combination with surveys to establish a more reliable evidence base.

Acknowledgements
An earlier version of this paper was presented at the Networked Learning Conference in Aalborg Denmark May 2010. The research reported in this article was funded by the UK Economic and Social Research Council (Grant RES-062-23-0971). I would also like to acknowledge the assistance of our collaborators at the five participating universities, in particular Susan Armitage, Martin Jenkins, Sheila French, Ann Qualter and Tunde Varga-Atkins.

Notes on Contributors
Anesa Hosein's main interests are in the use of technology for learning in particular, how students make sense of mathematics depending on the types of software they use in tertiary education. Her main theoretical interests are in cognitive learning and self-explanations. She also likes repurposing Web 2.0 technologies for study and work practices.

Ruslan Ramanau's main interests are in ways in which e-learning experiences are shaped by contextual factors and exposure to technology. One of the foci of his work is on how students from different cultures vary in their approaches to learning and learning strategies, particularly in the context of adult practice-based learning. .

Chris Jones' main research interests lie in the study of networked learning in Higher and Further Education. The foundation of his interests lies in social theory and socio-cultural approaches in particular. He is especially interested in the relationship between technological artefacts and social order and the ways in which policy

affects practice in the field of networked and e-learning. He has a long standing interest in the application of collaborative and cooperative methods to teaching and learning and the use of networked technologies in Higher Education and a particular interest in the use of the ideas of Communities and Networks of Practice.

Table 1: Student Characteristics in Surveys 2 & 3 and in the Matched Surveys.

Social/ Demographic Factors	*Matched Surveys 2 & 3*
Age Group	
Net Generation (≤ 25 yrs)	340 (92%)
Non-Net Generation (≥ 26 yrs)	29 (8%)
Gender	
Males	144 (39%)
Females	225 (61%)
University Mode	
Place-Based	355 (96%)
Distance-Learning	14 (4%)
Student Nationality	
UK or Home	287 (78%)
International	81 (22%)
Total	**369**

Table 2: Example of questionnaire items from Surveys 2 and 3 and their corresponding aims

Survey	***Example of Questionnaire Items***	***Aims***
ICT usage		
Survey 3	a. 'How much time do you spend using ICT for leisure and/or social purposes in an average week day?'	Aim 1
Survey 3	b. 'How much time do you spend using ICT for study in an average week day?'	Aim 1
Frequency of ICT Use		
Surveys 2 and 3	c. In roughly in the past month, how often have you done the following? 'Edited digital audio' Very Often; Often; Sometimes; Occasionally; Never	Aims 2 and 4
Competence in ICT		
Surveys 2 and 3	d. How competent are you in performing the following? 'Edited digital audio' Very competent; Competent; Reasonably competently; Slightly Competent; Not really competent	Aims 3 and 4

Table 3: The actual ICT time (Survey 3) for study and social and leisure purposes [a]

Main Effects	Social Life and Leisure (Living)	Study (Learning)

Age Group		
Net Generation	2.2**	2.0
Non Net Generation	1.4**	2.4
Gender		
Males	2.0**	2.2
Females	1.5**	2.2
University Mode		
Place-Based	2.1*	2.4
Distance-Learning	1.5*	2.0
Nationality		
UK or Home	1.8	2.2
International	1.7	2.2
All Students	1.8	2.2

[a]p-values represent comparisons between the main effects (e.g. between male and female) for social life and leisure or study purposes

* $p < 0.05$

** $p < 0.01$

Table 4: The overall mean frequencies and competences for 10 ICT activities in Surveys 2 and 3 when taking gender, university mode, nationality and age into account[b]

Item	*Frequency*		*Competence*	
	Survey 2	Survey 3	Survey 2	Survey 3
Maintained own blog or website	2.0[n]	2.1[n]	2.4[a,n]	2.8[n]
Edited digital audio	1.8[g,n]	2.0[g,n]	2.2[g,n]	2.7[g,n]
Edited video on a computer	1.6[g]	1.9[g,n]	2.2[g,n]	2.5[g,n]
Edited a digital photo	2.9	2.9	3.0	3.0
Sent or responded to an e-mail	4.5	4.5[n]	4.8[n]	4.8
Used a Web search engine	4.6[n]	4.7[n]	4.7[a,n]	4.6[a,n,u]
Used a word processing programme	4.5	4.6	4.6[a,n]	4.8[a]
Used a spreadsheet	3.6[g]	3.9[g,n]	3.4[g,a,n]	3.7[g]
Used presentation software	3.3[g,n]	3.6[n,u]	3.3[g,a,n,u]	3.6[a,u]
Accessed library resources online	3.8[n]	3.6[g,a,u]	3.7[n,u]	4.0[g,n]

[b]: a,g, n, u represents that this item was significant at $p<0.05$ for age, gender, nationality or university mode respectively

Table 5: The beta values for the step-wise regression of the change in competence with the change in frequency, university, age and nationality.

Change in Competence	*Beta values*				R^2
	Frequency	University	Age	Nationality	
Edited digital audio	0.36**	0.11*			0.15
Edited video on a computer	0.34**				0.11
Edited a digital photo	0.36**				0.13
Sent or responded to an e-mail				0.11*	0.01
Maintained own blog or website	0.34**				0.12
Used a word processing programme	0.18**				0.03
Used a spreadsheet	0.28**			0.12*	0.11
Used presentation software	0.26**		0.15**	0.11*	0.10
Used a Web search engine	0.15**	-0.11*			0.03
Accessed library resources online	0.50**	-0.11*			0.27

* $p < 0.05$
** $p < 0.01$

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