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LEARNING RESOURCE CENTRES IN SCIENCE AND ENGINEERING DEPARTMENTS:
AN INVESTIGATION INTO THEIR DEVELOPMENT AND USE.

Mario José Lopez Villarroel
SUMMARY

This thesis is an attempt to describe and interpret the development and use of learning resource centres in departments of science and engineering. After an overview of the thesis (chapter I), it first concentrates on the concept of evaluation, contrasting the traditional approach with more recent approaches, (chapter II). Next, the methodology employed in the research is analysed (chapter III); and the existing knowledge on resource centres is reviewed through the published literature, (chapter IV). A description of learning resource centres is then presented (chapter V): how they started, how they operate, and how they are influenced by other departmental activities. The chapter also includes a description of the kind of learning resources housed in these centres and their use, and what staff and students regard as their advantages and disadvantages. In order to provide examples of the complex situation described in chapter V, three centres, which were studied in depth, are presented as case studies (chapters VI, VII and VIII). These case studies document what it is like for staff and students, to be involved in a departmental learning resource centre and illustrate the feelings of their advocates and opponents as well as presenting students' supportive and critical reactions. Following this the thesis moves on to present the common features and differences amongst learning centres (chapter IX), including what those directly involved perceived as advantages and disadvantages and the impact that such centres have had on teaching and learning. A number of suggestions as to how centre staff may study or review their own centres are given in chapter X. Finally those features which appeared to be relatively most significant are presented together with some recommendations regarding the improvement of the services provided by the centres.
"... This visit to the unexpected is worth all the distance covered, everything read, everything learnt ... We have to disappear into the midst of those we don't know, so they will suddenly pick up something of ours from the street, from the sand, from the leaves that have fallen for a thousand years in the same forest ... and will take up gently the object we made ..."

(Nobel prize for literature in 1971).
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CHAPTER I: INTRODUCTORY

1. IDENTIFYING THE RESEARCH SUBJECT

For the last decade or so, many libraries in higher education institutions—universities and polytechnics in Great Britain—have been incorporating non-book learning materials in their stock, such as for example: audio tapes, video tapes, slides, computer based materials, etc. These learning materials as well as books are now usually known as learning resources. But only recently have some incorporated a separate unit for the use and sometimes production of such learning resources, often known as learning resource centres. A growing use of these learning resources has also occurred in subject departments, in particular those in which innovatory teaching methods have been developed. The perceived need for having such materials available for students as readily as books within the departmental setting, has led in these departments to the establishment of the so-called departmental learning resource centres.

There are then two kinds of learning resource centres: departmental and institutional. However, the most common situation in higher education is that of centralised institutional provision. The study reported here concentrates on departmental centres, particularly on those in science and engineering departments, but some institutional ones have also been studied to observe the differences in their use.

2. SETTING UP THE STUDY

A number of factors have contributed to deciding upon this study. These were of different order such as for example the timeliness of looking at departmental learning resource centres, the Institute for Educational Technology's involvement in the establishment of two of
these centres and a personal interest to look at departmental settings.

2.1 It became clear from the literature, firstly that attempts have been, or were being, made to study learning resources provision in institutions, see for example Hewton et al (1976) reporting on a study conducted by the Group for Research and Innovation in Higher Education of the Nuffield Foundation; in secondary schools, such as the Schools Council Resource Centres Project (Beswick 1975); in Colleges of Education by the Council for Educational Technology for the United Kingdom (Fotherhill 1973); but that educational researchers had given very little attention to the study of such provision within higher education departmental setting. Secondly, it also became clear from the relevant literature to departmental learning resource centres, mainly by their developers, that these centres began their development about 1970, that since then the published literature has basically been concerned with their organisation and that little attention had been paid to their significance for staff and students.

2.2 At the time I joined the Institute for Educational Technology there were two learning centres in the stage of planning and in which the Institute was involved. In one case, it was directly involved, since the centre was established by the Institute; I evaluated this centre (see chapter VI). In the second case it was involved more indirectly, because the centre was established by the Department of Chemical Physics with the assistance of the Institute for Educational Technology.

2.3 I became interested in educational innovations and research at the time I was lecturing in Physics at the University of Chile (1970-1973). The University was expanding and classes had large numbers of students. We, as a department, found it extremely difficult to teach such numbers within the traditional style of lectures. This as well as interest
from staff members motivated the introduction of innovations and their corresponding studies.

3. PURPOSE OF THE RESEARCH WORK

The first and main purpose of the research work was to evaluate the use of departmental learning resource centres in higher education institutions in Great Britain. Closely related to this, there was a second aim, which was an exploration of student learning through such centres.

A third purpose of the research was the effort to communicate with staff involved in centres in order to both share knowledge and to inform them about my conclusions on the applicability of evaluation techniques, I had used, to their own situation.

4. THE LITERATURE

In the first stage of the work I was concerned with becoming familiar with the relevant literature, not only that particular to the subject being researched -departmental resource centres- but also more generally that of educational technology, educational research methods and evaluation. As the study progressed, the relevant literature was continuously up-dated. Thus chapter II reports on the general literature on educational research methods and evaluation, summarising arguments and making my own interpretations. Chapter III discusses the research methodology employed during the study, which followed the recently developed methods used for curriculum evaluation, which started about 1972 and are based on social anthropology rather than psychometric testing. Therefore the evaluation has been primarily concerned with the description and interpretation of the activities of the centres and it is oriented towards the provision of a sensible understanding of
intended and unintended issues that arise in connection with their work.

Chapter IV concentrates on the literature review of publications relevant to the research subject: departmental learning resource centres.

5. VISITS

The second stage of the study was an open ended exploration of what was happening in certain centres; trying to tease out what staff's and students' feelings were. This evaluation attitude was maintained throughout the study, perhaps to a lesser degree once a general view had been obtained, a number of issues regarding the centres emerged and the investigation developed towards more focussed enquiries into these issues; trying to find out the reasons why they arose and the possible effects they had on students and staff.

To do this I visited a number of departmental learning centres, in many cases more than once. Visits were arranged through both my personal contacts with people in departmental centres and as an observer member of a Council for National Academic Awards Working Party (see section 6 below). On the basis of these visits, chapter V describes the organisation of institutional centres and then concentrates on the development of departmental learning resource centres. It analyses a number of issues regarding their setting up and work, including origins, philosophy, organisation, aims and scope of learning resources.

6. COUNCIL FOR NATIONAL ACADEMIC AWARDS WORKING PARTY

Due to my involvement with learning resource centres and with the learning resources available in these centres, I was invited to participate as an observer member in a C.N.A.A. Learning Resources...
Working Party whose purpose was "to investigate and appraise critically, in a sample of British higher education institutions, the developing plans and current practice concerning the design, production and use of learning resources and the introduction of staff and students to the characteristics, uses and implications of these materials" (CNAA 1977). The Working Party had a particular concern regarding the implications for the validation procedures of the Council of proposals for courses in which there is a substantial commitment to the use of learning resources by individual students.

7. CASE STUDIES

It became clear from early visits that departmental learning resource centres vary enormously in organisation, administration and pedagogy. With the aim of providing examples of this complex situation as well as getting an insight on the centres' life, I decided to conduct case studies, which allowed me to study a few of these centres in depth. Three cases studies were carried out; these were of centres developed in science departments and the factors which contributed to choose them are presented in the introduction of the corresponding chapters which report on them. So, chapter VI reports on a physics course taught through a learning centre, chapter VII on a chemistry learning aids laboratory and chapter VIII on a self instructional biology laboratory.

8. INTERPRETATIONS

Up to this point -chapter VIII- the thesis will have reported largely on actual findings. The next three chapters are interpretative ones, which review the purposes of the research work: chapter IX looks at its first and second aims -evaluation of the use of departmental centres
and exploration of student learning— which in the light of the information gathered analyses their common features and differences as well as the impact of centres on teaching and learning. Chapter X presents my conclusions on a possible application of evaluation techniques by staff involved in departmental centres; it also prompts ways in which they could conduct studies or reviews of their centres. Chapter XI—the last one—presents those aspects of both the departmental learning resource centres and their study which were to my mind the relatively more important. It also makes a number of recommendations both regarding the work of the centres that have started and for those to be set up in the future.

9. ADDITIONAL INFORMATION

Throughout the report there are references to evaluation instruments used in the study, subsidiary papers and other documentary materials. They provide additional information and are included separately in a section of appendices.

10. NOTES ON THE STYLE OF WRITING

As will be seen in chapter III, the data obtained during the investigation was collected through several techniques; a good deal of which was obtained in conversations and interviews with people involved, e.g. staff, students. In order to use their own 'vocabulary', they are often quoted in the following chapters. Quotations coming from these sources—interviews and conversations—are not identified to keep the confidentiality offered to the people interviewed; however they are quoted in context, that is to say that, for example, quotations in a section concerning staff are taken from what staff members have
said. Hence, I have often felt it unnecessary to indicate where a quotation comes from.

Double inverted commas are used when there is a verbatim quotation of what someone said and single inverted commas are used to emphasise phrases or words which are used in ways other than the common usage.
CHAPTER II: EVALUATION - THE LITERATURE

1. INTRODUCTION

"'Evaluation' has become one of the current catchwords in educational parlance. Unfortunately for the clarity of our thought, however, the word is used in a number of different ways" (Cooper 1975). Thus, one often finds in the literature that reference is made to several types of evaluation, such as for instance, evaluation of students' achievement of educational outcomes, evaluation of students' learning, evaluation of teaching, evaluation of different teaching and learning situations, evaluation of courses, evaluation of educational programmes or curricula, and evaluation of educational systems. It can be argued that educational systems are formed by various educational programmes and that the other items in the list above are subset or elements of an educational programme. Because of its importance this chapter begins by analysing and discussing two senses in which the concept of educational programme is used.

The traditional or dominant approach to evaluation is then discussed by means of some of its definitions, description, and implications. Next, the chapter analyses a number of criticisms to the traditional approach. Then a few attempts to move away from this dominant approach are described and this is followed by an analysis of three new approaches - holistic, responsive and illuminative - with the latter being described at full length because of its appropriateness to the study of the educational innovation reported here: departmental learning resource centres.

Finally a general (and brief) discussion is included of four separate but relevant aspects. They are: Firstly a note on the wide range of
contributions to the field of curriculum evaluation and the impracticality of including them all; secondly, the similarities amongst new approaches are presented; thirdly, some limitations of the illuminative approach are reviewed and discussed; and fourthly, a philosophical consideration is made regarding the shift in the thinking behind evaluation practices as a result of the introduction of new approaches to evaluation.

2. EDUCATIONAL PROGRAMMES

2.1 First sense of curriculum.

There would seem to be at least two different senses in which curriculum is used, i.e. restricted and broad. The first, and until recently almost universally accepted view, is curriculum as both the precise specification of the behaviour that students have to reach at the end of a particular teaching and learning activity and the design of those activities. As Inlow (1966) has put it: "Curriculum is the planned composite effort of any school to guide pupil learning towards predetermined learning outcomes".

2.2 Discussion.

This view considers education as a means to an end, and this end is explicitly expressed in terms of students achievement of behavioural objectives. This conception of curriculum can be criticised in terms of the limitations of the use of behavioural objectives in which it is based, but to go into details of both its description and criticisms would depart from the main focus of this report.

However I would like to draw the reader's attention to Bloom et al (1956 and 1964) who describe the approach. Also to Popham (1968 and
1969) who strongly supports the behaviourist approach and summarises eleven reasons why people do not use behavioural objectives and attempts to refute the objections contained in or implied by those reasons. Objections and criticisms are developed by many authors, see for example Guttentag (1971), MacDonald (1971a), Parlett (1972). Stenhouse (1975) criticises the behaviourist model and provides numerous references as well as an alternative approach, which he calls "a process model". Section 2 and 3 of Hamilton et al (1977) also criticise this traditional approach.

2.3 A second sense of curriculum.

The second sense in which curriculum is used, is its identification with an educational programme. Stake (1967a) says that: "Educational Programmes are characterised by their purposes, their content, their environments, their methods, and the changes they bring about. Usually there are messages to be conveyed, relationships to be demonstrated, concepts to be symbolised, understandings and skills to be acquired".

2.4 Discussion.

This second view, which is a broader one, not only considers the educational programme as a means to an end - understandings and skills to be acquired - but additionally sees education as something more complex which is interrelated with and dependent on other activities in life, i.e., purposes, environments, changes it brings about not only on students, but also on, for example, parents, educators, community. An example is provided by Jenkins and Shipman (1976) who in their summary to the chapter on National Influences on the British Curriculum write that:

"The message in this chapter is that the curriculum, as with any
aspect of education, is subject to administrative, financial and legal pressures as well as professional influences. The British way of administering education leaves considerable autonomy at school level, but central government influence is always present. This is not a system that works through the resolution of differences, but through conflict and bargaining leading to compromise, or the maintenance of the balance of the forces which control the innovation.

3. EVALUATION OF EDUCATIONAL PROGRAMMES

3.1 Evaluation and behavioural objectives.

Traditionally evaluation has been concerned with the end product of the educational programmes, that is with the achievement of behavioural objectives. This approach to evaluation has been one of measurement, basically through psychometric testing, in order to indicate how individuals perform - their achievement of objectives - in relation to a certain pre-determined standard.

3.2 Some traditional definitions of evaluation.

Many evaluators who are advocates of this approach have at some stage of their work, given a definition of evaluation. Some of these are provided below:

Tyler (1949), in a book considered as "the classic" (Boud and Kilty 1973) in curriculum development, has defined evaluation as the process of determining to what extent the educational objectives are actually being realised by the programme. A rather similar definition is provided by Harris (1963), as follows: evaluation is "the systematic attempt to gather evidence regarding changes in students behaviour that accompany planned educational experiences."
Bloom, Hasting and Madaus (1971) see evaluation as "the systematic collection of evidence to determine whether in fact certain changes are taking place in the learner as well as to determine the amount of change in individual students".

Scriven (1967) introduces the terms "formative" and "summative" evaluation and indicates that there is a temporal difference between these two forms of evaluation; that is: formative evaluation which is done during the development of the programme and aims to improve it, and summative evaluation which is applied to a whole and completed programme, although it may aim to improve its future applications.

4. THE TRADITIONAL APPROACH TO PROGRAMME EVALUATION AND EDUCATIONAL RESEARCH

The view of education as a means to an end and the psychometric testing approach to evaluation have had a considerable impact in both education and educational research. The latter is described in some details below, since it is much more along the lines of this report than the former. Thus this section attempts to summarise how the traditional approach to programme evaluation has worked.

4.1 Description.

Very often, in particular in the United States evaluation has been associated with students' assessment, therefore when designing an evaluation, the emphasis has been on the definitions of behavioural objectives, indentifying the variables on which to obtain information, the construction of the appropriate tests, if standardised ones have not been published and selecting samples of students.
These tests may be of various kinds, such as I.Q., test scores, attitude rating. Tests to identify particular groups are also used, such as social class, personality. All these are codified, processed through statistical means in order to provide 'objective' indications of the efficiency of students and/or the programme, by comparing for instance a traditional and an innovatory programme.

4.2 Cost-effectiveness.

Educational research based on the traditional approach has been basically concerned with comparisons. Thus it has been oriented to determine the students' 'competence', grading them as lower or higher achievers according to their performance on the score tests. As far as researching into educational programmes go the comparisons are made in terms of their cost-effectiveness. Its description would be as follows: once the objectives of the programme -say a course- have been specified, students are given a pre-test to relate them to a certain pre-determined standard. Next they are divided into groups and are submitted to different teaching and learning experiences, e.g. different teaching methods. Then after some time their achievement of the objectives -the criteria for teaching success- is measured in order to establish the relative cost-efficiency of the various teaching styles employed in the experiment.

5. CRITIQUE OF THE TRADITIONAL APPROACH

5.1 Dissatisfaction.

As Stake (1967c) has put it, "dissatisfaction with the formal approach is not without cause", then he continues arguing that "few highly relevant, readable research studies can be found" and that "many
checklists are ambiguous; some focus too much attention on the physical attributes of a school. Regarding psychometric tests he has said that they "have been developed primarily to differentiate amongst students at the same point in training rather than to assess the effect of instruction on acquisition of skills and understanding".

5.2 Agricultural botany approach.

Parlett (1972) makes a parallel between the traditional approach to evaluation/educational research and investigations in agricultural botany, pointing out that they have similarities, for example, "in the notion of testing for beneficial effects; the pre-occupation with controlling or eliminating as many random variables as possible; and the power that statistical requirements exert on the design of enquiries". In short, the parallel between "the testing of plant chemicals and the testing of educational innovations" can be summarised in the following table.

TABLE II-1: PARALLEL BETWEEN PLANT CHEMICALS AND EDUCATIONAL TESTING

<table>
<thead>
<tr>
<th>STEPS IN THE TESTING OF</th>
<th>a) PLANT CHEMICALS</th>
<th>b) EDUCATIONAL INNOVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Seeds weighed and measured</td>
<td>1. Pre test to students</td>
<td></td>
</tr>
<tr>
<td>2. Treatment of conditions</td>
<td>2. Different teaching and learning activities</td>
<td></td>
</tr>
<tr>
<td>4. Statistical analysis</td>
<td>4. Statistical analysis</td>
<td></td>
</tr>
<tr>
<td>5. Conclusion on what conditions (fertilizers) are best</td>
<td>5. Conclusion on what teaching methods are best</td>
<td></td>
</tr>
</tbody>
</table>
Parlett's argument goes further saying that the traditional approach to evaluation is one "for plants, not people" and that it "survives in the evaluation field not because of inherent strengths, but because its deficiencies in this area are never faced". This is illustrated with criticisms of the 'objective model'.

5.3 Is it possible to measure every thing?

Another major limitation of the traditional approach to evaluation is pointed out by Stake (1967a) in "Toward a Technology for the Evaluation of Educational Programmes", Stake claims that there is a need in evaluation for identifying the perceived impact of an educational programme, and that it cannot be measured. His argument: "Measurement specialists are proud of their perspicacity. 'If it exists', they say, 'it exists in quantity; and if it exists in quantity, it can be measured'. It follows that if an educational programme has an impact, that impact can be measured. Most specialists in educational testing and measurement believe they can do the job... but the fluidity of our experiments and the bluntness of our tests deny us that capacity. Neither quantity or quality of impact can be measured".

5.4 Achievement tests.

Stake (1971) has also shown reservations on what achievement score tests can actually do, since "they provide correlates of achievement rather than direct evidence of achievement" and "errors and hazards abound".

5.5 Artificial methodology.

Parlett and Hamilton (1972) also critically analysed the traditional approach to evaluation, in particular on grounds of it being pre-ordinate which in turn makes evaluators to ignore the on-going process
of an educational programme. Their criticisms include the methods used by traditional approach evaluators, they say that their methods "impose artificial and arbitrary restrictions on the scope of the study. For instance, the concentration on seeking quantitative information by objective means can lead to neglect of other data, perhaps more salient to the innovation, but which is disregarded as being 'subjective', 'anecdotal', or 'impressionistic'."

5.6 Inadequacy,

The invited audience to the Churchill College, Cambridge conference on non traditional approaches to evaluation (see section 7 of this chapter) summarised their conclusions as follows:

"Past efforts to evaluate these educational practices have, on the whole, not adequately served the needs of those who require evidence of the effects of such practices because of:

a) an under-attention to educational processes including those of the learning milieu;

b) an over-attention to psychometrically measurable changes in students behaviour (that to an extent represent the outcomes of the practice, but which are misleading over-simplification of the complex changes that occur in students); and

c) the existence of an educational research climate that rewards the accuracy of measurement and generality of theory but overlooks both mismatch between school problems and research issues and tolerates ineffective communication between researchers and the outside community". (MacDonald and Parlett 1973).

6. THE SEARCH FOR ALTERNATIVES

There have been a number of efforts by evaluators in order to provide either an alternative or a broader approach to the traditional experimental approach to evaluation and to move away from strict
measurement and prediction.

6.1 Evaluation for the improvement of courses.

An early attempt to depart from this was made by Cronbach (1963) who became "convinced that some techniques and habits of thought of the evaluation specialists are ill suited to curriculum studies". He introduced, quite strongly, the concepts of evaluation for the improvement of courses (which can be seen as a particular educational programme) and as the basis for decision making about educational programmes. Cronbach defines evaluation "as the collection and use of information to make decisions about an educational programme".

6.2 Need for a flexible approach.

Another early attempt to move away from the traditional conception of evaluation is given by Atkin's (1963) paper "Some evaluation problems in a course content improvement project", in which he states that "a small body of researchers is challenging some of the older guidelines", but that, "their influence is not yet broad enough to have had an appreciable impact on curriculum evaluation". The paper is also concerned with evaluation for course improvement and claims a "flexible approach to the role of evaluation", which "must be fostered by evaluation specialists themselves".

6.3 Goal free evaluation.

Scriven (1967) introduces another new concept to the evaluation field, that is the recognition that evaluators need to interpret the information they have gathered in order to provide a more meaningful report. In his words: "When somebody is asked to evaluate a situation or the impact of a certain product on the market, then what is being called for is an analytical description of the process, usually with respect
to certain possible causal connections, indeed an interpretation", Scriven (1973) also proposes that in evaluations of educational programmes there is a need for the study of its intended and unintended effects: when describing his "goal-free evaluation" he emphasises the need for the evaluation of actual effects and that "the less the external evaluator hears about the goals of the project, the less tunnel-vision will develop, the more attention will be paid to looking for actual effects rather than checking on alleged effects".

6.4 Transactional evaluation.

A more modest contribution to the search for an alternative is that of Rippey's (1973a) transactional evaluation. As he has put it:

"Unfortunately, examples of transactional evaluation are not readily available. The methodology has not been perfected. Applications are few and far between. The data collected may not be clean enough to appear in more formal journals". In transactional evaluation there is a shift of the target of evaluation, that is "the subject of evaluation is the system, not the client or the services rendered by the system. The variables relate to the social, psychological, and communication aspects of the system, rather than to the manifest objectives". It recognises the presence of both protagonists and antagonists to an educational programme and that the evaluation "includes not only outcomes expected by proponents, but also unexpected outcomes suggested by opponents".

7. THE NEW APPROACHES

7.1 The Churchill College Conference.

In December 1972 a small number of evaluators got together at Churchill College, Cambridge, to concentrate on both "new developments in research
method and theory and also on how evaluation relates to educational policy". (Parlett 1974). The conference was set out to deal with the questions: "What is 'non traditional' evaluation? What was wrong with 'traditional'? And what sort of evaluation is, in fact, useful for educational decisions, varied and complicated and politically sensitive as so often they are?"

"At the end of the conference, the participants decided that it might be useful to make available an agreed summary of their conclusions, drawing attention to significant issues" (MacDonald and Parlett 1973). The second section of their statement reads: The participants 'also agreed that future efforts to evaluate these practices be designed so as to be:

a) responsive to the needs and perspectives of differing audiences;

b) illuminative of the complex organisational, teaching and learning processes at issue;

c) relevant to public and professional decisions forthcoming; and

d) reported in language which is accessible to their audiences.'"

The conference final statement ended by acknowledging "that different evaluation designs will serve different purposes and that for a single educational programme many different designs could be used".

The non-traditional approaches to evaluation which were discussed at the Churchill College were to be later labelled as the "new wave evaluation" (Stenhouse 1975), or also "counter movement in evaluation" (House 1973a), or "counter culture in evaluation" (House 1973b), and some of the major issues of the approaches are described below; they are: MacDonald's holistic approach, Stake's responsive evaluation and Parlett's and Hamilton's illuminative evaluation. The latter is more fully described, since it is the most relevant to the work evaluated in this report.
7.2 The holistic approach.

The development of MacDonald's holistic approach to evaluation is very much related to the evaluation of the Humanities Project (details of the project can be found in Humanities Curriculum Project 1970). As the project did not use the objectives model the evaluators had to look elsewhere for a concept of evaluation, at the time when "the climate of educational theory in Britain strongly favoured the behavioural objectives model of curriculum development and evaluation". (MacDonald 1971a). Nevertheless MacDonald himself "had become increasingly sceptical of the notion of confining evaluation to the measurement of intention achievement" and he summarises the belief of the holistic approach as follows: "Education is a complex practical activity. Any effort to reduce that complexity to singularistic perspectives tends to distort the reality, and may mislead those who seek to understand the reality. Least of all does it help those who live there. Perhaps a bolder design can give us a more adequate view of what it is we are trying to change, and what is involved in changing it".

Later MacDonald sees the task of evaluation as one "of feeding the judgment of decision makers by promoting understanding of the considerations that bear upon curricular action" (1971b). Based on this idea he defines evaluation as "the process of conceiving, obtaining and communicating information for the guidance of educational decision making with regard to the specific programme" (MacDonald 1973, quoted by Stenhouse 1975); this is further developed when he outlines his Democratic Evaluation as "an information service to the whole community about the characteristics of an educational programme" (MacDonald 1974). Democratic evaluation for which he has a "personal preference" is presented in contrast to Bureaucratic and Autocratic evaluations. Both are services "to those government agencies which have major control
over the allocation of educational resources'; though the Bureaucratic
evaluation is an unconditional service offering information which will help to accomplish policy objectives. Autocratic evaluation is a conditional service offering external validation of policy in exchange for compliance with its recommendations.

7.3 Responsive Evaluation.

Stenhouse (1975) quotes Stake's (1972) definition of responsive evaluation: "An educational evaluation is a 'responsive evaluation' if it orients more directly to programme activities than to programme intents, if it responds to audience requirements for information, and if the different value-perspectives present are referred to in reporting the success of the programme". It is clear from this definition that responsive evaluation shifts the emphasis from outcomes of the programme to the programme itself. It also shifts evaluation from being "pre-ordinate" (Stake 1974) to being responsive, in that it does not rely on pre-specification nor emphasizes definitions of objectives and does not use objective testing. Earlier, in 1967, Stake wonders about the value of over concentrating on outcomes measurement and clarifies where the responsive evaluators' commitments lay. He states that evaluators could devote themselves to improving the precision of their instruments, but he asks: "are there not higher priority tasks?" and goes on to provide his own answer, as follows: "For the evaluation of curricula, I believe that we should postpone our concern for greater precision. We should demonstrate first our awareness of a full array of teaching and learning phenomena. We should extend to this array our ability to observe and pass judgment. We should commit ourselves to a more complete description". (Stake 1967a).
Stake's approach to evaluation is descriptive and interpretative; to this effect he has said that "the educational evaluator's obligation is not to discover the essence of human learning, but to discover the diversity of viewpoints and explanations of what is going on in the school". (Stake 1969). The approach is also concerned with judgments; for him these form part of an evaluation report and the "evaluation of the programme should portray the merits and faults perceived by well-identified groups, systematically gathered and processed. Thus judgment data and description data are both essential to the evaluation of educational programmes" (Stake 1967a). For this evaluators have to seek out and record the opinions of persons of special qualification. "These opinions, though subjective, can be very useful and can be gathered objectively, independent of the solicitor's opinions".

7.4 Illuminative Evaluation.

This approach has the great merit of not being a standard methodological package, but a general research strategy, being both adaptable and eclectic; all this makes it an appropriate approach to evaluation and educational research, in particular for non-comparative studies, which made me favour it and work within its theoretical framework. In the following paragraphs I shall attempt to partially review the approach, leaving for the next chapter the description and discussion of its methods, which were the ones I used during the study reported here.

In 1972 Parlett and Hamilton published a discussion paper (Occasional Paper No 9 of the Centre for Research in the Educational Sciences of the University of Edinburgh) entitled "Evaluation as Illumination: a new approach to the study of innovatory programmes". The origins of the approach are connected with Parlett's research at Massachusetts
Institute of Technology as described in Parlett (1969). Although when paper No. 9 was first submitted for publication, it was turned down, since then it has had four "complete printings" in books on evaluation (Parlett and Dearden 1977), and has become one of the most thought provoking papers on evaluation of this decade.

Evaluation as Illumination "advocates a total re-appraisal of the rationale and techniques of programme evaluation" (Parlett and Hamilton 1972), however the new approach "does not aspire to overthrow traditional evaluation; on the contrary it has different methodology, precepts, and intended benefits". (Dearden and Laurillard 1976). It supplements the traditional approach and offers a new dimension to the evaluation of educational programmes.

Illuminative evaluation is primarily concerned with "description and interpretation rather than measurement and prediction" and aims "to discover and document what it is like to be participating in the scheme, whether as teacher or pupil; and, in addition, to discern and discuss the innovation's most significant features, recurring concomitants, and critical processes". It does not study the educational programme in isolation; that is, it is not concerned with the measurement of "educational products"; it does it in the context of the "learning milieu". (Parlett and Hamilton 1972). They argue that the concept of learning milieu is central to "the understanding of illuminative evaluation". It is the social-psychological and material environment in which students and teachers work together", it represents a network "or nexus of cultural, social, institutional, and psychological variables". (Parlett and Hamilton 1972).
The importance of looking and paying attention to the learning milieu lies in the fact that the introduction of educational programmes "set off a chain of repercussions throughout the learning milieu". In turn these unintended consequences are likely to affect the programme itself.

Another salient characteristic of illuminative evaluation is that it is client-centred: it is applied research that concentrates on its 'clients' - used here in a very general way to include groups as diverse as innovators, project participants, advisers, local officials, related professional interest groups, governmental policy makers, and other constituencies within or related to the educational system defined as 'target audiences' in particular studies. (Jamieson et al 1977).
8. DISCUSSION

8.1 Other contributions.

In order to avoid this chapter becoming too long, reference has been made mainly to those aspects which I have considered most concerned with the development of evaluation approaches. There are, certainly, many other contributions and only some of these are now mentioned, since it is practically impossible to make reference to them all in a report of this kind.

a) For traditional evaluation: Gage's Handbook of Research on Teaching (1963); Skinner's Technology of Teaching (1968); Bloom (1970); Gagne (1967 and 1970); Glaser (1970); and others.

b) For the search for change: Eisner's Instructional and expressive objectives (1969); Stenhouse's Limitations of the use of objectives (1970); Wiseman's and Pidgeon's Curriculum evaluation (1972); and others.

c) For the alternative approaches: House's Conscience of educational evaluation (1973b); Kraft's et al Four evaluation examples (1974); Hamilton's doctoral thesis (1973); Walker's Conduct of Educational Case Studies (1974); Kemmis's Portrayal of Educational Programmes (1976); Hamilton's Illumination and Rumination (1976); Mjøller's and Horton's paper to the second British Educational Research Association conference (1976); the ten contributions to section 5 of "Alternative evaluation: the new approach in action" in Hamilton et al (1977) and many others.

8.2 Family resemblances of the new approaches.

Three approaches to the 'new wave' were described in section 7 above and some other contributions were mentioned in section 8.1. They were initially developed independently and have differences in aims and
style. However they do present some common features and emphasise similar aspects in methodology. For instance, the Churchill College conference recognised that each evaluation approach "(i) featured naturalistic, process-oriented field studies of educational experiments which attempt to portray the innovation in the context of a recognisable social reality; (ii) documented a full range of phenomena, perspectives and judgments that might have relevance for different audiences and diverse interest groups; (iii) utilised observational and interview techniques extensively, and gave less than usual prominence to measurement procedures; (iv) followed a flexible rather than pre-determined research plan, thus enabling the investigation to be responsive to unpredictable and typical phenomena and to sudden changes of direction in the form of the experiment, as well as to the planned and to the typical". (MacDonald and Parlett 1973).

Moreover, MacDonald in his "Portrayal of persons as evaluation data" (1977) has stated that: "portrayal is a key concept of the counter-culture in evaluation which in the last decade has mounted an increasingly articulate challenge to the prevailing engineering paradigm...Whether the intention is to provide 'vicarious experience' as Stake suggests, or to 're-educate perception' as Eisner has it, or more simply (irony intended) to 'tell it like it is' (Kemmis), there is shared concern among members of this school to create and convey images of educational activity which both preserve and illuminate its complexity".

8.3 Limitations of Illuminative evaluation.

In this section I intend to review two papers; Hudson (1975) and Goodson (1977), which to some extent attack the illuminative approach and in the case of the latter, make a claim for the need of a "second
wave" (referring to Stenhouse's "new wave") or historical evaluation. This 'attack' is made on paper No 9, which, it seems to me, has been taken as a final statement (or manifesto) of the approach, rather than for what it is: an initial statement, which, without doubt, needed refinement. On the one hand and quoting paper 9: "This approach does not cure all ills" and on the other hand as MacDonald (1977) has put it: "new approaches to evaluation solve old problems but create fresh ones".

8.3.1. Goodson's paper argues that the original data base of illuminative evaluation is "insufficient" and that it "should be extended as the enquire unfolds. The pursuit of data relating to historical context and process" should be "viewed as a major concern of the evaluator. This paper "argues for a broader conception of evaluation, which sees case studies as essentially concerned with observation and interview and further focussing on historical and contextual analysis".

Hudson's criticisms are along the same line; he too notes that Illuminative Evaluation as well as the traditional approach are "asocial and ahistorical in their data collection and analysis of education...".

However, compared to traditional methods, it seems to me that one of the major merits of illuminative evaluation is the introduction of the "learning milieu" which means that learning is not studied in isolation. The introduction to this chapter lists a number of different types of evaluation - evaluation of teaching, of learning, of courses, of programmes, of educational systems, etc.- therefore the illuminative evaluator's claim would seem to be one of recognition of the milieux and it would be possible to speak, for example, of the 'educational programme milieu' and so on with any of the evaluation subjects listed above, since the learning milieu is described as "a network or nexus
of cultural, social, institutional, and psychological variables" which can be extended to the type of evaluation been conducted. Goodson himself would seem to be supporting this complexity rather than calling for a second wave when he quotes 'a social evaluator' saying that "men make their own history, but they do not make it as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past" Marx (1951).

To enter into detailed analysis of the variables influencing and modifying the milieu and/or of the role of history on it would also depart from the main focus of this report.

8.3.2. Another ground on which illuminative evaluation is criticised (not only by Hudson and Goodson, but by various other authors, see for example Parsons 1976) is its 'subjectivity': this is so because the approach recognises the possibility that different groups and individuals may define educational situations differently. Goodson, for example, argues that to rely on data obtained by over-reliance on the investigation of participants' perceptions in short-span interactive situations is "to take the problem (in Seeley's terms, 1966) as 'given' - the evaluator is in danger of locking himself into the 'taken for granted' world of the participants and 'the project'."

However, as has already been mentioned, illuminative evaluation is primarily concerned with description and 'interpretation' of educational programmes. It is therefore a task for the illuminative evaluator to distinguish between 'facts' and cheerful speculation within a particular programme. On the other hand the approach is "to assist educators in appraising policy alternatives and sizing up overall educational or institutional benefits" (Parlett and Dearden 1977).
Thus educational decision makers are also in a position to distinguish between evaluator's and participant's interpretations.

8.3.3. It may be useful to firstly reiterate here that I have seen paper No 9 "Evaluation as Illumination" as an initial articulation of a new approach and secondly to mention that since then there have not been as many publications with examples of the approach as one would have wished. However, three recently published books: "Towards Integration" by Jamieson et al (1977), "Introduction to Illuminative Evaluation" by Parlett and Dearden (1977) and "Beyond the Numbers Game" by Hamilton et al (1977), to all of which reference has been made several times throughout this chapter, have further developed the approach and provided several examples of its use. The approach was also the subject of a symposium on "Illuminative Research and Evaluation in Education: how it works in practice" at the Second Annual Conference of the British Educational Research Association. (Research Intelligence Vol. 2 Part 2, 1976 and Vol. 3 Part 1, 1977).

8.4 Philosophical considerations.

In this final section I will attempt to show that the introduction of the new approaches to evaluation has meant a shift in the philosophical thinking behind evaluation practices. It should be emphasised here, that the literature on evaluation has very rarely been addressed to this topic; however some authors have made reference to it in some publications. For example Stake (1967a) asked for the development of a new technology of educational evaluation and he concluded his statement on "Accuracy versus Completeness" by saying that: "New techniques of observation and judgment need to be developed. In fact we need a new technology of educational evaluation. We need new paradigms, new methods, and
new findings to help the buyer beware, to help the teacher capitalise on new devices, to help the developer create new materials, and to help all of us to understand the changing educational enterprise.

Later, Parlett and Hamilton (1972) also made a claim for a new paradigm in educational evaluation. They explicitly are calling for a new philosophy when they explain their meaning of paradigm as an overarching concept similar to 'world view', 'philosophy', or even 'intellectual orthodoxy'. In "educational research -say they- two distinct paradigms can be discerned": "Dominant is the 'classical' or 'agricultural botany' paradigm, which utilizes a hypothetico-deductive methodology derived from the experimental and mental testing traditions in psychology". The second and contrasting paradigm or 'social anthropology' paradigm is related "to social anthropology, psychiatry, and participant observation in sociology".

More recently, Parlett (1977) has said that "a paradigm change signals the arrival of fundamentally new conceptions and theoretical frameworks ...The arrival of illuminative evaluation and kindred approaches may (or may not) prove to be a truly significant shift, warranting being termed a paradigm change". Then he adds that "one of the most significant shifts in thinking associated with illuminative evaluation is that attention is paid to wholes rather than to parts".

I would like to illustrate this by referring to the holistic view of the cause-effect relationship. As Elton (1977a) has put it: "it is always difficult to challenge implicitly agreed presuppositions and the assumption that scientific investigations are based on cause-effect relationships is certainly one of these". The new approaches reject the simplistic view of a cause-effect relationship, particularly the opposition between cause and effect which is
characteristic of the traditional approach. As Parlett (1977) has put it, "attention has been paid to indices of teachers' behaviour; to behavioural objectives; to measures of introversion/extroversion; to social class of parents, race, and intelligence quotients; to academic attainment on conventional criteria and on objective tests; to scores on vocational interest questionnaires; and so forth. Attempts have been made repeatedly to show patterns of connections between two or more of these 'variables'. The search has been for generalisable relationships — that is, for correlations or connections that hold up over a large number of varied situations and circumstances".

In opposition to this, the 'new-wave' evaluations regard cause and effect as aspects of interactions by which an effect, determined by a cause, in turn influences the cause. The emphasis is on cause-effect relationships being multiform and that it is practically impossible to reduce them to any single form. A simple example of this kind of interactions is provided by Elton and Laurillard (1977) as follows: "It is a common experience that we tend to learn better when we enjoy it. But do we enjoy it because we are learning better or do we learn better because we are enjoying it? Which is cause, which is effect? ... In fact, what we are dealing with here, as in much of education, is a symmetrical relation of mutual cause and interaction". Thus from the example given above it is clear that the emphasis has to shift from determining which event is cause and which is effect to the interactions between events. This is what I have tried to do in my work.
CHAPTER III: EVALUATION - RESEARCH RATIONALE

1. INTRODUCTION

The preceding chapter was concerned with reviewing the literature on evaluation and mentioned that, during the study being reported here, the illuminative approach was used as the major theoretical framework. This chapter, therefore, deals with the methodology and investigative techniques of the approach. Stylistically, the chapter presents alternatively the features of the methodology and its application throughout the study. Similarly, various evaluation techniques are described together with how and why they were used. Finally an explanation is given of how the information obtained with the investigative techniques was analysed.

2. NEED FOR A SUITABLE EVALUATION STRATEGY

The basic purpose of the study reported here was to explore, describe, analyse and portray educational practice in learning resource centres set up in science and engineering departments. To do this it was necessary to select, use, and develop an evaluation strategy suitable for the study of each learning resource centre in its actual situation which can never be compared in a simple way with that of other centres or other teaching and learning situations.

Another factor which influenced the decision on an evaluation strategy was that learning resource centres pose some special problems to an evaluator, since "their use is more casual and less structured than that of most other learning methods" (Elton 1977b).

The factors mentioned above made me look for an evaluation approach,
which without dismissing comparative studies, would emphasise the study of each learning centre in its own context. In other words I looked for an evaluation approach which "is not a standard methodological package, but a general research strategy", which is "both adaptable and eclectic" (Parlett and Hamilton 1972); an approach to evaluation which is not pre-ordinate (Stake 1974) in that no evaluation techniques enjoy privileged status within the study; one that uses methods similar to those used in social-anthropology, as described in "Up to the Mark" by Miller and Parlett (1974). The following sections describe the research strategy and its methods and the last section of the chapter explains why this strategy was thought the most suited to the needs of the study.

3. THE RESEARCH STRATEGY

As has already been mentioned in the previous chapter, the methodological framework employed during the study was that described in "Evaluation as Illumination" by Parlett and Hamilton (1972). Thus this section is concerned with providing those features of the approach which were not described in the previous chapter.

3.1 The five phases of the evaluation.

Characteristically the approach has five phases; first and last are concerned with initiating and reporting the study, while the other three are related to the actual field work. The five phases are: (a) setting up the evaluation study; (b) open ended exploration; (c) focussed enquiries into emerging issues; (d) interpretation of the information gathered; and (e) the reporting of the study to interested parties.
3.2 Setting up the evaluation.

When an evaluation of the illuminative type has been agreed upon, great attention has to be paid to the evaluation proposal, known as the "evaluation contract" (Parlett and Dearden 1977). The importance of this proposal lies in that the foundations for the evaluation can be clarified at the outset, i.e. decisions are made regarding its size, duration, budget, general objectives, access to information, how confidential the information gathered will be, publication, general facilities, etc. An explicit and detailed proposal also enables one to reduce the possibilities of misunderstanding on what is intended and what is not. It should be emphasised, however, that the proposal is the overall plan of the study, an outline and not a research blueprint. The variables to be studied are not specified at this stage: "No closing of research doors before discovering what lies behind them" (Parlett 1974).

3.3 Example from the study.

An example of a proposal setting up an evaluation is the one I prepared in order to evaluate a Self Instructional Laboratory (see the case study in chapter VIII), in which the first two paragraphs read: Resulting from a discussion and subsequent correspondance (between the laboratory organiser and myself) an evaluation study will be carried out of the Self Instructional Laboratory. There follow fourteen points which sum up the agreements reached and outline the overall evaluation plan. (Lopez 1977). To illustrate them, two of the fourteen points are now quoted:

"2. The study will begin in the Summer term of 1976-1977 and continue throughout the Autumn term of 1977-1978. An exploratory week long visit (Summer term) will be followed
by periodical focussed investigations (Autumn term).

3. The evaluation is not going to inspect or pass judgment on the Self Teaching Laboratory, but study it with a view of providing a sensitive understanding of intended and unintended outcomes of the educational practice of the Laboratory".

Due to its relevance to this section as well as to chapter VIII which reports on this Laboratory, the whole proposal is included in appendix I.

3.4. Open-ended exploration.

The collection of information begins with this phase, which is of a general kind. In it, the researcher familiarises himself with the situation under study. Much information is gathered through observation and informal talks with participants and other interested and/or involved people. It is a matter of building up a picture of the situation which becomes more and more comprehensive as the exploration unfolds. The background, the history, the rationale, the resources and costs involved in the particular situation become accessible and known to the evaluator. In short the evaluator becomes knowledgeable about the subject being researched. This phase is, perhaps, the longest of all five, because the large amount of information being obtained, has to be verified and confirmed through cross-checking using different evaluation techniques and with different involved parties, as well as by reference, if available, to published documents which contrasts the situation as it is perceived at the time of the evaluation with that in earlier stages.

3.5 Example from the study.

As far as the study of learning resource centres is concerned, it
began as an open-ended exploration, basically through visits to centres, both institutional and departmental ones. Informal talks were held with organisers, supervisors, technicians, students and other people involved, such as professors and post-graduate demonstrators. Their behaviour within the centres was observed, the published literature examined and some internal documents analysed.

Many places were visited, a list of which is given in chapter V, section 2.1, together with a general description of learning centres.

Some time after this exploratory phase had started, it became clear that learning resource centres as such were too large a research topic, since the number of issues would demand more researchers and/or time than were available. I therefore decided to concentrate on (a) departmental centres and (b) on-science and engineering. This brings me to the next phase of the approach: focussing onto emerging issues.

3.6 Focussed enquiries.

It is practically impossible to draw a line between the previous phase - exploratory - and this one, in which the evaluator enquires further into those issues and problems which are most frequently raised and relatively more important. This is so firstly because an exploratory attitude must be maintained throughout the evaluation study, although perhaps to a lesser degree once a general view had been obtained, in order to be on the alert to issues which may not have come to surface earlier; and secondly, because focussed enquiries develop quite naturally once the evaluator has become knowledgeable on the subject and problem areas become progressively clarified.

At this stage the use of evaluation techniques become more directive and systematic. For example informal talks and/or unstructured
interviews become more structured around particular topics and observation also becomes more selective.

3.7 Example from the study.

As has already been mentioned a decision was made to concentrate on science and engineering departments. It also became clear from early visits that departmental centres vary enormously in organisation, administration and pedagogy and another concentrating decision was made to study this complex situation through case studies.

The same general evaluation strategy was applied to carry out these case studies, in which further enquires were developed on some key issues regarding the learning resource centres, such as for example on the degree of actual participation of the academic staff in the centres' activities and in particular on the types of interrelations and interaction between them and students, since the level of communication between the groups appeared to be critical in the use of the centres. Also particular attention was paid to their finances, since quite a few people have not been able to go further than the planning stage due to lack of economic support. The actual development of centres depends very much upon this, particularly when education in general is passing through a phase of economic constraints.

3.8 Interpretation.

This phase basically consists of seeking general principles and patterns which would explain the organisation and activities of the educational programme under study. Note is taken of any existing elements of interactions. The information gathered in the previous phases is ordered and organised, and preliminary findings are
clarified. Sometimes going back to the field is necessary in order to fill in certain gaps on the data or to check on alternative possible interpretations.

3.9 Example from the study.

This interpretative phase was of great help in organising the present report. When preparing a half-way report on my research, I tried to interpret the information gathered so far and set out some preliminary findings together with an outline procedure for both making some of the findings more definite and answering some questions which were still unanswered. In other words this was a situation in which the need to go back to the field, in order to complete and augment the data, was clearly felt and stated. How the information obtained during the study was analysed is explained in section 5 of this chapter and chapter IX presents some interpretations of the information.

3.10 Reporting the study.

Most, if not all, evaluation studies end with a report in a written form. As in any case of reporting, the illuminative approach too, emphasises that this report should be understandable, not over-technical and thorough. Also that it should provide the information that its readership want to have, and that all this should be presented in an appropriate form and style.

3.11 Example from the study.

As will I hope be clear later on, I have been conscious of the readership of the reports arising from various parts of the whole evaluation study. Thus for each case study, reports were submitted
to the interested parties, in the form of interim and final evaluation reports. Efforts were made to address the issues of their concern; for example one of the reports was based on a number of questions, some of which the audience, in this case the organiser of the centre, had been asking. My answers attempted "to present the information collected and to summarise the arguments". The write-up of the report as a case study, in chapter VIII, has kept to the same style.

4. EVALUATION TECHNIQUES

Earlier some mention has been made of evaluation techniques used in the study; this section is concerned with their description and the why and how they were used.

A number of investigative techniques were used during the study. These included: observation (unstructured and structured), interviews (open-ended and structured), questionnaires (to elucidate facts, opinions and attitudes) and scrutiny of documents; all these being used in an attempt to detect their strength and weaknesses as well as their appropriateness and applicability at different stages of the investigation.

In practice the evaluation techniques were used in combination in order to permit easy cross-checking of the information obtained. However, to facilitate their description they are described separately.

4.1 Observation.

Observation was used as an immersion strategy for building a record of on-going events and interactions through documenting the day to day
activities of the centres. Two main types of observation were used: unstructured and structured.

4.2 Unstructured observation was used specially in early stages of the study of a centre in order to become familiar with its activities, but also in later stages in order to get a better comprehension of earlier identified issues. For example in one centre it was observed that the supervisor consulted students about how they were getting on with their work in the centre. This was followed up with further observation and then pursued in student interviews.

It was also used because it provides another "kind of evidence" (Becker 1958). For instance, in a centre, some students complained that certain materials had not become available for their use and which was meant to be available by that time. Observing the verbal interaction between student users of the centre and a demonstrator, I noted that this was a quite generalised complaint.

Observation as a technique is necessarily related to the technique of recording observed events. In the context of unstructured observation it was felt appropriate to record in the form of note-taking, which was generally done during the observation.

4.3 Taking notes.

Three different types of notes were taken: (1) observational notes; (2) theoretical notes; (3) methodological notes (Schatzman and Strauss 1973). An OBSERVATIONAL NOTE (O.N.) is one which tells what occurred and who said or did what. This type of note is concerned with facts and their surrounding circumstances. In contrast, THEORETICAL NOTES (T.N.) attempt to conceptualise what has been experienced. Here the emphasis is on linking observational notes and interpreting
relationships. METHODOLOGICAL NOTES (M.N.) are generally instructions to oneself or sometimes reminders, for future actions, as for example to follow up in a formal interview something said in an informal talk. They may also be criticisms or reflections on the way the evaluation has up to then been conducted.

The following extract is from note taking during observation in a particular learning centre. The time and the type of note being taken are shown in the left hand column.

11.20  O.N. Student enters learning centre, carefully closes the door. Seems aware of "study atmosphere", mentioned by one demonstrator, as he avoids all noise. Goes to the shelves with audiotapes, looks at them, chooses one, goes to study booth.

11.25  O.N. There are seven students in the centre, two of them talk to each other in whispers. The rest are watching an Open University TV programme that had been announced on the notice board.

11.30  O.N. Two girls come in and ask for past examination papers.

11.55  O.N. At the end of the TV programme, supervisor of centre asks two students whether it was interesting. "Quite informative" is the reply.

11.55  M.N. Next time I talk to the supervisor, I should ask him about how often he gets this sort of informal feedback from students.
13.35 T.N. There seems to be a certain relation between use of the lab. and course related materials, since of the materials used this morning, students have used those materials in preference to background ones.

4.4 Structured observation.

This was used for monitoring trends of students' activities in the centres, in particular when it was necessary to quantify events. An example is that of structured observation on students' activities in a centre through a form which had to be filled in every hour. The form is reproduced below:

```
DAY _______ DATE _______ PERIOD _______

ATTENDANCE. Give the numbers of users in the laboratory according with their activities.

a) Students working with:
....audio tapes
....slides
....overhead projector transparencies
....tape slides (synchronised)
....tape slides (unsynchronised)
....film loops
....film strips
....video tapes
....micro 16 computer based materials
....1905E computer based materials
....models
....books
....lecture notes (from L.A.L. collection)

b) Students discussing their work....

c) Students having breaks/rests....

d) If other activities, please specify.
```
4.5 Interviews

Just as observation so the interview is a fundamental technique for evaluation. Cicourel (1967) describes, in "Methods and Measurement in Sociology" various ways and situations in which the interview is a major technique, and Steadman (1975) points out that "its uses are manifold, from subsidiary purposes ... to being the foremost means of gathering opinions". Dean et al (1969) analyse two limitations and fifteen advantages of interviewing and unstructured observation. In short it allows a broad gathering of opinions, permitting people involved in learning centres, i.e. professors, lecturers, organisers, demonstrators, technicians, administrators and students, to talk about problems and issues as they see them. Interviews also make it possible to be "responsive" (Stake 1974), since one can follow up newly stated issues, sometimes during the same interview, or to make a methodological note to pursue in the future.

Interviews may be carried out either with single individuals or with small groups, depending on the type of information wanted. According to the type of comments sought in them, they may be categorised in two groups: open-ended and structured interviews.

4.6 Open-ended interviews.

These are suitable for obtaining general views and were used at early stages of the evaluation studies. For example, the following is an extract of an open ended interview schedule with students on a course taught through a learning centre. It was oriented to obtain the general students' feelings and was carried out in the third week of the first term of the course. The points to be raised were written in the schedule, but questions were not necessarily asked in the order
Extract from an interview schedule.

- general reactions to the course (good and bad features).
- comparisons with other courses (more or less interesting).
- learning (better - easier - the same ?).
- relation between notes and text book, laboratory, computer exercises.
- assistance from lecturer / demonstrator.
- time (is one week enough for each unit ?).
- improvements. In what way could the course be improved ?

4.7 Structured interviews.

These were used to seek out more factual information or for focussing on previously identified important issues. The next extract is taken from the structured schedule for an interview with the organiser of the above course, which concentrated on seven aspects of the course. Two of these, relating to the background of the course are reproduced below:

Extract from an interview schedule.

2. PLANNING:

(a) How did you become the teacher of this course ?
(b) Did you design the course ?
(c) How did you decide what to include ?
(d) How long have you been running this course ?
(e) How long do you expect to run this course ?
(f) Have you changed this course? Why? How did you decide what to change ?

3. PARTICULAR FEATURES:

(a) Could you describe the teaching method for this course ?
(b) Why have you chosen this particular new way? What have been your aims for it ?
(c) How are you getting on with the method ?
(d) What is your reaction to the different learning resources being used? Are they what you wanted?
(e) How do you see your role and that of the technician and demonstrator for the course? How could these roles be improved?
(f) How much time do you spend on the course? Is it more or less what you would like to spend?
(g) Are there any lectures or seminars to back up the course work? What purpose do they serve?

4.8 Semistructured interviews.

Despite the above classification, most interviews were of a semistructured type, that is allowing the interviewee to talk freely as well as answering to specific questions. As in the case of observation, it was also very helpful to record the interviews. This was generally done on magnetic tape. When this was not possible, notes were taken during, and sometimes after the interviews; they were then written up and expanded.

4.9 Questionnaires.

Two factors contributed to use questionnaires during the study. Firstly, the need for quick feedback, and secondly, the need for sustaining and validating information previously obtained from other sources, i.e. observation, interviews.

4.10 Feedback sheets.

These were specially useful in early stages of an evaluation, since they permitted a check with students of those aspects that staff thought important. It should be pointed out here that although feedback sheets provided quick information, this was not always as relevant as expected due to them being used in isolation. They were
more useful when used as a result of earlier information. The following is an example of a feedback sheet, prepared to get information on the different units which comprised a course taught through a learning centre.
UNIVERSITY OF SURREY
INSTITUTE FOR EDUCATIONAL TECHNOLOGY
VIBRATIONS AND WAVES COURSE 1975 - 76

FEEDBACK SHEET

Please state the number of the unit:...........
Name (optional).................................

Please rate the first seven items on this questionnaire on the five point scales by ringing the appropriate numbers.

1. The difficulty of this unit. easy difficult
   1 2 3 4 5

2. Your interest in this unit. boring interesting
   1 2 3 4 5

3. The relevance of explanatory notes to the text. unrelated closely related
   1 2 3 4 5

4. The number of problems. few many
   1 2 3 4 5

5. The difficulty of these problems. easy difficult
   1 2 3 4 5

6. The difficulty of the self test. easy difficult
   1 2 3 4 5

7. The value to you of the self test. useless useful
   1 2 3 4 5

8. Please write down any particular difficulties, which you had in this unit.

9. Were you assumed to have preknowledge that you did not have ?
   YES
   NO
   If YES, please give some details.

10. Approximately how many hours did this unit take you in all, i.e. include reading, problems, exercise, etc.

   HOURS       MINUTES

   Thank you very much for your co-operation.
4.11 Specific questionnaires.

These were mainly used for checking those aspects that students thought important. Used late in the evaluation studies, they made it possible to confirm and quantify information previously obtained, specially when the number of students involved made it impossible to talk to them all.

Two types of specific questionnaires can be distinguished: free and fixed answers. The first result from open ended questions in which answers have to be elaborated on; this sometimes produced new and unexpected comments. In the latter ones the responder has only to insert ticks or numbers into relevant boxes. Some of these questionnaires may include attitude check lists. The next example is a questionnaire administrated at the end of the evaluation of a learning centre. It was basically used to confirm information obtained through interviews with a sample of students and consists of questions leading to free and fixed answers as well as a check list on the aims of the centre.
This questionnaire has been prepared in co-operation with Mr. Mario Lopez of the Institute for Educational Technology at the University of Surrey. Its purpose is two-fold: firstly, to enable us at Aston to more closely identify students interests and needs in our own Learning Aids Laboratory, and to help us to improve the service that we provide; secondly, to help in identifying students attitudes towards the services provided in the Learning Aids Laboratory.

We hope very much that you will be willing to spend a little time to complete the questionnaire. Even if you do not use the Learning Aids Laboratory, please complete question I.

Most of the questions can be answered by putting ticks into the relevant boxes. In some cases, additional information is asked for. Please supply this if you can. We shall also be pleased to have any other comments on any matters relating to the Learning Aids Laboratory that you might like to make. You are at liberty to reword any of our questions if you think this necessary to enable you to answer them.

When you have completed this questionnaire, please place it in one of the boxes provided in the Learning Aids Laboratory (Room 259) and in Room 519.

Please do this as soon as possible, but in any case not later than the end of the present Spring Term.

Peter Groves - Chemistry Department.
Oliver Downing - Pharmacy Department.
1. About how often do you use the Learning Aids Laboratory?
   - twice a week
   - once a week
   - once a fortnight
   - occasionally
   - never

If NEVER is this
   a) because you did not know about the Laboratory
   b) there is no material relevant to your needs
   c) you do not like the working conditions
   d) Other reasons. Please list:

2. As far as you are aware is there any learning material (excluding books) in the Learning Aids Laboratory specifically relevant to the present year or your course?
   - Yes
   - No

If YES please tick those you think are available
   - audio tapes
   - video tapes
   - films
   - slides
   - overhead projector transparencies
   - computer based materials
   - models
   - reprints
3. What sort of material have you used most and second most in the Learning Aids Laboratory?
   Please put a "1" against the material that you have used the most and a "2" against the material that you have used the second most.
   - audio tapes
   - video tapes
   - films
   - slides
   - overhead projector transparencies
   - computer based materials
   - models
   - reprints

4. The following is a list of reasons why you may be using the Learning Aids Laboratory. Please tick those you agree with and add any other you have.
   a) to supplement the lectures
   b) to get help on difficult subjects
   c) to get past examination papers
   d) to get help from demonstrator
   e) to cover lectures you missed
   f) to discuss subjects with students
   g) to prepare essays, papers, etc.
   h) to use the model kits
   i) to use the computer or calculators
   j) to consult books and/or reprints

   Other reasons. Please list.
   k)
   l)
5. Would you like to see more learning material in the Learning Aids Laboratory?

Yes [ ] No [ ]

If YES please tick those you would like to see.

- audio tapes [ ]
- overhead projector transparencies [ ]
- video tapes [ ]
- computer based materials [ ]
- films [ ]
- models [ ]
- slides [ ]
- reprints [ ]

Other materials. Please list:

6. How do you rate the following in terms of their teaching effectiveness?

Please tick one box for each item.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>VERY EFFECTIVE</th>
<th>FAIRLY EFFECTIVE</th>
<th>NOT VERY EFFECTIVE</th>
<th>POOR</th>
<th>NO OPINION</th>
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<tr>
<td>Conventional lectures (without notes issued by the lecturer)</td>
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<td>Conventional lectures (with notes issued by the lecturer)</td>
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<td>Audio tapes and printed notes</td>
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<td>Audio tapes and slides</td>
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<td>Slides and printed notes</td>
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<td>T.V. programmes</td>
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<td>Books</td>
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</table>
7. Have you had any difficulties in finding or using any material in the Learning Aids Laboratory?
   Yes ☐ No ☒
   If YES, please give brief details.

Have you had any other difficulties?

8. Have you ever consulted the demonstrator about any study problem?
   Yes ☐ No ☒
   a) If YES, how many times have you done this?
      once only ☐ between two ☐ and five times ☐ more than five times ☐
   b) Did you find the assistance or demonstrator useful?
      Yes ☐ Moderately ☐ No ☑
   c) Do you think that more, or better, assistance should be provided in the Learning Aids Laboratory?
      Yes ☐ No ☐
      If YES, please suggest how this could be done.
9. Please suggest any improvement you would like to see in the Learning Aids Laboratory.

   a) Short term improvements:

   b) Long term improvements:

10. If in your future studies you had the opportunity to choose between:

    a) a course taught conventionally by lectures and tutorials.

    b) a course taught by lectures supported by materials in the Learning Aids Laboratory.

Which would you choose?

   a  b

Please suggest how you would like to see the course organised and the sort of materials you would like to be provided in the Learning Aids Laboratory.
11. The following is a list of general aims of Learning Aids Laboratories, like the one you are using. Please indicate how important you consider these to be by putting a tick in the appropriate column.

<table>
<thead>
<tr>
<th>AIM</th>
<th>VERY IMPORTANT</th>
<th>FAIRLY IMPORTANT</th>
<th>NOT VERY IMPORTANT</th>
<th>UN-IMPORTANT</th>
<th>NO OPINION</th>
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<tbody>
<tr>
<td>i) to provide a room in which students can discuss their work with other students.</td>
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<tr>
<td>ii) to provide a room in which students can discuss their work with demonstrators.</td>
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<td>iv) to make the study of Chemistry, pharmacy etc. more attractive.</td>
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<td>v) to encourage students to develop the ability to learn independently.</td>
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<td>vi) to provide resources for students to prepare materials (essays, papers) for use in seminars, tutorials, etc.</td>
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<td>vii) to provide access to crystal and molecular models and to model kits.</td>
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<tr>
<td>viii) to encourage and enable staff to develop improved teaching methods.</td>
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<tr>
<td>ix) to provide direct access to a computer and to a variety of electronic calculators.</td>
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<tr>
<td>x) to provide an alternative study place to the Library.</td>
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Please suggest other desirable aims and their importance.

xi)

xii)
12. How well do you think that the Aston Learning Aids Laboratory fulfills the aims set out in the last question? Please tick one box for each item.

<table>
<thead>
<tr>
<th>AIM</th>
<th>VERY WELL</th>
<th>FAIRLY WELL</th>
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<td>xi) others</td>
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</tbody>
</table>
13. Is there anything else you would like to write down about the Learning Aids Laboratory (i.e. advantages, disadvantages)?

14. If you wish, please comment on the nature of this questionnaire or give detailed comments on particular questions.

Thank you.

January 1977
4.12 Documents.

Innovations do not happen overnight. In the case of departmental learning resource centres the examination of proposals, departmental committee minutes, handouts and other documents provided useful information. They, for instance gave a historical perspective of how the centre was seen at its beginnings by its mentors. These documents also provided indications on aspects of the past of the centres which might otherwise not have been obvious from the evaluation. The following extract is from an old handout not longer used, of an evaluated centre, which threw a light onto present practices that could not have been obtained otherwise. Thus, the opening times and the strong emphasis on computing facilities had both decreased since then.

"The laboratory is open daily for use by undergraduate and postgraduate students and by staff (opening hours Monday - Thursday, 9.00 a.m. - 7.00 p.m., Friday, 9.00 a.m. - 5.00 p.m.). A wide variety of learning material is provided including films, tape recordings, transparencies, slides, models, books, reprints, etc. There is also a small computer (Micro 16 with 8K core store, two on-line teletypes and 500 cps PTR) and students can teach themselves to program this by working through one of the tape recorded courses available in the laboratory. Television facilities are now being introduced; these will provide for programme production and video recording and for play back to students in lecture rooms and in the laboratory.

During most of the day research students are in attendance both to supervise the room and to give undergraduates advice and assistance with any study problems". 
5. ANALYSING THE INFORMATION OBTAINED

5.1 A definition of analysis.

Considering that "rigorous procedures for qualitative analysis have not developed apace with those for quantitative analysis" (McCall and Simmonds 1969), the attempt made by Strauss and Schatzman (1973) to redefine the concept of analysis is very relevant to the analysing strategy used in this study. Their conception of analysis is "as the working of thought processes rather than as a formidable, academic abstraction". (The emphasis is theirs). They then argue that this definition contributes to the understanding of "the craftsmanship involved in the production of theory".

5.2 The analysis of the information gathered during the study.

In the section on observation it was said that observations were recorded in a written form through note taking. After each session of note taking, I classified the notes in different files, according to the subject matter they referred to. The files had headings such as for example, "staff-students interactions within the centre"; "demonstrators remarks" and so on. In one particular instance I had a file with the initial heading "student-users comments", which with time and the increasing number of notes, was subdivided according to comments on specific aspects of the life of the centre, e.g. comments on particular learning resources used, advantages, criticisms and disadvantages of the centre, etc. Something very similar happened with interviews. These in most cases were recorded on magnetic tapes. As soon as the situation allowed, the interviews were written up from the recordings, or from the notes taken at the time if recording was not permitted by the interviewee. All comments made during the
interview, including both those which I specifically asked for and additional ones made by interviewees, were analysed by coding them according to subject matter and classified in appropriate files.

Similarly, transcribing comments from questionnaires, processing the information on fixed-type questions and classifying information from a variety of documents, all contributed to the data profiles obtained from note taking and interviewing.

I used two types of files: those which fully covered the information coming from anyone source, i.e. an interview or a day of note taking, and those which covered information from various sources on any particular subject through relevant extracts. It should be emphasised here that the major advantage of using this double classification of information was that of making sure that any one piece of information to be included in the final report could be traced back to the context in which it had first been obtained. To this effect comments included in the subject matter files were coded with a capital letter to indicate the source (observation: O and so on), a lower case letter to indicate the people (s for student and so on), a number to be associated with a particular person on the left hand side of the sheet and the date at the end of the comment. Thus "Im3" would refer to the interview with the member of staff labelled 3. This is illustrated in the next section.

5.3 Illustration from an interview.

A useful way of illustrating the building up of the data profiles is by quoting a passage from an interview taken from a file of the first kind, in which I have underlined the pieces of information relating to one topic, i.e. feedback. These were then put into
a file of the second kind, labelled "feedback". The passage is taken from a semi-structured interview with a staff member.

"Q. You have mentioned that you have talked to students. Do you do it regularly in order to get some feedback from them about the Self Teaching Lab.?

A. There is one systematic way; this is through the staff-students committee. Now, every class in the university must have its own staff-students committee and that's one of the university regulations. It's one of the ways that students can give academics feedback on the courses, and complain if they don't like the way that things are going; and these are very informal. I usually try and have about three members of the staff present, i.e. enough so that the information can get to the right people, but not so many that the students are put off and they may feel it as a too formal occasion and they can't say what they think ... (There followed a detailed account of the composition of the staff-students committee which is omitted to shorten the quotation) ... That usually forms a committee and there we'd cover the points. You know, what do you think about the lecture, any complaints, any suggestions, improvements and so on. Then, we discuss the practicals and then we go onto the Self Teaching and then anything else they want to bring in, perhaps exams or something like that, but certainly Self Teaching always comes up.

Q. Do you get feedback through any informal way?

A. I'm trying to get informal feedback as well as on these staff-students committee meetings. Occasionally I go up there and I simply wander around, students might grab me off and ask me questions and I can take it from there, or one occasionally is bold enough to go to say, you know, what are you doing, do you find this place useful and so on."
6. THE NEED FOR THIS TYPE OF RESEARCH

A case must be made for this kind of unorthodox work, insofar as it is concerned with description and interpretation rather than comparisons; it is based upon a holistic outlook rather than reductionist; it is responsive, adaptable and eclectic rather than pre-ordinate; it collects information via several techniques rather than mainly psychometric ones; it is largely based on qualitative data rather than statistical (see section 7 in chapter II).

It is very often pointed out that educational research has had almost negligible impact on practicing teachers. It has also often been said that this is due to the lack of interest on the part of the teacher. Far from this my experience gained throughout the present study has been that teachers are generally interested in improving their teaching and value research results that seem relevant to them. Moreover, in the case of departmental learning resource centres, many staff feel that there is at present insufficient evidence for supporting their existence.

All the descriptions and interpretations to be presented in the following chapters have been made through the deployment of the research strategy described in this chapter. It aims to provide a sensitive understanding of the intended and unintended outcomes of such centres, by which I hope to contribute to staff awareness of what is going on in the centres in order to equip them with information which may enable them to pass judgment on whether and how to continue with existing centres, and whether and how to start new ones. Thus, this kind of research puts the emphasis on the contribution to decision making, the task being "to provide a
comprehensive understanding of the complex reality (or realities) surrounding the programme: in short, to 'illuminate'." (Parlett and Hamilton 1972).

To what extent my own work has been fruitful in this respect, it is difficult for me to know, mainly because the studies I conducted, and which are reported in the form of case studies (see chapters VI, VII and VIII), were not commissioned but negotiated by the project (see in particular section 3.1 of chapter VII); however, I would like to make reference to two instances which provide indications that in fact my work has been 'illuminative' for those involved. The first example concerns one of my fellow research students who when attending a conference had the opportunity of talking informally to another participant, who had established a learning centre, and made reference to some of my findings, in particular the one on the dependence of centres' use and the level of staff awareness about the centres (see section 3 in chapter IX), which for him was a recognisable 'reality' (Hodgson 1977). The other instance concerns the reaction to an interim evaluation report of the organiser of one of the learning centres studied: he commented that the report made interesting reading as well as indicating areas for further work and that measures would be taken to meet some of the suggestions made by students.
CHAPTER IV: LEARNING RESOURCE CENTRES - THE LITERATURE

1. INTRODUCTION

Chapter I presented an overview of the research work being reported and chapters II and III were concerned respectively with a literature review and the methodology of evaluation. This chapter begins with the analyses of the specific research topic, learning resource centres, through a report of the relevant literature.

Both books and journal articles selected for the purposes of this chapter seem to fall logically into three distinct categories (the first two are suggested by Horton 1970):

a) Those prescriptive in nature, through which a theoretical rationale is developed for the design and implementation of centres.

b) Those descriptive in nature, i.e. descriptions are provided on how learning resource centres are operated.

c) Those which report about particular studies carried out on them.

The total amount of literature on learning resource centres is indeed large, but it radically decreases as one goes from (a) to (c) in the above classification. The amount of literature in (c) is definitely small and in this connection Atkinson and Toogood (1975) have said that learning centres "are usually seen as successful, often on the basis of impressionistic opinions rather than judgment based on evidence".

The literature covers centres at all educational levels, i.e. primary secondary and tertiary, with much the greatest number relating to the secondary level. In general terms, this chapter does not
distinguish between levels until later sections, since the topics
treated in the earlier ones present a high degree of similarities.
These are: The sources of information; factors which have contributed
in one way or another to the establishment of learning centres; some
definitions of learning centres; their involvement in the curriculum
and their connection with independent learning. The chapter becomes
more specifically concentrated on higher education in section seven,
when some of the arguments between institutional and departmental
based centres are presented. It finally, in section 8 and 9,
concentrates on experiences of centres in departments of engineering
and science in higher education and on some problems arising from
their use.

2. SOURCES OF INFORMATION

Although the literature on resource centres abounds, it appears in
both scattered journals and various publishing companies. Below
are given the major places where the literature was found.

2.1 Bibliographies.

Several bibliographies have been published. Some of these are:

a) Horton (1970), who reports on the American development of learning
resource centres between 1964 and 1969.

b) Windsdale and Beswick (1971), whose bibliography was compiled to
cover those aspects of "interest to anyone who may have to deal with,
or have an interest in, the Resource Centre / Instructional Materials
Centre / Multimedia Centre concept". It is concentrated on the
decade 1960 - 1970 and covers work in this country as well as
elsewhere.
c) The Educational Research Council of America has also published an annotated bibliography, which includes books, pamphlets and articles of the decade 1960 - 1970. (Davis and Crotta 1971).

d) Carpenter (1975) is concerned with the international scene of learning centres. It covers the period 1970 - 1975.

e) Townsend (1977c) has published a privately commissioned search of M.E.D.A.S. data banks at the National Library of Medicine, Bethesda, Maryland; it concentrates, though not entirely, on nursing education.

2.2 Journals.

Several specialised journals are periodically publishing articles on the subject. Some of these are:

a) Programmed Learning and Educational Technology, journal of the Association for Programmed Learning and Educational Technology, whose issue of May 1975 was fully addressed to the topic. (Clarke 1975a)

b) British Journal of Educational Technology.

c) Subject journals such as Chemistry in Britain, Journal of Chemical Education, Engineering Education and others.

d) Audio Visual Instruction.

e) Educational Technology.

f) many others, but at a lower frequency.

2.3 Conferences.

Papers concerning learning resource centres have been presented at many conferences in both general education and educational technology.
These include:

a) The 1976 Annual Meeting of the Chemical Society included one symposium which was dedicated to the subject. Almost every year the subject is presented at these meetings.


c) The Association for Programmed Learning and Educational Technology annual conference - ETIC (Educational Technology International Conference) has frequently been concerned with learning centres.

d) Conferences of the British Association of Civil Engineering Education.

e) Many others.

2.4 Projects and individuals.

Projects and work by individuals have also been reported in the literature; the following are projects which have at the end been reported in book form:


b) Nuffield Resources for Learning Project (Taylor 1971).


Some of the individuals who have reported at departmental level in higher education are:

a) John Cowan, Civil Engineering Department, Heriot Watt University.

b) Péter Groves, Chemistry Department, University of Aston in Birmingham.
c) R. Poller and M. Seeley, Chemistry Department, Queen Elizabeth College London.

d) Gaye Manwaring, Zoology and Education Departments, Glasgow University.

Finally, it is important to cite here the Nuffield Group for Research and Innovation in Higher Education, who conducted "a study of forms of support for improving teaching in Universities" (Hewton et al 1976).

3. FACTORS CONTRIBUTING TO THE ESTABLISHMENT OF CENTRES.

3.1 Disenchantment with the existing situation.

UNESCO's Higher Education Director has stated that "within each country there is a clear demand for more education of a higher quality for all. Despite the phenomenal growth in educational opportunity during the past 25 years, despite the fact that many countries are spending more than a quarter of their national budgets on education, despite that education is the largest single social expenditure in the budget of most governments, there is still widespread disenchantment with the way the educational enterprise goes about its business" (Spaulding 1971). Goldschmid (1976) has explained, to some extent this disenchantment, emphasising the students' contributions, by saying that "in the last decade, the traditional teaching and learning methods and current instructional systems have come under increased scrutiny ... As student numbers kept increasing in the sixties, it became evident that the whole climate, and in particular the relation between students and professors had become the hallmark of university instruction. Students dissatisfaction grew correspondingly and fuelled by a number of other concerns, finally erupted in explosive manifestations and demonstrations. The students' revolt certainly
represent one of the key factors underlying the questioning of traditional approaches and the search for alternatives.

All this, together with two factors listed in sections 3.2 and 3.3 below and some other ones, provoked a "crescent upsurge in the development of learning methods in which students work at one remove from the teacher, and which dates back from the early 1960s (Elton 1973). (See section 3.7 in this chapter for a brief description of some of these teaching and learning methods). Thus "it is obvious from any position that resource centres and what they represent in their many and various guises are only one element in the large pattern of education. There are those that carry its standard high, just as there are those who march under the banner of programmed learning, academic gaming or team teaching. All are part of a changing structure -changing along with the changes in our society and the technological wrap-around world we have developed" (Tucker 1975).

3.2 Technological influence.

Technological developments have had a considerable influence on the development of learning centres, since they have enabled "an increasing amount of information to be made available in the form of films, television programmes, video and audio recordings, slides, models, etc." (Groves 1971). All of these are powerful instruments of communication, and are being used in teaching and learning; their adaptation from the former to the latter has been facilitated because "the present generation of students has grown up with television and tape recorder in addition to film and radio which were available to their parents in their formative years" (Poller 1977).
The educational community has not only adapted these instruments of communication to its needs (or desires) but also has requested such technological developments; as Peterson (1974) has put it: "As the communication field enlarged, as we began to find out the dynamics of learning, as technology timed with entertainment and sputnik-like hardware emerged as an end in itself, the educational community demanded and received a wide range of learning media". The impact of the increasing inclusion of technology in education has been summarised by Duncan (1976) as follows: "Ten to fifteen years ago came another of those partial breakthroughs in technology based learning, the emergence of tape slides or similar combinations of words and pictures aimed principally to self instruction."

3.3 Educational Technology.

The development and implementation of educational technology is another factor contributing to learning centres' establishment, since educational technology "is concerned with the design and evaluation of curricula and learning experiences and with the problems of implementing and propagating them" (Rowntree 1973). This is basically done by "deciding what to teach and how to teach, preparing to teach, trying out one's chosen approach and then evaluating it" (MacKenzie et al 1970). Thus educational technology may lead to the preparation of learning experiences which are resource-based or media based, and which need to be used within a learning resource centre premises.

3.4 The Open University.

Because its teaching is mainly done through the provision of learning resources and because it has established a number of regional centres,
the Open University has without doubt contributed to some degree to the development of learning resource centres. The student-centred teaching methods of the University are stated in the "Guide for applicants for undergraduates courses 1977": "The University's teaching methods are design to guide you through your studies week by week. Most of your study material is sent to you by post. This correspondence material includes a series of specially written texts, notes on radio and television broadcasts, reprints of articles and other documents, and assignments for you to complete".

3.5 An educational argument.

Educational factors have also contributed to the establishment of learning resource centres. For example Husband (1970) has said that "it has been shown that some students learn best by reading, others by hearing, others by seeing. I believe it is the teacher's job to provide the means by which all kinds of students can learn best!" This has been more fully explained by Turner (1974) when he says that some students "although high in intelligence find it difficult to learn from print materials. Often they have a slow reading speed and their comprehension of print material is far from satisfactory. As a result of this handicap, unless they put an above average burden upon their teachers and contemporaries, their achievements are often below expectation. It is these children who require the provision of non-print resource materials to take the place of the worksheet and the textbook. It is also for these pupils that a resource centre should be provided to perform the same service that their more fortunate contemporaries obtain from the school library". The argument has been extended into higher education and developed further and broadened by Cowan (1975a) who has considered not only the
students' requirements, but also those of the teacher and those which to some extent are external to them. His argument: "Many people have now come to appreciate that it is foolish to imagine that there is an absolute solution to any teaching problem. There is no such thing as the 'correct way', or even the 'best way' to teach any given topic. The best way for me - says he - and for my students, will obviously depend on me and on the students - and on our past history, and the available resources and the subject matter concerned".

The argument develops further to teaching methods. Brick (1967) has said in this respect that "it is becoming conspicuous to practitioner, as well as observers, that our electronic technology is precluding the status quo in education - and then he adds that - perhaps the first casualty to the traditional theories and methods is the concept of teacher-centred instruction". Here again it is Cowan who emphasises the argument by saying in "Two case history of curriculum development" (Cowan 1972) that the two examples provided in the paper "have been selected because of their dependence on modern media and methods; for it seems likely that any notable developments in university curricula will be achieved through the introduction of entirely new methods rather than by the improvement of existing methods".

3.6 Experience.

The experience accumulated on resource centres is by no means very large and does not at present, provide sufficiently convincing evidence to support their existance, "that is, evidence in 'hard' form which can be used to show that learning via resources centres is any better (whatever that may be taken to mean) than learning as a result of traditional teaching experiences" (Townsend 1977b).
On the other hand efforts made by other centres have been a factor leading to the setting up of more centres. For example Townsend himself (1977d) has explained that "the adoption and evolvement of the Learning Resource Centre by the nursing profession is a reflection of the change in attitudes towards learning in society and in nursing in particular", and that "possibly this move has been helped by the fund of experience which exists in general education percolating through to the School of Nursing". Another example is the increasing number of libraries transformed into resource centres. Douglas (1975) has illustrated this by saying that "during the last decade a vast range of multimedia materials for learning and teaching -plus fundamental curricular and organisational changes- have transformed libraries from the medieval book-lined mausoleums into resource centres". This may well continue to be so since "a factor that one must assume about instructional materials is that the collection of books and non-books materials will continue to grow" (Hansen 1972). This and the needs of particular institutions has meant that "no school planner would think of planning a school without providing study carrels" (De Bernardis 1967).

3.7 Other innovations.

A major factor which has contributed to a large extent to the development of learning resource centres concerns the numerous innovations in teaching. During the past few years a number of different types of educational innovations, mostly in individualised learning, have been developed to help with the process of learning. In this connection (Elton 1975) has pointed out that "there are a number of significant innovations which have stood the test of time over at least a few years, and these are beginning to form a 'bag
of tools' from which it is possible to begin selecting those most suitable for a given purpose". The following list gives some of these and references are given to relevant works:

a) Programmed learning, which consists of a package with specific steps to follow for obtaining knowledge in some subject. (Strout 1970).

b) Audio visual aids such as taperecorded lectures (Groves 1974), video recordings (Pantoleo 1975), (Watson 1977), tape slide presentations (Manwaring 1973), (Graves 1974).

c) The audio tutorial approach to learning (Postlethwait et al 1971).

d) Self teaching exercises in laboratories (Gore and Rayner 1972), (O'Connell 1975).

e) Project work (Hewton 1975).

f) Keller plan in which students work at their own pace and take tests when they feel adequately prepared (Keller 1968), (Green 1971), (Elton et al 1973).


h) Small group teaching (Abercombie and Terry 1971), (Black et al 1974).

4. DEFINITIONS OF LEARNING RESOURCE CENTRES

4.1 Different uses.

The Learning Resource Centre as a concept has many meanings and it is used in many different ways by different people. It is also applied to many different purposes in different contexts. "It would appear - says Kirkland 1976) - that there is no one definition or
prescription of what a resource centre is". Clarke (1975b) has also pointed out that "there is little consensus on the form a 'Resource Centre' should take or on the limitations of the nature of a 'resource' and different conceptions of the term abound". An illustration of this is provided by Self (1977) when he says that "I know a school where a white plastic notice bearing the words 'Resource Centre' has been glued on a door partially obscuring an earlier label which said 'Store cupboard'. The tiny's room contents are what used to be kept in and on a teacher's desk". At the other end of the spectrum, is the view expressed, for example, in the title of Malcolm's (1973) paper: "A Resource Centre ... is a state of mind" or in Gerletti's (1969) assertion that "a media centre is whatever we choose it to be". Hence it is quite legitimate when Townsend (1977b) asks "but what exactly is a resource centre? -and then indicates- that ideas vary". The following sections attempt to provide some of the various ideas.

4.2 Some definitions,

Many authors have attempted to determine what a learning resource centre is either by providing a definition or through the description of the functions they foresee for it. Some examples are now given:

"A learning resource centre is a store house of materials from which people can learn what they want to learn with a fair chance of doing it well" (Powell 1974).

"An instructional material centre is a place where ideas, in their multimedia and diverse forms are housed, used and distributed to classrooms and laboratories throughout the school" (Beggs 1964).
"All that goes together to make a university or college campus - buildings, classrooms, libraries, professors, fellow students, shaded walks - comprises a centre of educational media. These media provide the means for the students' learning experiences at this centre" (De Bernardis et al 1965).

"A Resource Centre is the best learning situation in where the pupil discovers and uses knowledge for himself" (Malcolm 1974).

"The learning/teaching aids centre allows students to have access to a wide variety of material that is available in the department" (Corfield 1975).

"Learning Centres can be places where students practise skills and develop concept mastery in an environment that stimulates interest and creativity" (Moore 1974).

"A learning centre is an institutional facility designed to supplement or replace classroom teaching" (Merren 1975).

"The resource centre is not just a museum or archive. It should be an active learning area in which students as well as teachers make use of the materials stored there" (Fotherhill 1973).

"Resource centre for learners is a place which should offer to the students learning materials presented by a variety of equipment and media" (Howe and Romiszowski 1974).

"Resource centre is an agency for stimulating the active creation and use of a learning collection" (Beswick 1972).

"The learning centre functions as a resource centre for diagnostic materials, electronic teaching devices, tape banks, test banks, science
centre, rotating library systems, use and storage of audio visual equipment, and reference and resource materials" (Brick 1967).

4.3 Commonalities.

The learning resource centre has become a fairly common entity and as Lawes (1971) wrote in the Times Educational Supplement, they "are very much in the news at the present time - and added - Perhaps it is time we all decided what we are talking about". A very praiseworthy task, but very difficult to perform in practice due to both differences amongst the people involved in them and the different purposes that particular centres serve and also because the latter have not always been clarified, (this is examined in more details in chapter V, sections 5 and 11). Another confusing factor is the large number of names given to them: Cerletti (1969) lists the following when defining a media centre, "learning resource centre, learning materials centre, educational media centre, educational services centre, educational communication centre, instructional technology centre, a library, an audiovisual centre, an educational materials centre". To these, may be added the names of resource centre, learning aids laboratory, self teaching centre, self teaching laboratory, which are fairly common in the literature.

However, there are some common elements in the definitions quoted in section 4.2 which, although by no means is comprehensive, show that the centres

a) comprise a physical place,

b) store learning resources and are equipped with the appropriate machinery for their use,

c) make learning resources available to pupil/students/teachers/etc.
d) have some sort of organised storage, production, administration, etc.,
e) involve a variety of people, e.g. staff members, technicians administrators, students.

5. LEARNING RESOURCE CENTRES AND EDUCATIONAL/CURRICULUM DEVELOPMENT

5.1 A curriculum model.
Taking Eraut's (1975) simple curriculum model, which "divides curriculum into four interrelated elements" as a reference may help to place the development of learning centres into context. The model is as follows:

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outcomes and objectives

subject matter

assessment

teaching, learning and communication methods
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5.2 Links between learning centres and curriculum.
A very strong link between educational development and learning centres has been suggested by Groves (1975) when in "Problems and challenges in Independent Learning" he said: "I would very strongly suggest that some sort of departmental learning resource centre such as our Learning Aids Laboratory is essential if educational development is to be seriously pursued". Then he draws the parallel: "You cannot do research without a research laboratory -you cannot undertake educational development without a departmental resource centre".

This view is confirmed by Beswick's (1975) conclusions of the Schools Council Resource Centre Project of which he was the research officer.
The second item of his summary of main conclusions reads:

"2. Curriculum. The Learning Resource Centre was most effective when its existence arose from curriculum need, and particularly when it was regarded as one of the central agents in a curriculum development programme."

Another link between curriculum development and learning centres is pointed out by Cowan et al (1974) they "suggest that curriculum development should be planned by regarding the selection of a balanced blend of learning experiences as being a more important decision than the choice of the supposedly essential items of learning context", it is in these learning experiences where the learning centre plays an important role. Cowan (1972) provides an example of this when describing the advantages of the taped instruction method available to his students in his "Learning Unit". He says that "the advantages of this method of teaching are several. It is possible to polish and refine an explanation or piece of teaching until the teacher is satisfied that this is the best that he can offer. He then knows that this 'personal best' is available to every student!" He then moves on to list other advantages of the method, which are also affecting curriculum development: "Taped instruction also permits a considerable measure of self pacing or group pacing to be introduced to any course. And it offers supplementary tuition to the student who has been ill or who has a particular weakness, with virtually no extra effort on the part of the lecturer."

A third example of links between learning centres and educational development is also given by Cowan (1973) when in his account of "an experiment involving structured and unstructured tutorial
material" he states that he is "quite confident that a learning package could be prepared for this target population which could rectify this serious flaw (absence of learning situations for the acquisition of certain skills) in the undergraduate syllabus".

One aspect of educational development, in which learning centres have played - and are playing - an important role, is the development of independence in learning. This, due to its importance, is treated separately in the next section.

6. LEARNING RESOURCE CENTRES AND INDEPENDENCE IN LEARNING

It would not be appropriate to discuss here the advantages or disadvantages of independent learning, but rather to give a summary of its relationship to learning centres. There would in any case seem to be agreement on the desirability of independent learning, as the Group for Research and Innovation in Higher Education (1973) has put it: "most university teachers would probably agree that one longer term goal of higher education is to lead students towards accepting greater responsibility for their own learning", but they have warned that "there would not always be consensus upon how far or how rapidly" the process of introducing opportunities for greater independence in learning should proceed.

6.1 Moving away from teacher centred learning.

The link between learning centres and independence in learning appears clearly when it is considered that learning materials, which are usually used in a centre, "are often called upon to play a major role in the shift away from a teacher-dependent situation (Nuffield Group
1974a). This great importance of the role of media for independent study is basically due to the fact that "many media have high content and impact quality in impact easy-to-use form" (Link 1970). Also, "individual study that once consisted almost entirely of reading printed materials now is likely to take place in a carrel with a great variety of audio and visual materials as well as print materials available for study as needed". (Wyman 1974). Other authors have put this more strongly, for example De Bernardis et al (1965) say that "preparing the student for independent enquiry, individual research, and broadened study is a significant trend in our schools. To accomplish this, the learner must use many types of materials and learning devices".

Garnett (1972) has given a more fundamental justification: "If the basis of learning is to ask questions, the answer must be available. Books and other resources must be at hand; doors must be left open; when the "other resources" include tapes, records, slides, and filmstrips, the classical arrangement of the classroom breaks down even further to allow of the inclusion of machinery and of corners in which to use it". Similarly, Holder and Hewton (1973), when explaining the emphasis of their centre, say that "if teacher involvement was to be an important part of our centre, the certainly pupil participation was to be a priority. The emphasis was to encourage independent and individualised learning".

6.2 Degrees of freedom in independent learning.

In "Independence in Learning" the Nuffield Group (1974b) identify four stages of independence in terms of the kind of options or choices available to students. They say that "the first is
concerned with the working pace ... The second relates to the choice of learning strategy ... The third option concerns the choice of the context and goals of the programme ... The fourth relates to assessment ..." Generally speaking learning centres contribute to a large extent within the first two stages. For example Manwaring (1976) refering to a particular resource centre states that "there are many elements of freedom which are present in this example ... These elements are common to many other cases of individualised learning"; then she lists seven elements which are: 1) Availability. 2) Self Paced. 3) Objectives. 4) Multimedia. 5) Interaction. 6) Student-centred. 7) Choice of sequence.

Several authors have emphasised one or more of these elements, in particular the one on availability of the materials. To this effect Hancock (1973) has said: "To provide the facility for students to pursue their individual studies, all media and supporting technical services are accommodated in resource centres". On the other hand Matlick (1974) reporting how his learning laboratory incorporates the element of choice of format, says that: "typically the learning laboratory is a facility and function of the learning resource centre, offering a broad range of independent learning materials in a variety of formats". The choice of student pace has also been emphasised, for example Blackler (1974) wrote, in the user's guide of his learning aids laboratory, that "The Learning Aids Laboratory was open in 1973 with the intention of allowing students to use, at their own pace, a variety of learning materials in Chemistry and Polymer Technology".

Finally, two remarks which illustrate the effort of learning centres to help in the improvement of learning: The first one is from "An
optimum interaction learning laboratory" by Wyman (1973), who says that "the purpose of the optimum interaction learning laboratory is to make the teaching and learning more efficient". The other one is from Corfield (1975) who in reference to his teaching/learning aids centre states that "the intention is to provide effective learning by incorporating audio visual aids into course work and the centre gives ready access to the materials for revision purposes".

7. AN ARGUMENT BETWEEN INSTITUTIONAL AND DEPARTMENT BASED CENTRES

Beswick (1975) asks: "why is that, in so favourable an educational climate, comparatively few teachers make thorough use of all facilities and media available to them?". He then continues his argument -which although it is based on school experience is also applicable in higher education- "It is not that they are waiting for the results of protracted comparative studies, or for intricate validation exercises, nor are they holding back impatiently until the arrival of video disc and holographic equipment. One hypothesis was that on the contrary, the development of resource based learning had simple but crucial organisation implications, and that when these were understood it would leave the way a little clearer for advance". However there is no argument on whether the centres should be organised on an institutional or departmental basis. Both types have been developed and advantages for each have been reported.

7.1 Advantages for institutional centres.

Enright (1972) quotes a policy statement on College libraries by the Council of the Library Association, Which puts forward "practical reasons for the library to be responsible for learning resources of all kinds". The Council states that "the library is the natural
repository for these items because (a) they are similar to books in content and aims and they will be used in conjunction with books in the teaching programmes of colleges, (b) cataloguing, storing and retrieval expertise is immediately available, and (c) college libraries are traditionally available for service over a longer period of the day than other departments of a college" (Library Association 1971).

7.2 Advantages of departmental centres.

The major merits reported for departmentally based centres are concerned with the fact that they permit a closer relation between staff and students and also amongst students. In this connection Merren (1975) has said: "Departmental centres are usually found in large institutions and offer instruction in one discipline. They are a product of the faculty's desire to develop alternative instruction. Their major advantage is close association with the total programme of the department, even total integration so that the learning centre is the department". A similar reason is given by Poller (1977): "A resource centre which is departmentally based has great advantages over the more impersonal facility which serves a whole institution. These advantages result, in the main, from the high degree of involvement of the teaching staff in the operation of the centre".

8. PARTICULAR EXPERIENCES IN HIGHER EDUCATION

As has already been mentioned, the literature is rich in accounts of what people have done, but much less so in evaluative studies. The present section gives typical examples of both and also quotes two studies of cost-effectiveness.
8.1 Descriptions.

Diederich (1975) has described the activities of her "Audio Tutorial Learning Centre" as follows: "The audio tutorial method of instruction used at Cornell included an hour of recitation per week. This hour of group interaction was included primarily to provide an opportunity for group interaction, as well as students contact with one particular instructor and an opportunity for testing at regular intervals. All the other instruction took place at the students convenience in the learning centre".

The Aston Learning Aids Laboratory has been described by Groves (1973) as having "a full range of equipment, all of it available on a self-help basis. There are overhead transparencies used in lectures, together with printed study notes. There are tape players for use with recorded lectures again accompanied by notes which can be taken away by students. Other lectures on tapes are accompanied by slides operated by the student". Groves (1974) has reported that for one of his lecture courses "an appreciable amount of the lecture material has been pre-recorded onto audio cassettes which are then made available to students in the learning aids laboratory".

Hansell (1976) reports on a smaller scale situation when he says that his "resources room, as it is at present, is doing almost the minimum that such a facility could do. It is providing some supplementary materials, but no course integrated material at all".

Another description is given by Manwaring (1977), who says that "first year students of biology at Glasgow University receive part of their instruction via audio visual self instructional programmes. They are available in a learning centre known as the Self Teaching Lab.;"
a multimedia resource centre used as a library with minimal supervision and open to the students any time in the working day". (See also Manwaring 1975).

Lopez (1976) provides an account of an evaluation of a course taught through a learning centre and says that "as the course was intended to be taught without lectures, audio tapes were available on optional basis for those students who liked to supplement their reading by listening ... it seemed natural to rearrange a room in order to have a resource centre which housed the audio tapes and the laboratory exercises. It also housed a number of relevant materials to the course, i.e. recommended books, reprints, films. Tutorials were held in the centre as well as some of the students group work".

Cowan (1975b) states that "the Learning Unit at Heriot Watt University ... grew out of a desire to improve the quality of advise and direction which could be made available in an understaffed department, to undergraduates working in drawing offices, labs. and worked examples classes". While Morton et al (1974) say that "the main aim of the Civil Engineering Learning Unit is to use modern teaching methods to obtain an improved learning response from the full expectrum of undergraduates in any class within the department". Later Cowan (1975b) has stated that "the Unit now offers a context in which educational experiments can be carried out without the contamination of confusing Howthorne effects. For the week to week programme is so varied, and so unlike the traditional pattern, that the student, once he has become acclimatised would not recognise an experiment, or its post-testing, as being any different from the other learning activities he is offered".
8.2 Some reported conclusions.

Some of the work reported also includes conclusions which have been obtained informally or are the result of the author's own experience. Other conclusions result from questionnaire and on a few occasions from an evaluated experiment. For example Groves (1972) has said that "the learning aids laboratory has now been open for just over two years. During that time we have had some influence on student's study methods; we have been able to explore some ways in which the audio visual media can be used in the interest of Chemistry teaching, and we are beginning to have an influence on the attitude of staff to teaching and learning methods". Piller and Seeley (1977a) referring to the users of their learning centre have said: "we are attracting a large proportion of the students one hopes are highly motivated and committed to chemistry". For Brooks (1972) the perceived favourable involvement, between first year students and the surrounding scientific community, has made him suggest that other people "too will profit from developing" their own learning centre. On their part Shotter et al (1974) have said that "ideal world experiments should produce clear-cut answers. New methods of teaching and learning cannot aspire to do this, but after a year coping with a self-paced study method, both students and teachers are reasonable satisfied".

Jones and Cunan (1974) have reported that "a controlled experiment to assess the efficiency of the technique was carried out ... and that the results showed that within the limitations of an experiment of this type, the students taught with tape-slides presentations significantly improved their position in the class". Cowan (1976) after a number of controlled experiments has concluded that "the switch to resource based learning has reduced the failure rates by
almost half in the classes concerned".

8.3 Cost-effectiveness.

There are some reports on costs of centres, e.g. by Holder and Hewton (1973) or Cowan et al (1973), but there are few on the more difficult subject of cost-effectiveness. Hamilton (1971) established that from his experience with learning resources "the teaching has been improved although there have been no savings in instructional costs to this point". However Cowan et al (1973) report an opposite result, that is "that the cost of the Unit is less than that of the conventional teaching arrangements which it replaced and that the teaching effectiveness is comparable".

9. PROBLEMS

Although to some extent "learning resource centre is the current 'in' title for the department housing the books and media necessary for the learning process on to day's campuses" (Miller 1971), such centres are, as seen in the previous sections and to be shown in the next chapters, playing an important role in the learning process in particular regarding independent learning. However, and as one can expect, their day to day activities and implementation have not been without problems. Thus Hancock (1973) referring to one particular aspect of the centres -the use of technical aids- has said that "clearly, there is considerable scope in education for employing technology as a means of solving problems but often the use of technology merely creates a new problem in solving the other. These include: cost of purchasing hard and software and maintaining it; problems of recruiting suitable technician and tutorial staff; problems of administrating and accommodating these new methods of
learning". Cowan (1975c) has pointed out that "the problems of the large scale resource centre are quite different from those of the smaller scale activity" and then he continues that "diverse problems in human relationships, management, efficiency, organisation and institutional policy may emerge or completely disappear with changes in the scale of operation".

The next sections look to four of the many problems that centres and the people involved in them are facing.

9.1 Educational developers.

Learning centres, like other innovations in education are due to educational developers and one problem is that there are only few of these, Cowan (1974) has quite strongly pointed out that "very few people in universities care about teaching, so the innovator faces a lonely existence, even if in a small group -struggling against the glutinous constraint of apathy-and mild contempt".

Various reasons are given for this relative lack of participation. For example, Miller (1974) has mentioned that "the philosophy of merging audio visual concepts with prints -in order to show students that all tools are necessary- is still in the future" and Macqueen et al (1976) have commented that learning centres bring teaching into the open and that some "staff members object to defining their lecture content so closely and to being continuously scrutinized by their collegues", but they add that "if the staff member's objection to being 'tied down' is simply because of his own lack of discipline in preparation or delivery, then his approach is rightly open to question".
Groves (1975) has emphasised that educational development is not recognised. He has said: "now the university teacher's work is conventionally divided into three areas -teaching, research and administration ... I would like to make a plea, however, that four areas should be recognised -teaching, research, educational development and administration; research and educational development should be placed firmly together, recognising that they require equivalent, if not exactly the same, intellectual skills ... I do not think that teaching and learning methods in tertiary education -certainly not in the universities- will properly develop until this is done".

9.2 Non academic staff support.

Townsend (1977a) has rightly said that "successful resource centres cannot be created by waving a magic wand - they need long and careful planning". They also need non-academic staff support. As Powell (1969) has put it "such a concentration of learning sources and facilities calls not only for a professional and technical staff but also for clerical assistants able to produce handouts, cope with enquiries and support the specialist staff, and for a graphics assistant able to produce illustrations and generally advice on aesthetic matters". However this is not always possible to achieve due to the present economic climate (see chapter IX).

Another problem which is related to the maintenance of learning centres which are inadequately supervised is the odd theft. Although it happens rarely and it is a low scale phenomenon, theft does occur in centres, for example Seeley (1976) in a termly newsletter regretted this by saying: "Unfortunately we suffered a spate of thefts. Whilst none of the actual audio equipment was stolen, several books and pieces of 'course material' disappeared. In some instances the items
are irreplaceable. The following measures have now been taken to ensure that such an outbreak does not occur again: (i) no one is permitted to bring a brief case. (ii) students must now sign for certain items.

9.3 Involving centres in the curriculum.

It has already been mentioned that learning centres are most effective when they arose from curriculum needs (see section 5.1 in this chapter). However this is not always reflected in practice. Hence we find statements like: "now that hardware and some commercially developed software were available, the next problem was to implement a systematic use of this equipment and materials in the instructional programme" (Elkings et al 1970). Several efforts are reported in this connection, for example Goldschmid and Goldschmid (1973) reporting on a particular case said that "it became apparent that an intensive effort by faculty and administrators have to be made to create and adapt effective software and to integrate the learning centre experience in the students' total curriculum". Another example is given by Poller and Seeley (1977b) when they say that "when setting up a learning aids laboratory a determined effort has to be made to sell the new facility to students"; they go on to suggest that "the most reliable method is to place in the laboratory items such as tapes, programmed texts, etc. which are essential to courses taught and to make it clear that the student has not completed the course until he has worked through these items".

These and other problems are described and analysed within the context of the study. For example section 7.2 of chapter V deals with support from non-academic staff and how centres get this kind of support; sections on the organisation of the three centres presented
as case studies in chapters VI, VII and VIII also deal with this problem. Section 5.1 in chapter IX looks at this situation more generally and section 5.2 in chapter IX is concerned with aspects of educational developments and with aspects of the curriculum.
CHAPTER V: LEARNING RESOURCE CENTRES - A DESCRIPTION

1. INTRODUCTION

Chapter III discussed the methodology used during the study reported here, chapter IV reviewed some of the literature on learning centres and this chapter now concentrates on the description of departmental learning resource centres. The information gathered during visits to centres (see section 2.1 which gives a list of places visited and chapter III which puts the visits into the context of the study) forms the basis of this chapter. (Appendix II presents the core questions of the talks with centre staff). In order to sustain, confirm and quantify that information on the basis of a wider audience, a questionnaire, based on the visits, and which is included in the appendix III, was prepared and sent out to 34 departmental centres. The response was 82%.

The chapter begins with a brief description of what a learning resource centre is and in order to appreciate some of the differences in use between departmental and institutional centres, the latter are then briefly described. Next the description moves onto the main core of this chapter - departmental learning resource centres. Firstly by discussing some of the reasons for departmental settings of centres and analysing both their origins and the assumptions behind their establishment. Then, the organisation of centres, the use and production of learning resources are described.

Next, some consideration is given to copyright problems and activities of centres regarding feedback are presented. Finally some general aims of departmental centres and the scope of some learning resources are analysed.
It may be useful to refer the reader to section 10 in chapter I, which explains the way I have used quotations from interview data. In short: the sources are not identified because I offered them to treat the information confidentially.

2. LEARNING RESOURCE CENTRES

2.1 Places visited.

In carrying out the study being reported here, I visited a large number of departments in several institutions. These visits were done through contacts developed by myself and as an observer member of the C.N.A.A. Learning Resources Working Party. In total I visited 61 departments, units and libraries in the following institutions:

- Newcastle-upon-Tyne Polytechnic
- University of Newcastle-upon-Tyne
- Open University Study Centre at Newcastle-upon-Tyne Polytechnic
- University of Surrey
- Royal Air Force Staff College, Bracknell
- London College of Printing
- Queen Elizabeth College, London
- University of Dundee
- The Centre for Medical Education at Ninewells Hospital, Dundee
- Dundee College of Education
- Dundee College of Technology
- Heriot-Watt University, Edinburgh
- Moray House College of Education, Edinburgh
- Napier College of Commerce and Technology, Edinburgh
- North East London Polytechnic
Learning centres have been developed as places in which students can get, and use, appropriate materials for their individualised work (see section 3.7 in chapter IV, which lists a number of innovations). This has occurred in parallel both in institutions as a whole and in individual departments, for some time now institutions in British higher education have been incorporating in their stock these newly developed learning materials and recently some of these have established separate units for the use, and sometimes production, of such learning resources. They are often known as Learning Resource Centres. A growing use of these learning resources has also recently occurred at departmental level, (mostly in science departments and particularly where innovatory teaching methods have been developed). All this and the departmental staff's perceived need for providing such learning resources within the department premises, as readily available to students as books, have led to the establishment of so-called departmental learning resource centres.

Basically there are then two kinds of learning resource centres - institutional and departmental. The former are of general use in an institution and sometimes more than one institution, while the latter may be used by a whole department or by particular courses in that
department. Sometimes institutional centres are also for the use of the general public.

2.3 A descriptive definition.

As has already been discussed in the chapter on the literature survey, definitions of learning resource centres present a number of commonalities (see section 4.3 in chapter IV). Accordingly, it would seem possible to provide an operational descriptive definition of such centres, and it is this which has been used for the purposes of the research work reported here. It is the following:

"A learning resource centre is the entire entity - organisation; staff, their philosophy and approach to teaching and learning; space; equipment, resources - which provides learners with learning resources".

2.4 An operational definition of learning resource.

The above descriptive definition indicates the need for also clarifying the meaning of learning resources. Davies and Needham (1975) have classified "whether reasonable or not" learning resources - books and audio visual items - as "those items from which a student can learn either directly or with minimum (supervisory) guidance". Within the project being described here, I have worked with the following operational definition:

"Learning resources are materials, such as slides, audio tapes, video tapes, films, models, printed materials and computer based materials, which are designed as aids to learning either to supplement or replace traditional teaching".
3. INSTITUTIONAL CENTRES

The organisation of institutional centres differs greatly from each other. However, they can in general terms be described in the following way, though combination of them are sometimes better descriptions for particular centres.

a) centres attached to the library or Library Resource Centre,
b) centres in which the library is part of an integrated Learning Resource Centre.

3.1 Library-resource centre.

This is the most common situation at institutional level, that is the conventional library which increasingly incorporates non-books learning resources, (but books are their first priority), and provides facilities for their use, e.g. booths, equipment, etc. either within the library premises or in an adjacent room to the library (more details on this in section 3.2.1.)

3.2 Integrated Learning Resource Centres.

According to the services provided, integrated learning resource centres are usually organised in three different units:- library; production unit and educational unit. These 'units' may either be an integrated part of the centre, or be a separate department, or be a joint effort between a department and the centre.

3.2.1. The library as part of a learning resource centre plays the role of the conventional library, that is, the acquisition and the browsability of materials (books and non-books) are the main tasks of the library unit. Usually the acquisition of new materials is made according to the library's development plans and teaching staff
suggestions. The most common classification system used for arranging the volumes (including non-books) is the Dewey Decimal, and the index may be available in the forms of microfiche or cards. Sometimes colour cards are used to distinguish the medium in which a particular item is available; other times the media and the appropriate section of the library in which the item should be found are included in the cards. These indexes also provide information on whether a particular item is in stock and which items are in stock on a given subject.

3.2.2. The production unit provides the means for the production of usually a wide variety of learning resources, their extent depending on the individual situation and conditions. However, most of these units are usually subdivided according to the type of production specialization, e.g. into television section; printing section; photographic section, etc. A workshop area sometimes forms part of this unit, for the maintenance and repair of equipment.

3.2.3. The educational unit provides services to both students and staff. The service to students usually consists of the provision of an introductory course in the use of the library. This is often given to first year students at the beginning of their studies; however, several continuing courses exist, which cover further knowledge on the use of the centre. Generally speaking those courses comprise matters such as study techniques, bibliographical approach to project work, type and use of bibliographical tools, systematic literature searching, media, introduction to the services provided in the centre, and others. Their main purpose is to orient students to make better use of the facilities provided and to encourage them to use the different learning materials available in the centre.
In a similar way the educational unit lets teaching staff of the institution know about diverse teaching and learning methods, encourages them in the use of audio visual aids in their teaching and provides the help needed for those involved in an educational innovation. Some of these units also hold periodical lectures or seminars with internal or external speakers, who are expert on particular topics.

4. SOME REASONS FOR DEPARTMENTAL CENTRES

Although staff involved in departmental learning centres tend to recognise that these centres some times "may involve duplication of equipment" within the institution, as well as economic constraints within the department, they are inclined towards departmental centres rather than institutional ones due basically for two reasons:

Firstly, because unlike a library, a departmental centre is "geographically close to the department". It provides students with a working "place where they have access to subject expertise" and where they are exposed to the influence and enthusiasm of the academic staff and other students. Secondly, because "more independent study and the use of more non-book learning resources has given greater importance to the department as a study base".

5. ORIGINS OF DEPARTMENTAL CENTRES

The way in which centres were set up and their subsequent growth present certain commonalities. Thus the origins of most centres are related to the desires of a few members of the staff, and in some cases due to the enthusiasm of just one member of the staff, who have had the support (moral and financial) from their Head of Department.
It would seem that this support is of crucial importance, since "without a sympathetic and benevolent Head" of department most interested people would not have been able to establish their centres.

Most centres started opening with the existing non-book materials in the department, which previously were usually "used as teaching aids" during lectures, seminars, tutorials and so forth. In some cases new items of learning resources were included, either "from production within the department" and/or university or through purchase of commercially produced materials. Similarly the equipment and furniture of the centres had either been available or was supplemented by purchase.

6. ASSUMPTIONS

6.1 Compiling a list of assumptions.

Another commonality—amongst centres—are the assumptions or hypotheses underlying their establishment. Although sometimes these assumptions have not been present in the staff's mind, at most times they have been made either explicitly, that is in documents, or at least have been implicit in the actions of the staff involved. It has been possible to compile a list of some of these assumptions through talking to some staff in charge of centres, also to some of those who have been in one way or another involved in their setting up and/or implementation, and from a small number of documents, in particular users' guides.

6.2 List of assumptions.

The following is the list of assumptions compiled. It is presented according to the ratings made by staff in charge of centres in
response to questions in the quantifying questionnaire, (see the introduction of this chapter for details).

TABLE V-1: LIST OF ASSUMPTIONS

<table>
<thead>
<tr>
<th>ASSUMPTIONS</th>
<th>RATING OUT OF 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The centres can be of valuable assistance to students in learning and understanding their subjects.</td>
<td>17</td>
</tr>
<tr>
<td>b) The assistance provided in the centre can also be a valuable supplement to the scheduled departmental tutorials.</td>
<td>17</td>
</tr>
<tr>
<td>c) Recent technological developments enable an increasing amount of information to be available in the form of learning resources which enables students to supplement the more conventional presented material.</td>
<td>16</td>
</tr>
<tr>
<td>d) Weaker students can receive assistance with particular parts of their course.</td>
<td>16</td>
</tr>
<tr>
<td>e) Students have many different styles of learning and it is part of Higher Education to encourage students to find a learning style which suits their requirements.</td>
<td>15</td>
</tr>
<tr>
<td>f) Learning resources have a very important role in teaching and learning methods.</td>
<td>15</td>
</tr>
<tr>
<td>g) The learning resources must be regarded as a supplement to, not as substitute for, traditional methods of study.</td>
<td>15</td>
</tr>
<tr>
<td>h) Learning resources should be available to students as readily as books.</td>
<td>11</td>
</tr>
<tr>
<td>i) Many subjects can be learnt better using audio visual methods.</td>
<td>8</td>
</tr>
<tr>
<td>j) Students can be better motivated through the use of learning resources.</td>
<td>7</td>
</tr>
</tbody>
</table>

The questionnaire allowed people to state any other assumptions they had made. Hence another two can be added to the list:

k) The centres can encourage staff to develop and utilise newer teaching and learning methods. | 4 |
1) There must be a better way of handling tutorials than I was previously doing by following the conventional approach.

7. ORGANISATION OF DEPARTMENTAL CENTRES

The organisation of departmental learning resource centres varies a lot from centre to centre. However in order to describe their organisation an attempt to classify them is made at the risk of oversimplifying the real situation. Through visits to learning centres an early tentative classification was prepared and some questions included in the questionnaire were written with this in mind. This section is therefore based on both talks during the visits and the questionnaire. It is divided in the following sub-headings:

a) Departments involved.
b) Staff involved.
c) Space.
d) Learning resources.
e) Cataloguing.
f) Resources.

7.1 Types of departments involved.

Of the 34 surveyed departmental centres 23 (67%) are in individual science departments, of which two are in their planning stage, four are in engineering departments, and in seven cases two or more related departments collaborate, such as for instance Chemistry and Pharmacy or Chemistry and Biology.
7.2 Staff involved.

7.2.1. Before describing in detail those involved in departmental centres it may be useful to clarify one general point regarding those involved in the development of centres. Only one of the centres investigated is in an educational technology department, but provides facilities for science students; all other centres are in subject departments and are, therefore, run by practising teachers, who are interested in educational development. Very few of them have had training in educational technology and/or in the production of learning resources.

7.2.2. In eleven of the surveyed centres the responsibility to run them lies with individual members of the department. Two centres are run jointly by two members, four centres by individual members supported by a committee of few members (two to four), in two centres the responsibility lies on all members of the staff in the department, five centres are run by technicians and two have organisers.

7.2.3. With three exceptions all centres are supervised in one way or another. The following list gives the sort of persons who provide supervision in centres. The numbers in brackets indicate the number of centres in which each happens.

<table>
<thead>
<tr>
<th>TABLE V-2: SUPERVISORS OF CENTRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) One staff member, in charge of centre (5).</td>
</tr>
<tr>
<td>b) Several members of the academic staff (5).</td>
</tr>
<tr>
<td>c) Postgraduates demonstrators (6).</td>
</tr>
<tr>
<td>d) Technicians (7)</td>
</tr>
<tr>
<td>e) Organisers (2).</td>
</tr>
</tbody>
</table>
7.2.4. Question eleven in the questionnaire asked people in charge of centres how they rate the support they are getting for staffing the centres and from the general academic staff. The following table indicates the means and standard deviations of their ratings which were given on a five points scale according to the coding:

5 = very good  
4 = adequate  
3 = fair  
2 = unsatisfactory  
1 = none at all

**TABLE V - 3: SUPPORT FOR STAFFING THE CENTRES.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean ((\bar{x}))</th>
<th>Standard Deviation ((\sigma))</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Technical</td>
<td>3.60</td>
<td>1.14</td>
</tr>
<tr>
<td>b) Clerical/administrative</td>
<td>4.05</td>
<td>0.85</td>
</tr>
<tr>
<td>c) Demonstrators</td>
<td>2.44</td>
<td>1.63</td>
</tr>
</tbody>
</table>

**ACADEMIC STAFF SUPPORT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean ((\bar{x}))</th>
<th>Standard Deviation ((\sigma))</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Moral support from senior staff</td>
<td>3.55</td>
<td>1.39</td>
</tr>
<tr>
<td>b) Provision of learning resources</td>
<td>2.95</td>
<td>1.36</td>
</tr>
<tr>
<td>c) Assistance with supervision</td>
<td>2.44</td>
<td>1.62</td>
</tr>
<tr>
<td>d) Encouraging students to use the centre</td>
<td>2.85</td>
<td>1.44</td>
</tr>
</tbody>
</table>

7.2.5. A classification of departmental centres. According to the number of staff members involved in the departmental learning centres, it is possible to classify them into three groups. They are:

a) Centres run by individuals in connection with particular courses, 5 (18%).
b) Centres run by a member of the staff with the support from a few other staff members, 20 (75%).

c) Centres run by several staff members and/or by the whole department, 2 (8%).

7.3 Space.

The great majority of centres consist of a room specially furnished for the purpose; a few centres occupy more than one room. They are usually arranged with study booths; sometimes these are to be used with a particular media and by students working individually. Some centres also have tables for student collective work and/or to hold tutorials. Some centres have a room attached for use by supporting staff, e.g. an administrator.

7.4 Learning resources.

Centres house a large range of learning resources. The following list provides those being used in the centres contacted. The numbers in brackets indicate the number of places in which they are used.

   a) audio tapes (21),
   b) sets of slides (15),
   c) overhead projector transparencies (14),
   d) tape slide presentations (synchronised) (16),
   e) tape slide presentations (unsynchronised) (11),
   f) film loops (14),
   g) film strips (6),
   h) video tapes (14)
   i) computer based materials (5),
   j) models (14),
k) books (13),
l) programmed texts (15),
m) lecture notes (12),
n) reprints (14), and
o) handouts (9).

Further discussion of learning resources is deferred to sections 8 and 12.

7.5 Cataloguing.

As the quantity of learning resources housed in departmental centres is not too large, and as most of their 'advertising' is done by teaching staff involved, no special cataloguing and/or indexing systems have been developed; though some research is being conducted in this subject, such as for example the work in the Heriot-Watt Learning Unit and Aberdeen University's Department of Education.

Most of the departmental centres have their items catalogued according to the media available and this is accessible to students as a user's guide. A few of them have also catalogued the material by subject matter and the course with which they are connected.

7.6 Resources.

7.6.1. The costs of departmental centres have been almost exclusively borne by the departments: only four of the centres surveyed are getting some financial assistance from outside the department, but these are grants, or contributions, sometimes quite small, by external bodies in order to support research and/or development projects. In quite a few cases there have been support from institutional central services or committees; this has either taken the form of loans
(permanent or temporary ones) of equipment or grants.

7.6.2. Section 7.2 described the people involved in running the departmental centres. All of them, that is staff members (supporting and in charge of centres), postgraduates demonstrators, technicians, clerical staff and organisers are financed by the departments themselves. The point here is that the centres started as a result of departmental initiatives and that external expertise from trained educational technologists in the form of consultancy or new staff members have not been necessary, at least within the departmental setting. An exception must be made in the case of both postgraduates demonstrators who are helping with supervision and are often paid centrally; and of organisers who are appointed by the departments and are, as their names indicate, in charge of the organisation.

Regarding the grades of the academic staff running centres, the results of the survey indicated that most centres are run by lecturers, a few by senior lecturers and one by a professor.

7.6.3. As far as the resources for the setting up of the centres are concerned, they vary a lot according to their size and level of their operation. The centre with the most sophisticated equipment, in both furniture and machinery, which does not include computing facilities, had an initial expenditure of over eight thousand pounds in 1972. In contrast, the resources needed to establish a modest centre was of about £1,500 in 1972, which includes the purchase of some equipment and minor rearrangement of a room which had previously been used as an experimental laboratory.

7.6.4. Regarding the resources needed for the day-to-day running of the centres, they also vary to a large extent from centre to centre.
However people involved in centres reckon that a minimum annual figure for the production and/or purchase of a few new materials and the updating of existing ones is about £200, but this does not include the payment of staff or demonstrators, or the maintenance of equipment and its replacement when necessary.

It may be useful to quote here Poller and Seeley (1977b) who provide an indication of the typical costs of some learning aids produced or purchased for their learning aids laboratory:

<table>
<thead>
<tr>
<th>TABLE V - 4: COSTS OF PRODUCTION.</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio tape (2 x 30 min.)</td>
<td>5</td>
</tr>
<tr>
<td>Audio study course (24 lectures plus book)</td>
<td>100</td>
</tr>
<tr>
<td>Synchronised tape-slide presentation</td>
<td>12</td>
</tr>
<tr>
<td>Film loop</td>
<td>8</td>
</tr>
<tr>
<td>Film strip</td>
<td>4</td>
</tr>
</tbody>
</table>

7.6.5. The validating questionnaire asked staff members in charge of centres to rate on a five points scale (see section 7.2.4.) how they consider the support they are getting from the department for both capital expenditure and consumables. The results are given in the following table.

<table>
<thead>
<tr>
<th>TABLE V - 5: SUPPORT FOR EXPENDITURE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratings:</td>
</tr>
<tr>
<td>Capital expenditure</td>
</tr>
<tr>
<td>Consumable expenditure</td>
</tr>
</tbody>
</table>

The relatively low standard deviations indicate that there is good agreement amongst people in considering that the financial support they are getting is nearly adequate.
8. USE AND PRODUCTION OF LEARNING RESOURCES

8.1 Uses of learning resources.

In a majority of centres the learning resources may be used on an optional basis by all students in the department, but a fifth of the centres surveyed were set up exclusively for first year courses, and a few are for the use of students on specific courses.

8.2 Production of learning resources.

The way in which new materials are incorporated into the centres can be classified into three categories. These are:

a) Production of materials by staff members who are already making use of the centre and expanding the range of their use.

b) Production of materials by members of the staff who were not involved in the centre and have started making use of it. Sometimes this has been due to pressure from students who use the centre for some of their courses and want more materials in those and other courses.

c) Purchase of materials suitable for the needs of specific courses.

Question seven in the questionnaire asked for the percentages of learning resources available in their centres produced by various agents. The following table gives the averages and standard deviations of the answers (sections 4.1 and 4.2 in chapter IX provide a breakdown of these, and other figures).
TABLE V - 6: AGENTS OF PRODUCTION.

<table>
<thead>
<tr>
<th>Agent</th>
<th>%</th>
<th>σ</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your department</td>
<td>60</td>
<td>34</td>
<td>18</td>
</tr>
<tr>
<td>Academics elsewhere</td>
<td>17</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Commercial firms</td>
<td>29</td>
<td>29</td>
<td>19</td>
</tr>
</tbody>
</table>

Facilities for the production of learning resources vary from centre to centre. A few of them (four centres) are well equipped for production and most centres have links with central Audio Visual Aids Units for production purposes.

9. CONSIDERATIONS ABOUT COPYRIGHT

In almost all centres it has become impossible to develop a scheme by which learning resources, in particular cassettes tapes (for which most students possess players), can be borrowed for overnight use. It has been repeatedly said that "this is basically due to copyright problems". The implications are that they are easy to copy which is not always done with copyright in mind. But the problems with copyright are not only related to the protection of rights held by teachers and/or institutions, but also in the case of a centre wishing to preserve an item purchased from a commercial firm and having a copy of it available in the centre, that is, it is not possible (without breaching copyright regulations!) for any centre to copy a purchased tape in order to keep the latter in the store as a master original.

As copyright considerations appear to be a fairly complicated subject, it may be useful to draw attention to a Council for Educational Technology publication (C.E.T. 1976), which deals with the present legal situation in this connection.
10. FEEDBACK

10.1 Types of feedback.

The majority of the centres are getting some sort of feedback information about their activities from both staff and students, either formally, e.g. through interviews, questionnaires, or informally, e.g. through occasional talks.

10.2 Feedback from staff.

60% of the centres are getting feedback from staff. 42% of these (25% of the total number of centres) are doing it formally, mainly through interviews. Other forms which were mentioned included: "weekly staff meetings", reports by participating staff members, staff tutors filling in a tutorial book "after each hour of duty giving details as to how many students have been seen and problems dealt with", "enquiring at course board meetings". Most of these centres also get informal feedback. 83% of centres getting feedback (50% of the total number) are getting informal feedback, which is basically done "by word of mouth", but which varies according to the level of integration of the centre into the department from "very close and trustful rapport - criticisms and praise are given and received in a very creative co-operative way", or talk at "coffee, lunch and tea every day" to the occasional discussion when the opportunity arises.

10.3 Feedback from students.

80% of centres are getting feedback information from students. Most of them are doing this both formally and informally, and in the
analysis of results the figures, as in the case of staff, overlap.  
68% of these centres (55% of the total) were getting formal feedback and 81% (65%) informal feedback.

Formal feedback information from students is obtained in various ways. Some of these are given in Table V - 7, (the percentages relate to the 55% which receive formal feedback of some kind).

TABLE V - 7: MEANS OF FORMAL FEEDBACK.

<table>
<thead>
<tr>
<th>Method</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires</td>
<td>62%</td>
</tr>
<tr>
<td>Observation</td>
<td>25%</td>
</tr>
<tr>
<td>Interviews</td>
<td>19%</td>
</tr>
<tr>
<td>Suggestion box</td>
<td>12%</td>
</tr>
</tbody>
</table>

Other forms for obtaining feedback information were: various meetings between staff and students such as for instance in tutorials and practicals, committee meetings; post tests and self marking tests. Also by writing down "immediate reactions - quickly thereafter".

As far as the collection of informal feedback from students is concerned, it is mainly obtained by means of occasional talks in a variety of situations. Some of these are:

a) "as part of the normal intercourse with students using the centre: How are you getting on actually?",

b) "open invitations to make suggestions personally",

c) noting comments during conversations.

10.4 Changes as a result of feedback.

The main purpose for getting feedback is to introduce changes which lead to improvements, although this is not always easy, since "feedback can vary from very good idea to very bad idea, so it is difficult to
know what changes to make". 60% of centres surveyed have introduced some sort of changes as a result of feedback information obtained from staff and students. These changes are of various kinds as the following list indicates:

a) "Scrapped tutor".
b) Elimination of some learning resources.
c) "Less emphasis on individualised learning and more emphasis on the learning of students using audio visual materials in the presence of a lecturer".
d) Revision and/or up-dating existing learning resources.
e) Introduction of more learning resources and equipment.
f) "More student access to lecture support materials".
g) Provision of more course work.
h) Modification of the lay out of the centres.
i) Introduction of an index to the existing catalogue.
j) Complete recasting of lecture schedules and replacement of conventional bench practicals with self-paced audio tutorial sessions.
k) Expansion of existing facilities to cover new topics.
l) Changes in the format of some materials and in some of the teaching commentaries.
m) Changes in the overall programme and on retail of information provided about materials.

11. AIMS

11.1 Compiling a list of general aims.

As has already been mentioned, most if not all, departmental centres began operating with a clear intention, that is to provide access for
students to a variety of learning aids, in particular non-books i.e. audio visual materials, which up to then had been used in lectures and/or tutorials, and thus transforming them into learning materials. Another purpose was to provide students with additional learning resources through home production and/or purchase. Although most of them did not establish aims and objectives before starting operation, it has been possible, as was the case with the list of assumptions in section 6, to compile a list of general aims. This was obtained through talks, interviews and a few documents, but cannot be comprehensive.

11.2 List of general aims.

This list of general aims of departmental learning resource centres was included in the questionnaire and staff were asked to indicate how important they considered these aims to be. Their answers were given in a four points scale, with a fifth space for "no opinion", as follows:

- 4 = very important aim
- 3 = fairly important aim
- 2 = not very important aim
- 1 = unimportant aim

Table 1 provides both the list of general aims and the staff's ratings on their importance, in terms of means (\(\bar{x}\)) and standard deviations (\(\sigma\)).
<table>
<thead>
<tr>
<th>Aim</th>
<th>( \bar{x} )</th>
<th>( \sigma )</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) to provide a room in which students can discuss their work with other students.</td>
<td>2.35</td>
<td>1.09</td>
</tr>
<tr>
<td>ii) to provide a room in which students can discuss their work with staff.</td>
<td>2.55</td>
<td>1.36</td>
</tr>
<tr>
<td>iii) to provide learning resources which can be an alternative to or replacement of conventional lectures.</td>
<td>3.33</td>
<td>0.84</td>
</tr>
<tr>
<td>iv) to make the study of subjects, e.g. Chemistry, Biology, etc. more attractive.</td>
<td>3.11</td>
<td>0.83</td>
</tr>
<tr>
<td>v) to encourage students to develop the ability to learn independently.</td>
<td>3.63</td>
<td>0.60</td>
</tr>
<tr>
<td>vi) to provide resources for students to prepare work (essays, papers) for use in seminars, tutorials, etc.</td>
<td>2.47</td>
<td>1.02</td>
</tr>
<tr>
<td>vii) to provide access to models, such as for instance crystal and molecular models and to model kits.</td>
<td>3.33</td>
<td>0.77</td>
</tr>
<tr>
<td>viii) to encourage and enable staff to develop improved teaching methods.</td>
<td>3.65</td>
<td>0.62</td>
</tr>
<tr>
<td>ix) to provide direct access to a computer and to a variety of electronic calculators.</td>
<td>2.07</td>
<td>0.96</td>
</tr>
<tr>
<td>x) to provide an alternative study place to the library.</td>
<td>2.50</td>
<td>1.00</td>
</tr>
</tbody>
</table>
It is interesting to note in Table V-8 that five of the ten aims included in the list are rated over 3 (3 = fairly important aim). Moreover, their standard deviations are relatively low (below 1.00), which indicates a good agreement amongst responders. It is also interesting to note that the relatively high rating of three of these aims (iii) on the provision of materials as an alternative to lectures, (v) on encouraging students to learn independently and (viii) on encouraging staff to develop improved teaching methods— is closely related to the major reasons given by people for the setting up of departmental centres; that is, the high ratings are consistent with the two reasons given in Section 4 of this chapter.

12. DESCRIPTION OF SOME LEARNING RESOURCES

Section 7.4 listed the learning resources which are housed in most learning centres and this section, which is based on talks held during visits to centres, analyses briefly a number of them; tries to describe what they are for and how, and interpret some of the feelings of the people involved in them, e.g. students, staff. It begins by mentioning nine learning resources which are basically used for supporting conventional lectures, and then in more details analyses another seven, which are genuine learning resources for individualised use.

It should be emphasised, firstly that this section is concerned with advantages and disadvantages in the use of some of the learning resources, as perceived by people involved, and secondly that what may be a perceived advantage for some people is a clear disadvantage for others. To give a typical example, many people regard student paced learning as advantageous, but there are also people who regard it as disadvantageous.
12.1 Supporting resources.

There are a number of learning resources which are mainly used for giving some sort of support to the conventional lectures and are mentioned only briefly.

The use of MODELS is quite common in some subjects in order to obtain visualisations. Many resource centres also house model-kits for students to build the models.

For illustrating lectures it has become quite common to use overhead projector TRANSPARENCIES, and sometimes SLIDES or FILM STRIPS. These materials are often kept in centres for student use.

FILMS are also used for illustration, either in the form of FILM LOOPS or EDUCATIONAL FILMS, the former being of more use since it needs less hardware and is easier to handle.

For students to consult, resource centres keep a large number of REPRINTS of articles, which have appeared in specialised journals, on matters related to the students' subjects or courses.

Finally, some resource centres house BOOKS usually the ones recommended by lectures. Also some centres keep a collection of LECTURER'S NOTES.

12.2 Programmed learning.

There are two main forms of programmed learning. The so-called 'teaching machines', which emphasise the hardware aspect, and 'programmed texts', which are of greater use in learning centres and are described here.
Programmed learning is basically done by guiding the student through a sequence of frames in which a certain amount of information is given. There are two types of programmes: Linear programmes and branching programmes.

a) Linear programmes. These are programmes in which the frames are presented (or seen in the case of teaching machines), usually in a strict sequence, which is the same for all students, and usually requires a response formulated by the student. A teaching sequence of from 3 to 8 frames is normally ended by a key frame which tests the concept treated in the sequence. A series of linked and integrating sequences forms a linear programme.

b) Branching programmes. These are formed with frames in such a way that the student has to select the answer, after reading the frame, from anything from 2 to 5 possible answers. The choice made determines the next frame presented (or seen). If the student has chosen wrongly, he sees remedial frames, the correct response will lead him back to the main line of frames from which he has branched.

There is some agreement that the process for programmed instruction could be defined by the following steps:

1. Formulation of objectives;
2. Design and testing of appropriate criterion measures to determine when the objectives have been achieved;
3. Definition of the target population;
4. Analysis of learning tasks;
5. Preparation of prototype programme;
6. Developmental testing of programme;
7. Validation of programme.
A properly validated programme is usually designed such as that 90% of students get a 90% correct response to the questions asked.

Advantages. Amongst the advantages which people involved mentioned regarding programmed learning are: programmed texts are available for students use as readily as books and they can work through the programme at their own pace. Many staff in centres felt that programmed texts are much better for remedial purposes or for reinforcement of knowledge rather than learning from them. Other advantages mentioned were: easy usage and of duplicating.

Disadvantages. As with some other learning resources, staff members feel that programmed learning lacks interaction between students and staff. Many staff members feel that programmed texts are difficult and time consuming to prepare if they are to be properly validated and to be constructed so as to encourage both weaker and more gifted learners.

Reinforcement. Although programmed learning is meant to be self-sufficient for students' achievement of the programme's objectives, the knowledge gained is, in some cases, reinforced by post-tests and in some other cases through tutorials.

12.3 Problem solving booklets.

These are a kind of short programmed text, found in some centres. They are generally not validated. The basic idea behind these booklets is to lead the student from the problem to the solution in a series of logical steps and so train the student to ask the right questions in searching for a solution to a problem. The booklets are cast in a question and answer framework, the student has to respond at each step and the correct answer then is given for reinforcement.
12.4. Audio tapes.

One of the most common and most used learning resources in departmental centres are audio recordings on 1/4 inch magnetic tapes, which are contained in plastic cassette and can be played on ordinary cassettes players. According to the expected use of these recordings they can be classified into: Background to subjects, lecturing and remedial.

a) General background to subjects. These are usually single tapes with recorded seminars, inaugural talks, etc. Staff in charge of centres estimates that most of the commercially produced cassettes are in this category.

b) Lecturing. Two different types of lecturing cassettes can be distinguished here: recorded lectures and audio courses.

   i) recorded lectures. These are recordings of actual lectures for the purpose of students' revision of their lectures and/or for students who missed lectures.

   ii) audio courses. These are an alternative to the conventional lectures and they are not necessarily in the form of lectures.

c) Remedial audio tapes. These are the most used type of audio tapes, particularly for first year students. They basically consist of a single tape in which a particular topic is presented. However, some tapes of the type (b) are also used as remedial tapes.

Auxiliary material. Audio tapes are usually accompanied by printed notes, pictures or slides (for the latter see Tape-Slide presentations). Notes include instruction for the use of the tape, its aims, preknowledge needed for it, sometimes questions to be answered before, during and/or after listening to the tape. When illustrations are
considered necessary for complementing the audio presentation, pictures are included with the set of notes.

Advantages. A majority of people involved in one way or another with this type of learning resource reckon that the main advantages of audio tapes are: Students can go through them at their own pace, and at a time when students may be more motivated. Students can stop the tapes whenever they wish in order to think of what is being said, to write down some notes or just to have a rest or break. Unlike in the lecture, students can go through the materials as many times as they wish if they have not understood the first time. Their easy preparation from the technical point of view and easy usage were also mentioned as advantages.

Disadvantages. Many staff regret that audio tapes diminish the interaction between them and students. Students find it inconvenient that there has not yet been developed a loan system in libraries and learning resource centres, similar to that which exists for books. This means that students cannot use tapes at other times other than the opening times of the library or centre. Staff with long experience in preparing audio tapes realise that their preparation is very hard and demanding in order to get the right amount of material to be presented in a certain amount of time at the appropriate speed.

Reinforcement. As most of the audio tapes are used individually on an optional basis, reinforcement usually comes from questions or problems stated in the auxiliary notes. Post-tests are very unusual. In a small number of cases remedial tapes are used individually, but tutorials are held with students in order to clarify the points which students may not have understood. In a few instances reinforcement is done through group discussion between students with or without
12.5 Tape slide presentations.

Tape slide sequences consist of a cassette audio tape and a set of 35 mm. slides. Sometimes the audio tape is accompanied by 35 mm. filmstrips. There are two categories of presentation: synchronised and unsynchronised.

a) In synchronised tape slides presentations slides change automatically at appropriate places on the sound track.

b) In unsynchronised tape slide presentations slides must be changed manually.

Tape slides or tape film strips in learning centres are mainly used for two purposes: background and remedial. In few centres they are used as an alternative to the conventional lecture. In a majority of centres commercially produced tape slide presentations are principally used for introductory purposes, and the so-called "home made" presentations are usually used for supporting material presented in the lecture.

Advantages. Some of the advantages which have been mentioned by people involved in learning centres are: Students can stop the presentation as many times as they wish in order to take notes or to think of the subject being presented. Students can go again through the presentation if they have not understood it the first time. Students have said that these presentations are very appropriate in cases where illustrations are essential.

Disadvantages. Here again, the fact of lack of interaction was very often mentioned as a disadvantage of these presentations. Students
found it inconvenient that synchronised presentations cannot be rewound.

Reinforcement. This is usually provided through post-tests and in quite a few places tutorials are held with this purpose.

12.6 Audio pages.

Audio pages are also a combination of sound and picture. They consist of a page which on its top surface has some kind of visual material while the bottom surface has a magnetic coat on which is recorded an explanation of the visual material.

This learning resource is not very much used due to the fact that the time available for commentaries is of about four minutes only, which gives to the audio pages very little flexibility for longer presentations.

However, some staff have liked them because they are easy to prepare and cheap.

12.7 Video tapes.

This is one of the newest learning resources developed in learning centres. Video recordings are usually on one inch magnetic tapes, contained in plastic cassettes which can easily be played back on the appropriate players. At the time of the study the most common video cassette recorder and player-back was the Philips VCR. In the immediate past Sanyo and Shibaden had been the most popular and recently National has quite successfully come into the market.

Video recordings can be classified into:

a) Video courses. These consist of a number of tapes, in each of
which a particular topic is presented. They are either recordings of conventional lectures or specially recorded lectures for the purpose. (This is the case with the Open University video courses, some of which are used in some centres).

b) Demonstrations. They are generally single tapes in which experiments or some specific experimental skills are shown.

c) General purpose recordings. Under this category there is a wide range of tapes, i.e. recording of lectures, seminars, etc.

Auxiliary materials. Video courses are usually accompanied by printed notes in which the instructions for running the tapes are given as well as the objectives and some explanations of the experiment.

Advantages. Staff reckon that the flexibility of video players is the main advantage of video tapes since students can go through the materials as many times as they wish. For demonstrations tapes, staff have mentioned that the major advantages are: they can save the time of staff and avoid the routine of teaching the same experimental technique or skill again and again. That some students find explanations on video tapes clearer than in a live demonstration, because they are "apparently better planned and presented".

Other perceived advantages are: sensitivity of camera focussing on small objects, easy play back, staff could spend more time with students during their performance of experiments.

Disadvantages. Students feel that the lack of interaction and that they cannot ask questions is a disadvantage, but it should be said that they do not feel this as strongly as for audio tapes.

Reinforcement. In the case of Open University video courses,
reinforcement is done on the one hand through supporting printing notes and on the other hand a tutorial scheme has been developed for this purpose, which is administered in Open University Study Centres. Reinforcement for demonstration video tapes, is usually done through discussions between students and staff/demonstrators during the performance of the experiment itself.

12.8 Computer based materials.

Centres use three main types of computer based materials: computer calculations, computer exercises and computer teaching packages. Usually the former are done with teletype terminals, while the other two use graphics.

a) Computer calculations. These are programs in which mathematical calculations can be done, i.e. numerical integration, numerical differentiation, means and standard deviations, simultaneous equations, etc.; or some experimental data can be processed or checked.

b) Computer exercises. These are programs oriented to give reinforcement and/or visualisations of subjects and consist of an interaction between the student and the machine, during which the student is presented with the subject matter.

c) Computer teaching packages. These are the newest type of computer based materials and are still very much in the process of development. Two main areas can be distinguished here:

i) Packages to actually teach a subject which has not been met by the student before;

ii) Packages to bridge some gaps between theory and experiments, in which are presented topics useful for the data processing but not seen in the lectures.
Laurillard (1977) and MacKenzie (1978) provide evidence of what the staff and students' reactions are to computer-based materials.

Auxiliary materials. Very often, and sometimes before the students' performance of the exercises, they are given a set of notes which include the objectives of the program, the theoretical background of the subject matter treated in the program, instructions on how to interact with the computer terminal, and questions to be answered in response to the results and plots on the screen.

Advantages. Staff in centres have mentioned that the exercises can be run by students as many times as they estimate it necessary in order to obtain an understanding of the subject matter being presented in the program. Staff have also observed that students perform the exercises with great enthusiasm. Many students have said that it is easier to recall something which has been performed rather than read or watched. Staff and students have mentioned that the development of easy programming languages, e.g., BASIC, has made computing accessible to a wider range of people.

Disadvantages. A number of staff members have pointed out that computing is still not as available as many of them would like it to be due basically to the fact that the hardware needed is expensive. Students have complained that sometimes it is quite boring to be interacting with the computer terminal — in particular when it is overloaded and they have to wait for quite a long time for the computer answer.

Reinforcement. This is basically done within the context of the program and the auxiliary notes, but as much of the computing learning resources are for students' complementation of courses, the
reinforcement usually comes through the course work itself. Tutors or demonstrators are always available for students enquiries on their problems during their interaction. The most usual problem mentioned has to do with the use of the machine. Other problems are: the mathematics involved in the program, the interpretation of the computer screen's plots and graphs.
CHAPTER VI: CASE STUDY - A COURSE TAUGHT THROUGH A LEARNING CENTRE

1. INTRODUCTION

Chapter V provided a general description of learning resource centres in general and of departmental learning resource centres in particular. This chapter presents the first of three case studies of individual departmental centres. Some aspects of the rationale for choosing the three particular centres were stated in the introductory chapter, section 7. However, it may be useful to enumerate here the factors which contributed to the study of this particular centre.

a) It was a centre concerned with a Physics subject - Vibrations and Waves - and the project was concerned with science and engineering centres.

b) It was a centre run by an individual member of staff in association with one particular course, which makes it representative of one of the types of centres classified in section 7.2.5. of chapter V.

c) The use of the centre was as a replacement of conventional lectures and compulsory at times.

d) The teaching methods based on the centre were seen as vehicle for the achievement of extracurricular aims.

e) It was located in the home department of the learning centres evaluation project.

The chapter is based on a research report on the evaluation of the course. It begins with a brief outline of the course and a number of aspects of the evaluation study are then presented. Next, some
of the course features are described and analysed. From there it
moves to sections on staff, students and the different learning
resources used in the centre. The assessment scheme and the
students examination results are discussed and finally there is a
section on the achievement of the different sets of aims of the
course; students and learning resource centre.

2. OUTLINE TO THE COURSE

The course in question was the 1975 - 76 first year Vibrations and
Waves course for Chemical Physics students at the University of Surrey.
It was a service course given by Professor L.R.B. Elton, who
organised it in an unconventional manner; that is, the course was
teacher paced and based on a variety of learning resources - books,
explanatory notes, audio tapes, laboratory exercises, computer
exercises, films, self tests, problems and tutorials. It was also
based on student group work and made use of a departmental learning
resource centre, which was specifically established for it.

There were fourteen students on the course, which lasted for two
terms - Autumn and Spring. They formed four groups: two had four
members and the other two had three members.

3. THE EVALUATION STUDY

3.1 Reasons for setting up the evaluation.

Two factors contributed to setting up the evaluation study: firstly
the decision of the course organiser, who was also the teacher of
the course, that the innovative course should be evaluated, but not
by him, and secondly the fact that at that time the research project
on resource centres was beginning at the Institute and it was considered
appropriate that the evaluation be done by the project's researcher. The evaluation was primarily concerned with a description of course activities and with the interpretation of those activities. It was intended to provide the course organiser with a more sensitive understanding of intended and unintended issues regarding the course. Quoting from the proposal for this study:

"2. Purposes of the evaluation:
   a) to obtain a general view of the strengths and weaknesses of the resource based method,
   b) to get feedback during the progress of the course,
   c) to monitor the students' reactions to the course."

3.2 Evaluation characteristics.

In the light of the above remarks the evaluation study had one main characteristic - it was responsive rather than pre-ordinate. The study began as an open ended exploration of what was happening in the course, and tried to tease out what the students' feelings were. This evaluation attitude was maintained throughout the study; perhaps to a lesser degree after the first third of the course. Once a general view of the course was obtained; a number of issues regarding it arose and a second stage of the evaluation was initiated which consisted of more focussed enquiries into these issues. It tried to find out the reasons why they arose and the effects they had on students and staff.

3.3 Evaluation techniques.

The techniques used in carrying out the evaluation are now briefly described: observation, interviews and questionnaires were all used. The two students-staff meetings were attended and on a number of
occasions tutorials and exercise performances were observed. Three rounds of interviews were held with students; the first one after the third week of the beginning of the course, the second during the second term and the last after the examination. On average these lasted for about 30 to 40 minutes and a number of informal talks were held with students in a variety of situations: in corridors, campus grounds and bars. There were also interviews with two of the groups as such. (Appendix IV presents the core questions of the semi-structured interviews). The teacher was formally interview twice and many informal talks were held with him as well as with the computer demonstrator and technician. During the first term feedback questionnaires were given out every week to produce quick feedback to the teacher and in the last week a questionnaire was given out to students and staff (teacher and computer demonstrator) in order to validate and quantify information obtained from other sources.

4. THE COURSE

4.1 Reasons for the course structure.

Two factors were considered by the course organiser in developing teaching methods on the course. Firstly, it was a new course. In 1975 the University of Surrey started offering a B.Sc. in combined studies in Science through a modular scheme, which allows students a number of degree programmes, each with a core of Basic Physical Science. This included amongst others, a Vibrations and Waves course.

Secondly, it was considered a conceptually difficult course. The course organiser felt that there were two possible ways of dealing with such difficult concepts. One way was to organise the course on
the Keller plan method, which would on the one hand allow students to work through the course at their own pace and on the other contribute to students development towards independence in learning. The other way was to base the course on students group work which would not only make students work independently, but also serve as a vehicle to achieve extra curricular aims regarding students development towards interdependence with their peers in their learning.

4.2 Aims of the course.

Accordingly the course was planned with three different sets of aims. These were: content aims, which were reinforced by a large number of objectives; aims for the use of the resource centre; and general educational aims, which might be common for all first year undergraduate students (Cowan 1975d). The following list gives examples of these aims and section 9 lists the complete set of aims as well as providing some indications of their achievement.

Content aim: to provide an understanding of the simple mathematical theory of oscillations and its applications to mechanical and electrical oscillations.

Aims of resource centre: to encourage co-operative study amongst students.

Students educational aims: to express his thoughts lucidly and pertinentely when required to use the written or spoken word.

4.3 The teaching style.

The course was divided into weekly units. Definite assignments were given each week and new assignments were given after discussion between the teacher and each of the groups of students. The weekly
assignments were based on the textbook "Vibrations and Waves" (French 1971). A set of notes produced by the teacher was given out each week; this included explanatory notes on the textbook, preknowledge requisites for the unit, the objectives of the unit, problems to be solved and a series of self tests. The weekly assignments included self service, self teaching laboratory exercises and/or self service computer exercises for some of the units. Short audio taped lectures were also available. There was one time tabled tutorial each week, although more contact hours could be arranged and groups were expected to meet by themselves at least once a week.

4.4 The resource centre.

As the course was intended to be taught without lectures, the audio tapes were available on an optional basis for those students who liked to supplement their reading by listening, and as the number of laboratory exercises was almost one per unit for the first term, it seemed natural to rearrange a room in order to have a resource centre which housed the audio tapes and the laboratory exercises. It also housed a number of relevant materials for the course, i.e. recommended books, reprints, film loops. Tutorials were held in the centre as well as some of the students' group work. The computer exercises were done in a computing laboratory almost next door to the resource centre.

4.5 Course activities.

The main course activity requiring students-staff contact was the weekly discussion on the corresponding assignment during the group tutorial. Tutorials were arranged in such a way that each group met for a period of half an hour each week. Although the course
planning did not include any lecture, two were given: The first one at the very beginning of the course in which the course organisation was explained. The second one was included because students did not have the mathematical tool of partial derivatives, which they needed in order to start the subject of waves. Another occasional activity was a small number of extra tutorials which were arranged with particular groups at the initiative of the latter.

5. STAFF

5.1 Course team.

a) The teacher. His activities can be summarised by stating that he organised the course, prepared the units, notes and audio tapes, and decided in which units to include laboratory and/or computer exercises.

b) Four other people were involved in the course: a computing development officer, who designed the five computer exercises and wrote three of the programmes; The Institute's technician who was involved in the arrangements for the resource centre, the recordings of audio tapes and the setting up of equipment for the laboratory exercises; a visiting professor who outlined the laboratory exercises, but had left before the course started; a research student -myself- who finished the designed of these exercises and prepared their scripts as well as two of the computing programs.

5.2 Assistance available.

In addition to the assistance provided during the tutorials, other assistance was available as follows: although the laboratory exercises
were thought out, and prepared, for self teaching, and hence no regular assistance was available for students, on quite a few occasions some assistance was provided particularly in connection with the use of equipment, e.g. the oscilloscope. The situation was different with the computer exercises because the computing development officer was always available for consultation in order to cope with any difficulty or problem.

6. STUDENTS

As has already been mentioned the course began with a meeting at which the course structure was explained to the students; its subject and non subject aims were analysed and students were invited to form into groups in order to tackle the units. Four groups were formed and their common working fashion was: to work through the textbook, the notes and/or the audio tapes individually; to perform in pairs, usually between members of the same group, the laboratory or computer exercises when required; to try and solve the problems and self test. Students were expected to arrive at the solutions of the problems in their group work and present an agreed version in the tutorial. The groups usually got together the night before the tutorial and discussed the unit. This often consisted of "going through the work which people had not understood or explained to the people who had not done the work exactly what to do".

6.1 Group work.

The work in groups varied a lot from group to group and individual work within groups also varied. Of the four groups it could be said that only two of them worked as groups reasonably well, having discussion meetings at least once a week. A third one worked
occasionally as such and students in the fourth group had many difficulties in getting together. It should be pointed out here that this was the first time that they worked in groups in an organised situation, which made it more difficult for them to co-ordinate their work.

6.2 Reactions to the course.

Of the fourteen students who started the course, three left at different stages of it due to various reasons, and of the eleven students who finished the course, seven were in favour of it, three had reservations about it and one had a strong view against it throughout the course.

6.2.1. The strong opposition came from a student whose views were very different from those that had motivated the teacher to organise the course in the manner indicated. This student thought that students should compete rather than help each other since educational motivation would then be greater. He also resented "being used as a guinea pig".

6.2.2. Reservations that students had regarding their group work were mainly that the course took too much of their time and that it required a great sense of duty to do the work unsupervised. Some weeks there was a tendency for some of them to leave the work and think it would be done by others and students found it a "great disadvantage one week when all members of the group decided to leave it for each other". Other reservations were that it was not always possible to meet as a group, that "sometimes one member of the group contributed more than the others". Also the tutorials were thought to be rather short.
6.2.3. Most of the students found that the course taught them how to co-operate and felt that the novelty of working in groups was a good experience, because work could be "prepared for a set deadline so that all the members of the group had the unit content fresh in their minds and problems could be quickly solved without having to take people through preliminary work". They also found that the course made them talk more than usual over their study problems, which were generally sorted out during the group sessions. They thought it was good because the discussions took place outside the normal academic physical situation and lost the aura of compulsory work. It may be useful to quote here the views of one student which is typical of the seven students in favour of the course.

"Working in my group I feel I have a responsibility to the others, to at least have tried my hardest so that I can be prepared to understand their work. Also if for some reason I didn't do the work I am not left behind as is easy in other systems. Working in a group which is constant, helps me understand the problem solving powers of the other two, experience can tell me the type of difficulties the others will get into, so there are some problems I know I'll have to solve as the others will probably not be able to do the work. Also some other work I know I don't have to worry too much as the others should be able to solve it, even if I can't and problems which none of us can easily solve are spotted quickly and prompt in the tutorial".

The seven students who were in favour of the course also felt that the knowledge gained in the course was greater and more permanent than in any other of their courses, basically due to the group work.

6.3 Course pressure.

Students views on the pressure of work depended to a large extent on
whether they worked in groups regularly or not. Students who did work in groups considered that the course structure put a lot of pressure on them in order to do the work. This pressure came through their responsibility to work for each other, because they felt not to have done their share, would not have been fair. On the other hand students who found some difficulty in working in groups felt that there was little pressure to study, which provided "an excuse to go out places and fit work in when the odd few minutes arose".

It should be mentioned here that the pressure of work decreased by the end of the two terms. It was noted in the first term when only four students did the computer exercise corresponding to the last unit which, as the other exercises had been compulsory. By the end of the second term one student, reflecting a generalised feeling, strongly pointed out that in the last two or three weeks there had been less pressure, and the solutions and next unit would have been given even if the work had not been done properly, whereas in the first term the teacher had made sure that the work had been done. Coincidently or not, the tutorial periods were shorter than usual on both occasions and the teacher commented that he "was really pushed for time".

6.4 Confidence in mastering the units.

Student feelings regarding their confidence of having learnt the units varied, again, with the work in groups. Those who did it felt quite confident after both the discussion in groups and the tutorials, in particular because they felt that they had to reach a standard at which they could explain the work to others and that by this time they felt that they knew the material. For some students it was
more difficult to feel confident because "it was possible not to read the text all that thoroughly and still be able to answer the self test and look back on the formulae and ideas to answer the questions".

Each unit included a self test designed to help students feel confident in their learning. However it was not considered very helpful since they realised that it "was fairly easy to answer" and because it did not cover all the points within any particular unit. Much more importance and value was given to the tutorial as it "permitted to clarify concepts which could not be tackled in the groups discussions!"

6.5 Time needed to cope with the course.

During the two terms the Vibrations and Waves course lasted, students had to attend four other courses and when the course was planned it was estimated that it would take a little less than one eighth of their time for 20 weeks. However it took more than this and students mentioned that one of the reasons was the fact that they were presented with a new way of tackling their study. For those students who worked in groups the time taken for the course was greater compared with the others. It included reading the relevant material, taking notes, discussing and answering the questions as well as attending the tutorials. For about half of them the course meant more or less the same amount of time spent as on their other courses. None of them mentioned that they required less time.

6.6 Transferability.

One other situation which is worth mentioning here is that although some students worked quite well in groups, they did not transfer the
Vibrations and Waves experience to their other courses. They did mention that quite often they got off the course subject when working in their groups, and talked amicably about their social and domestic problems, but not about the difficulties with their other courses. The fact that this was the first time studying in a co-operative way was mentioned as a reason for this. One of the groups agreed that on future occasions, having had the experience, it would be possible to think about the application of this method as a style of studying.

6.7 Future studies and the course structure.

The three sets of students were equally divided regarding future courses like the Vibrations and Waves one. The critical student felt that he would not like another such course; three who had reservations on the course, plus another two, felt that they would like the use of learning resources, but with the course basically taught through lectures; and a third group of five students would choose such a course in the eventuality of one being available.

7. THE LEARNING RESOURCES

The course could be divided according to the learning resources used in it into two parts, which coincide with the two terms. The learning resources used in the first term were: the book, the explanatory notes to it, the computer and laboratory exercises and the audio tapes, while for the second term both types of exercises were replaced by films. All of them are now viewed separately.

7.1 The book and the notes.

Students were advised to buy the textbook and for supplementary
reading they were given the text "Vibrations, Waves and Diffraction" (Bradick 1965). These two books were bought for the resource centre and were available for students' use. The work was organised in such a way that specific reading from French's text was given each week and the preface of unit 0 of the notes reads:

"You will find that I have not followed the order of French's book. The main reason for this is that I do not expect you to read all of the book, and once I had decided which parts were really important, I also found that I had to arrange them in a different order. It has also meant writing some explanatory notes to go with the book and you should read each note at the same time as the page or pages to which it refers".

This rearrangement meant that students sometimes had to read, for example, pages 34 to 37 for one unit and pages 17 to 25 for the next one. They did not find this difficult to follow, on the contrary they found it "quite easy to follow, but it was a different matter what the book actually present". Some students also felt that this way of organising the units "may have meant that the topics learnt have been much better selected". Most students found French's book particularly difficult regarding its mathematics; that is, they found most of its concepts fairly understandable, but "rather abstract and vague, especially finding out how French arrived at his 'it can easily be seen that ...'"

Regarding the explanatory notes students commented that they were useful and helped them to a large extent. However they felt that notes could have been better if they had not been written "in a sort of telex message"; that is, instead of referring, for example, to equation (7-9), it should have referred to the equation of waves (7-9). They also mentioned that the notes should have contained
more practical examples of applications of vibrations and waves.

The questionnaire given out at the end of the course included a number of items in connection with the book and the notes. The following table shows the students' attitudes to them. It has three columns. The first one provides the limits of the scale, the second one the means of the student's ratings and the last the standard deviation in order to indicate the degree of agreement of their answers.

**TABLE VI-1: STUDENTS ATTITUDES.**

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale</th>
<th>$\bar{x}$</th>
<th>$\sigma$</th>
</tr>
</thead>
<tbody>
<tr>
<td>the usefulness of French's book</td>
<td>$1 = $useless, $5 = $useful</td>
<td>2.9</td>
<td>1.1</td>
</tr>
<tr>
<td>the relevance of the explanatory notes</td>
<td>$1 = $not related, $5 = $closely related</td>
<td>4.2</td>
<td>1.1</td>
</tr>
<tr>
<td>the number of problems included in each unit</td>
<td>$1 = $too few, $5 = $many</td>
<td>2.6</td>
<td>0.7</td>
</tr>
<tr>
<td>the difficulty of these problems</td>
<td>$1 = $too easy, $5 = $too difficult</td>
<td>3.5</td>
<td>0.5</td>
</tr>
<tr>
<td>the value of the self test</td>
<td>$1 = $useless, $5 = $useful</td>
<td>3.4</td>
<td>0.8</td>
</tr>
</tbody>
</table>

The majority of the students felt the book and the explanatory notes were sufficient for covering the unit's material; only three students found it necessary to consult other books on some occasions, in particular for those units which students agreed were the most difficult ones - coupled oscillations (unit 8), group velocity (11) and Doppler effect (15).
7.2 The audio tapes.

As the course was taught without lectures, audio taped explanations were made available on an optional basis for each unit and for those students who liked to supplement their reading by listening. It should be emphasised that they were not produced as an alternative way of studying the subject, but as a supplement. Two copies of each cassette were available in the resource centre and a third copy was kept in the university's main library. They were of about 10 to 15 minutes in length.

The students reactions to them varied a lot. It ranged from those who never used them to one student who made regular use of them, with a number of occasional users. The regular user rated them as "extremely useful" while occasional users agreed that they were valuable for those who prefer lectures to having to do all the reading themselves. The fact that the tapes did not shed any new light on the material was given as a reason for not making use of them. Yet, after the first few weeks they "forgot completely about them and when stuck on later units did not think of them for help".

As the groups tended to prepare the unit the night before the tutorial, the use of tapes was diminished because they were not available at that time; this was due to the resource centre being closed and no loan system being developed.

7.3 The computer exercises.

Five computer exercises were included for five different units of the first term. It was compulsory for students to perform them all and interactive computer terminals were available. The time estimated to be spent in the interaction with the terminal was about
an hour for each exercise. The philosophy or aims of these exercises were to reinforce and visualise some topics on vibrations. Each student received a copy of an instruction package for each exercise. These consisted of various sections: aims, theoretical background, description of the program, instructions for the interaction with the terminal and a number of questions to be answered using the computer plots.

Students performed these exercises with great enthusiasm, although for most of them this was their first interaction with a computer. Every student mentioned the exercises were interesting, useful and relevant to the course, and they helped them to understand some of the units in greater depth, especially because they "bring home the relevance of the theory in French" and also because "it is much easier to recall something which has been performed rather than just read". Students also felt that the time allowed for them—an hour—was about right and on very few occasions it was necessary to extend this time or arrange to run the program for a second time.

A number of difficulties were encountered by students when performing the exercises. The most common of these was that some students did not know how to operate the terminal. A second type of problem was related to the mathematics involved or with understanding the concepts used. The third type of problem was in connection with interpreting results on the computer terminal screen or with graphical interpretations. Usually these were discussed between the student concerned and the computing officer; however some students preferred to work out their problems by themselves.

After completion of exercises, students were asked to optionally fill in a feedback sheet, a sample of which is provided in appendix
V and the section below gives an example of the information obtained for one particular exercise.

7.4 An example: computer exercise number one.

Title: Energy of Simple Harmonic Motion.

Number of forms filled in: 6

General aim: "to observe a number of graphs associated with Simple Harmonic Motion and to familiarised yourself with the computer!"

A number of aspects connected with the exercise had to be rated on a five points scale; this was: 1 = strongly disagreed; 2 = disagreed; 3 = neutral; 4 = agreed; 5 = strongly agreed. The following table presents their ratings.

**TABLE VI - 2: COMPUTER EXERCISE NUMBER ONE.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>$\bar{x}$</th>
<th>$\sigma$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I found the notes easy to understand</td>
<td>4.5</td>
<td>0.5</td>
</tr>
<tr>
<td>The notes are not essential</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Further explanation of the questions in the program is needed</td>
<td>3.8</td>
<td>1.2</td>
</tr>
<tr>
<td>I was enthusiastic about using the package</td>
<td>2.3</td>
<td>0.5</td>
</tr>
<tr>
<td>The results are clearly set out</td>
<td>4.0</td>
<td>0.0</td>
</tr>
<tr>
<td>I got meaningless results</td>
<td>2.3</td>
<td>0.5</td>
</tr>
<tr>
<td>I got bored while at the terminal</td>
<td>3.2</td>
<td>1.3</td>
</tr>
<tr>
<td>I spent a great deal of time in discussions after running the program</td>
<td>2.0</td>
<td>1.3</td>
</tr>
<tr>
<td>I'm interested in knowing more about the computer model</td>
<td>4.3</td>
<td>0.5</td>
</tr>
<tr>
<td>I feel I have gained a good understanding of this topic through using the package</td>
<td>3.7</td>
<td>0.5</td>
</tr>
</tbody>
</table>
The time spent in reading the instructions and performing the exercise varied from about one hour ten minutes to two hours, of this time between 3/4 of an hour and an hour was spent interacting with the terminal. Some comments were also written on the form, the following are two of these:

"I wish the computer wasn't so overloaded with the terminals that you have to wait so long for plots"

"We got bored at the terminal when we only wanted to study the energy graphs and had to wait for the displacement and velocity graphs to be drawn first".

7.5 The laboratory exercises.

There were five laboratory exercises; four of them were compulsory and the other one optional because on another of their courses - Electricity and Electronics - they had a demonstration very similar to the exercise in question. The pieces of equipment were in the resource centre and available five days a week during working hours; no booking was necessary. Like the computer exercises, these were thought to give a better understanding of some topics and to reinforce them in the context of vibrations. Instructions for them, in a semi programmed form, were left beside the equipment.

Generally speaking the exercises were found very helpful for the understanding of some concepts; however students felt that "the laboratory did not contribute as much as the computer to the course, but the exercises were interesting to do and were of great relevance to the course". In addition to the usual difficulties in getting maximum accuracy in the measurements, the most common trouble encountered by students was firstly with some deficiencies of the
equipment and secondly with the use of some instruments, e.g. oscilloscope. The average time spent on each exercise was 45 minutes.

As in the case of the computer exercises, students were asked to fill in a feedback sheet after they had done the different exercises: the next section provides the information from one of these and a sample is provided in appendix VI.

7.6 Example: laboratory exercise number one.

Title: "Simple Harmonic Motion"

Number of forms filled in: 12

General aim: to obtain a clear understanding of the basic characteristic of Simple Harmonic Motion.

Four items were asked to be rated on a five points scale, given in the following table, which has the items, the scale, the means and standard deviations.

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale</th>
<th>Mean (μ)</th>
<th>Standard Deviation (σ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty of the exercise</td>
<td>1 = very easy, 5 = very difficult</td>
<td>1.1</td>
<td>0.3</td>
</tr>
<tr>
<td>The interest of the exercise</td>
<td>1 = boring, 5 = very interesting</td>
<td>2.7</td>
<td>0.7</td>
</tr>
<tr>
<td>The relevance to the course</td>
<td>1 = irrelevant, 5 = very relevant</td>
<td>3.8</td>
<td>0.8</td>
</tr>
<tr>
<td>The usefulness of instruction</td>
<td>1 = useless, 5 = very useful</td>
<td>3.9</td>
<td>0.8</td>
</tr>
</tbody>
</table>
Some of the comments mentioned were:

- Difficulties with equipment (four students)
- Measuring accurately (five students)

Suggestion made: "to replace the simple pendulum by another pendulum, e.g. torsion pendulum".

7.7 The film.

At the beginning of the second term the film "Steady Waves and Progressive Waves" (Service D’Film, Research Scientific, 96 Bld. I Iaspial, Paris 6, France) was shown during one of the tutorial periods. Students were strongly advised to watch it and it was available for those who wanted to watch it again. The film replaced the laboratory and computer exercises as a learning resource to back the theory, because, as the lecturer pointed out: "I was trying to get away from intuition and get onto mathematical modelling, so in a sense this is a development. The second term is more conceptual, more theoretical than the first. I hope to have got students to the point to accept that not everything has to be backed up by using it or illustrating it, which after all is something that helps you, it doesn't actually convince you. So I thought that illustration through that film, which is such an excellent film, might serve the purpose". Students agreed in so far as the film gave them "a valuable image of waves and on velocity of waves".

8. COURSE ASSESSMENT

8.1 The assessment scheme.

The usual way of assessing students in universities is through an examination at the end of the course. The importance of such an
examination was clear in this course since it could test students on their ability to handle the concepts they had learnt, the use of mathematics and so on. As the course had a number of non-specific aims, the opportunity of doing an assessed project, which was seen as a vehicle to achieve some of those aims, was given to the students, leaving entirely to them the initiative in selecting the subject. It consisted of a written account of a particular topic related to vibrations and/or waves. Students chose subjects like seismology, musical instruments, ultrasonics. For those students who did the project, the final mark was equally distributed between the final examination and the project, and for those students who did not do it, the mark came from examination only.

Students reacted favourably to the project: all of them wrote one, either individually or in pairs. They felt that "it was a good idea to be able to do a project as some people tend to do badly when pressured by the exam and if all marks rest on the exam this could be disastrous".

8.2 Examination results.

The following graph gives the examination results of the eleven students who finished the course. The vertical axis plots the Vibrations and Waves results, the horizontal one the students average mark on their eight courses and the diagonal indicates the same examination mark performance for the Vibrations and Waves course as for the other courses. Each student is represented by a cross, but as previously mentioned only two of the four groups worked as such. Students in these groups are ringed and squared respectively.
GRAPH VI - 1: EXAMINATION RESULTS.

It could be easily argued that students who worked in groups and got top marks on the course are the most conscientious ones anyway, but from the graph it is possible to see that the two good groups did comparatively very much better for the Vibration course as they did for the other courses, they are above the diagonal; while the students in the other two groups lay nearer the line, which means that they did about the same for the Vibrations and Waves course than they did for their other courses.
On the completion of the course, eight students agreed that the course structure, group work, tutorials, use of resource centre, etc. encouraged them to do more work on the Vibrations and Waves course than they did for their other courses. It was also felt that it was one of the most demanding in time and work, and that all the extra work done for the course was rewarded with better marks.

9. ACHIEVEMENT OF AIMS

9.1 Content aims.

The content aims will firstly be stated, and then the views on them of staff and students are presented.

b) To derive the wave equation as a mathematical model of waves in one dimension and to develop the model in order to illustrate wave phenomena.

Every unit had its own set of objectives. For example, the objectives of one of the units, picked at random, were:

"UNIT 12. Dispersion and Energy Transport.

Objectives:
1. To appreciate in a dispersive medium, that a wave group consisting of the superposition of a number of sinusoidal waves travels with a velocity different from the velocity of the individual sinusoidal waves.

2. To be able to state the phase and group velocities formulae."
3. To be able to calculate group velocity, given the phase velocity as a function of the wave number and wave length.

4. To appreciate that wave carries energy.

On the first aim, students and lecturer agreed in considering that the course covered, during the Autumn term, the topic of vibrations and students in particular mentioned that they had realised that the same mathematical model describes both mechanical and electrical vibrations.

Regarding the second aim, students mentioned that as they "saw only one type of waves" they were not so sure about its achievement and some of them emphasised that they would have liked to have seen more applications of the wave phenomena to different situations in the real world.

For the lecturer the two aims were "broad enough to cover anything of the contents and they stressed the mathematical side".

9.2 The non specific aims.

The questionnaire at the end of the course included a question regarding the non-specific subject aims, which asked both staff and students to rate on a five points scale how important they thought these aims were for the course. The meaning of the scale was from 1 = not an aim to 5 = a very important aim. Ten of the eleven students who finished the course as well as the teacher and computing officer returned the questionnaire. The table below gives the means and standard deviations of their responses on both aims for undergraduates in their first year, as formulated by Cowan (1975d), and aims for the use of the resource centre.
TABLE VI-4: NON CURRICULAR AIMS.

a) AIMS OF UNDERGRADUATES IN THEIR FIRST YEAR.

1. To express his thoughts lucidly and pertinently when he is required to use the written or spoken word.

2. To read profitably for himself, with a minimum of direction and assistance, technical literature whether in the form of textbooks, research papers or reports.

3. To derive and formulate the answers to questions of varying complexity, without direction.

4. To take an enquiring initiative, asking pertinent questions without prompting.

5. To observe intelligently, accurately and promptly within his chosen field and to assess the value of these observations.

6. To formulate conclusions and deductions.

<table>
<thead>
<tr>
<th>STUDENTS</th>
<th>STAFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>σ</td>
</tr>
<tr>
<td>3.60</td>
<td>0.84</td>
</tr>
<tr>
<td>3.40</td>
<td>1.51</td>
</tr>
<tr>
<td>3.10</td>
<td>1.10</td>
</tr>
<tr>
<td>3.60</td>
<td>1.26</td>
</tr>
<tr>
<td>3.30</td>
<td>1.16</td>
</tr>
<tr>
<td>3.80</td>
<td>1.27</td>
</tr>
</tbody>
</table>

b) AIMS OF THE RESOURCE CENTRE.

1. To aid in the study of the course through the inclusion of computer exercises and audio tapes.

2. To encourage co-operative study between students.

3. To provide facilities for students to prepare material relevant to the project.
4. To permit better interaction between students and teacher.

5. To make the study of vibrations and waves more attractive.

The graph below compares students and staff views on the aims of undergraduates in their first year. They are indicated according to the numbers in the above table VI-4.

**GRAPH VI - 2: AIMS OF UNDERGRADUATES**

It is clear from the graph that:

a) Students considered all six aims were fairly well covered by the course activities, since at the end of the course they thought the aims were fairly important (they are in the range from 3 to 4 in the
scale), while staff views were widely spread.

b) These aims were set out for the course because of their relevance to the course intention of contributing to student development of independence (see sections 4.1 and 4.2 in this chapter). However, disagreement on some of them is observed in the graph, in particular on aim (1) on student's expression of their thoughts, aim (5) on observation and on aim (6) on formulating conclusions.

The next graph provides the staff and students views on the aims of the resource centre. They are also indicated according to the numbers in table VI - 4.

**GRAPH VI - 3: AIMS OF RESOURCE CENTRES.**
It is interesting to note from the graph that:

a) Agreement on some of the aims of the resource centre was greater than on the aims for undergraduates in their first year: aim (1) on aiding the study through the inclusion of learning resources, aim (3) on the provision of supplementary materials and aim (5) on making the study more attractive. These lay nearer the diagonal which indicate complete agreement between students and staff.

b) Aim two on encouraging co-operative study between students was particular relevant to the course intention of contributing to students interdependence from each other. Students saw this aim as much less important than staff, which is consistent with the fact that about half of the students worked in groups as they were expected.
CHAPTER VII; CASE STUDY - THE ASTON LEARNING AIDS LABORATORY

1. INTRODUCTION

This chapter deals with the second case study: the study of the learning aids laboratory of the Chemistry and Pharmacy departments at the University of Aston in Birmingham. Here again, as in chapter VI, it may be useful to enumerate the outstanding features that contributed to make the Aston learning aids laboratory a useful case study for the project:

a) The project was concerned with science and engineering departments and the Aston laboratory is run for Chemistry and Pharmacy courses.

b) The laboratory was the first learning centre to be established at departmental level.

c) It is a learning centre run by one member of the staff, who is supported by a few staff members, and is available for most students in the departments. That is to say, the laboratory is representative of one of the three kinds of departmental centres classified in section 7.2 of chapter V.

d) The materials available in it serve various purposes: general background to subjects, support to, and replacement of, certain lectures.

e) A second department had joined the laboratory for various reasons.

The report on the study begins with a brief outline of the laboratory and the way the study was conducted. It then presents a rather long, but necessary section on the history of the laboratory. Next its organisation is documented and sections on staff, students, learning
resources and on staff-students interactions are presented. Finally there is a section on how far the laboratory fulfilled its aims, as seen by the staff and students.

2. BRIEF OUTLINE OF THE LEARNING AIDS LABORATORY

The laboratory was established by the Chemistry Department of the University of Aston in Birmingham in 1970. In 1972 the Pharmacy Department became associated with the laboratory, since when it has been operated jointly by the two departments. It was opened with the intention of "providing access for students to a variety of audiovisual materials", which up to then had only been used in conventional lectures, "and also to provide other learning materials to be produced specially for use in the laboratory", in order to assist students in learning and understanding their subjects.

The learning aid laboratory opens five days a week in term time and for certain times during vacations. Its use is optional. It is operated on an optional basis with almost no rules and although a wide range of learning aids is available in it, it does not cover all aspects of the departments' course syllabuses.

3. THE STUDY

3.1 Setting up the study.

As the Aston learning aids laboratory seemed to be the first departmental learning centre to be established in this country—and I have not found so far any evidence to contradict this—I approached the laboratory organiser and expressed my wish to study it. This was kindly agreed. It was decided to carry out the study after
consultation on how the information to be obtained was to be used and discussions on the style of such a study—primarily concerned with description and interpretation. Thus it became 'the first time that a learning aids laboratory is researched in this manner' as was recognised by the laboratory developer.

3.2 Methodology.

The methodology used during the study was that described in chapter III. In summary, it is a multimethod approach in which no method or technique has any privileged status and which aims to provide the people involved—and also those who are not—with information and insight of the educational practices which are being studied.

3.3 Techniques.

Several techniques were used in carrying out the study of the laboratory. These included: observation—structured and unstructured; informal talks to students and staff; interviews with them; questionnaires; attitude check lists; and analysis of documents.

The study was extended over four terms during which the laboratory was visited approximately once every three weeks on average—15 half day visits. During these, laboratory activities were observed and 32 informal talks with users were held. Interviews were held with four demonstrators, 7 staff, the Head of the Chemistry Department and 17 students. The laboratory organiser was formally interviewed on three occasions and there was a large number of informal talks with him. As a way of facilitating talks with non-users of the laboratory and as "the bar in the union is a more widely used place to discuss Chemistry", I arranged to stay overnight on two occasions; in those evenings it was possible to talk to 8 non-
users, two of whom had used the laboratory a couple of times earlier. Questionnaires were prepared to sustain and quantify information with more numerous audiences; these included attitude check lists regarding both various teaching and learning methods and the aims of the laboratory. Many quotations were taken from a number of departmental documents and published material.

It is important to stress that the questionnaires were used to quantify the more qualitative information obtained from other sources, i.e. unstructured observation and interviews. They were distributed to a number of members of staff in the two departments, of whom 20 filled them in and returned them. The student questionnaire was distributed to some students during lectures. 72 student-users returned the questionnaires. In the two cases—students and staff—they were asked to fill them in on a voluntary basis.

4. THE DEVELOPMENT OF THE LABORATORY

This section will attempt to summarise the history of the learning aids laboratory, from just before its birth until the beginning of the study reported here. It is entirely based on departmental documents and on interviews with several members of the staff, including the Head of the Chemistry Department.

4.1 Some factors that contributed to the establishment of the laboratory.

a) Students criticisms. As has already been said, the late 1960s were characterised by student unrest and revolt on various matters; see section 3.1 in chapter IV. At the University of Aston in general and in its Chemistry Department in particular "there was,
at that time, some discussions with students; students were very critical of the lecture". Their major concerns were regarding the quality of the teaching they were receiving, on what was the use of the lecture and similar matters. "They believed that there was too much lecturing and not enough private study, not enough use of other materials rather than teaching".

b) A favourable climate for educational experiments. Two major factors -amongst many others- can be cited as contributing to a favourable climate for the establishment of the learning aids laboratory. One was "Harold Wilson's white-hot technological revolution of the 1960s", which brought into education new resources and what came to be called educational technology, "or educational development as many people would prefer to call it". The other factor was that "the U.G.C. had put out a report about audio visual aids and so on and there seemed to be a general climate in which people wanted to try out new methods in education".

c) An enthusiastic lecturer. "The history of the learning aids laboratory turns very much on Mr. Peter Groves, who was an enthusiastic for other methods of teaching". He has been "the main instigator" all through the life of the laboratory, and it was he who initially thought that it was quite "illogical that models, slides, overhead projector transparencies and sometimes film loops should be used in the lecture room and students should not have subsequent access to them". Summing up, it should be said that "he has really been the man who has looked to the different methods and ways of teaching and decided what things should go in the learning aids laboratory".

d) A sympathetic Head of Department. The establishment of the laboratory is also due to the sympathetic support by the Head of the
Chemistry Department who, initially listened to the case for the learning aids laboratory, decided on whether resources available would allow an experiment of that sort and, considering it worthwhile, gave the go ahead, trying not to squeeze out money from other departmental activities.

4.2 Origins of the learning aids laboratory.

As has already been mentioned, the origins of the Aston learning aids laboratory are related to the desires and initiative of Peter Groves. The initial idea was "simply to put existing teaching aids into a room to which students could have access"; that is, all audio visual aids which he and a few other staff members, were using at that time for their lectures, were made available for students further use by putting them into a rearranged room, specially furnished and equipped for the purpose; transforming thus the existing teaching aids into learning aids. From there on the laboratory began producing materials for specific purposes, e.g. learning aids to help students with particular courses. It also started purchasing some commercially available materials.

4.3 Some developments of the laboratory.

Since it was established in 1970, there have been a number of developments in the learning aids laboratory. Three of these are briefly described and analysed below: development of learning aids, departments, and staff attitudes towards the laboratory.

4.3.1. Development of learning aids. In 1970 when the laboratory began operating, all existing teaching aids were put into it.

a) From there on the organisers of the laboratory "were particularly
interested in making audio tapes" and production of these started. In some cases the audio taped material covered the lectures, some material supplemented lectures and in "one or two cases materials in fact replaced the lecture". The main reason for this particular development was: people involved perceived some advantages in their use, such as for instance that of "being self pacing, continuously available and so on".

b) Another major development of learning materials was the accommodation in the laboratory of the department's small computer - Micro 16 with 8K core store, two on-line teletypes and 500 cps PTR- which made it possible for students to run programs for some of their experiments, in particular those on Physical Chemistry, and also to develop computer assisted learning in various chemistry courses. Lately a computer terminal, with visual display, linked to the university computer -1905E- has been incorporated in the laboratory. Through this the applicability of computer assisted learning for some of the chemistry courses has been widened considerably. For the two types of computer terminal -teletype and visual display- there exist instructions for students to teach themselves to program the computer. These are in the form of an audio tape recorded course for the former and in book form for the latter.

c) By 1973 the laboratory had got television equipment, for both video recording and play back. An exploration of the potential of TV began and a programme to produce video tapes was decided upon. The "original intention was to make some video tapes of experimental techniques", showing students how to, for example, make up a mole for the I.R. spectrometer, or how to operate N.M.R. machine, or how to use the Ph meter. However due to reduction of the laboratory's
personnel (see section 4.4), the implementation of the programme has been rather limited. Production of video tapes has been restricted to lecture type presentations, which can be produced in a little studio area inside the learning aids laboratory and are technically simple, that is using two fixed cameras.

d) A number of other learning aids have been developed in and for the laboratory, such as tape/slide presentations -synchronised and unsynchronised-, collection of lecture notes, reprints of journal articles and books; for a complete list of learning aids used see section 8. Also many other learning aids have been obtained from academics in other higher education institutions and/or commercial firms.

4.3.2. Departments: As has already been said the learning aids laboratory was established by the Chemistry Department and after two years the Department of Pharmacy became associated with it. Since then it has been operated jointly by the two departments. The Pharmacy Department's interest in the project arose for various reasons. Some of these are: some courses run in the two departments, in particular those of a background nature and/or first year courses for Honours or Master Degrees, have certain similarities; quite a few members of the Pharmacy Department were interested in the development; the Pharmacy Department did not have the space available for developing its own laboratory; to a certain degree repetition in both equipment and learning aids could be avoided in this manner.

4.3.3. Staff attitudes. One of the most interesting developments associated with the learning aids laboratory concerns staff attitudes towards it. At the time of establishing the laboratory there was
very little enthusiasm for it; "most of the academic staff were against it"; they considered that it was not worthwhile, not a justifiable expenditure, not a good investment. However, with the setting up of the laboratory "usefulness has been demonstrated in certain areas" and a lot of the criticisms from the staff has evaporated, and in fact "quite a lot have been converted to, some have not" and some of these will not be since they "would not even use an overhead projector in a lecture".

4.4 A problem affecting development.

Besides the difficulties derived from both establishing the laboratory and little initial support, the laboratory has faced a major problem: the loss of its technician. The laboratory had for a time a technician, who left by late 1973 and due to an economic constraint at that time the post was frozen. Since then the department has been unable to replace the technician because the money has not been available. This has had a number of implications for the development of the laboratory, such as for instance on the video recordings; although the equipment is portable, the necessary number of hands to take it round to research laboratory has not been available and production has been limited to video recordings inside the learning aids laboratory. Another implication is that the laboratory organiser has been overloaded with work and some jobs have not been done, e.g. up dating users' guides, and others are done much more slowly, e.g. equipment maintenance.
5. DOCUMENTING THE LEARNING AIDS LABORATORY ORGANISATION

5.1 Laboratory philosophy.

The philosophy of the laboratory covers several aspects, which embrace both students and staff. The ones to be analysed in this section are: making materials available and providing a handy study place for both students and staff; the interface with professionals in the media unit; encouraging educational development.

5.1.1. Making materials available for students. Unlike books, which are readily available - mainly in bookshops and libraries - and can be taken home, other materials, often called technical aids, e.g. films, slides, "are not quite so easily portable and facilities for viewing them ought to be provided". Thus the learning aids laboratory makes these and other technical aids - whose use is rather limited because of the hardware - "as readily available to students as possible".

5.1.2. Providing a handy place. The laboratory is accommodated within the Department of Chemistry and in the same building as the Department of Pharmacy, though on a different floor, thus fulfilling the organisers' idea of providing the learning aids in a place which is close to subject expertise and in which they can also do their own work.

5.1.3. Interface with professionals. The laboratory is "a sort of interphase in between the department and the professional in the central Communication Media Unit". Many academics are not prepared and sometimes are "frightened off by professionalism". For first attempts, the laboratory provides, for example, facilities for audio recordings of reasonable quality and by the time staff wish to record
or re-record on more professional equipment they "are prepared to have a professional looking over their shoulder".

5.1.4. Educational development. The laboratory is seen as the research laboratory for educational development, allowing educational experiments to be carried out, which could not be done otherwise. The laboratory is also a means of encouraging staff to improve their teaching methods because it provides facilities for it and "there is inevitably some pressure within the department for people to produce materials".

5.2 Staff involved.

Various people are involved in the learning aids laboratory. These are members of the academic staff and postgraduate students; in both cases they come from the Departments of Chemistry and Pharmacy.

5.2.1. Staff members.

a) Laboratory organisers. There is one member of staff from each department (one a senior lecturer and the other a lecturer) in charge of running the laboratory: Peter Groves from Chemistry and Dr. O. Darwing from Pharmacy; in practice the former deals with its day to day running due to various reasons (see section 6.1), as well as providing supervision twice a week and communicating about the laboratory activities with the two departments.
b) Demonstrators. There is another staff member involved in the learning aids laboratory -Dr. Gregory (Chemistry Department)- who supervises it once a week. Supervision is complemented by postgraduate students who are on duty in the laboratory in blocks of three hours.

c) Other staff. Several other members of the staff are involved with the provision of materials (see section 6.1).

5.3 Space.

The learning aids laboratory is accommodated in a rearranged room which was previously a teaching laboratory. It has about 500 square feet, divided into four areas: the laboratory itself, an inner office for the laboratory organiser, another inner room which houses the departmental computer and some store cupboards, and a television studio area in one of the room's corner.

The learning aids laboratory has fourteen tables, arranged as study booths, some of which are to be used with specific media, such as for example tape slide presentations or film loop viewing. There are also six tables for student work and the learning resources are located on open shelves fixed to some of the walls.
5.4. Resources.

Two quite different periods on the life of the learning aids laboratory can be distinguished regarding its allocation of resources:

An initial one, of about three years, in which the department was "comparatively well off" and a second one since then, when there has been "serious financial restrictions".

The equipment of the learning aids laboratory was in large measure purchased during the first period mentioned above, and "was not terribly expensive, other than the computer and television". About nine thousand pounds were spent on the computer and about eight thousand pounds on the television equipment; it should be said here that by the time the latter was bought the Pharmacy Department had already joined the project and so the television equipment was financed by the two departments. As for the other equipment purchased at the beginning - tape players, slide projectors, slide viewers, etc. - not more than five hundred pounds were spent in all.

Since the Department of Pharmacy joined the learning aids laboratory there has been joint finance and in "principle every thing is paid by the two departments."
The laboratory gets a set allocation of money from both departments, but this is not in a separate account, rather the laboratory is "allowed to spend up to for that much in the two departments using the normal ordering procedure". Each department allowed £780 to be spent on demonstrators; this in turn governs the hours that the laboratory is open. They also contributed £100 each for consumable materials; mostly xeroxing, printing, purchase of tapes and so on.

The laboratory does get some of this money back for a number of reasons. Students are charged a small amount for some of the printing material. The Open University uses its premises and equipment and they contribute something. The Chemical Society has also been using the facilities and are charged for it. The income from these sources constitutes a separate Learning Aids Fund, which is "representing a little bit of private initiative on the part of the learning aids laboratory". At the time the study took place the fund had about £100. It is mainly used to purchase or contribute to the purchasing of learning aids produced elsewhere.

5.5 Learning Aids.

The laboratory organisation described in this section makes available a great variety of learning resources for student's individual use. The following table lists the wide range of materials available in the laboratory and section 8 deals with them in more detail:

<table>
<thead>
<tr>
<th>TABLE VII - 1: LIST OF LEARNING RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>audio tapes</td>
</tr>
<tr>
<td>slides</td>
</tr>
<tr>
<td>O.H.P. transparencies</td>
</tr>
<tr>
<td>tape/slide presentations (synchronised)</td>
</tr>
</tbody>
</table>
taped/slide presentations (unsynchronised)
film loops
film strips
video tapes
micro 16 computer based materials
1905 computer based materials
models
books
lecture notes
reprints
collection of Ph.D. and M.Phil. theses of the department

6. STAFF

This section attempts to summarise the staff's views on the learning aids laboratory. It is entirely based on seven interviews with staff members, some of whom were interviewed more than once, and on several informal talks with the laboratory organisers, also on a questionnaire which was returned by 20 staff members.

6.1 Degrees of involvement.

a) Departments. The involvement of the two departments is similar insofar as the finances of the laboratory are concerned, but not regarding the participation of their members. On the whole, Pharmacy as a department participates less in it for various reasons; firstly because the laboratory is geographically located outside the department, secondly because for some reason or another Pharmacy staff seem to have "less time available for the learning aids laboratory" and thirdly because there are several new members of the staff who "do not know much about the learning aids laboratory at all".
b) Individual members. The involvement in the laboratory also varies between staff members and they are "rather polarised". The range of participation goes from those who "are quite keen" and who have used the laboratory via some who are willing, but "flesh is weak and they have not got around to doing it" to "some who are plain anti".

6.2 Reasons for not using the laboratory.

A number of reasons were given by staff members for not using the laboratory, mainly that they do not have time and that the exercise is not worthwhile. The free time left from their other activities was considered to be very limited and they considered that this time as well as the departmental money should be spent on research in order to "make a name for the department". Other reasons given were "lack of awareness of existing materials", "inappropriate for particular courses", "lack of interest".

6.3 Some staff criticisms.

A major criticism which has come from the staff is that the room has not been used as much as they would have hoped considering the investment. In particular the investment on the TV equipment has been criticised because its use has been small and it has become "rather an embarrassment" to the departments. The lack of information about the laboratory has also been criticised; one particular staff member said that "it is terribly difficult to find information in the mounds of paper that comes my way". It was said too that "Pharmacy students seem to have been given little information about its facilities". There is a lack of exchange of information and experience amongst staff; some staff feel that they "probably act too independently and in some cases could do more by way of team effort". A few staff members have
mentioned that they "do not feel encouraged by the L.A.L.", that "a permanent technician is necessary", that some of the postgraduate demonstrators "are totally useless" and that the laboratory should open "at hours of most use to students", e.g. 5 - 7 p.m. and "whenever else they are free".

6.4 Staff contributions towards the laboratory.

There are different ways in which members of the staff contribute to the laboratory's work. These are: knowing about it and advertising it, producing materials for it, sending students to it, looking in and getting involved, purchasing or recommending purchase of materials, assisting with supervision, etc.

The following table gives the types of materials the twenty staff who filled in the questionnaire have contributed to the laboratory together with an indication as to how they are made available and how they are expected to be used regarding the lectures.

<table>
<thead>
<tr>
<th>TABLE VII - 2 TYPES OF MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of staff</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>audio tapes</td>
</tr>
<tr>
<td>video tapes</td>
</tr>
<tr>
<td>films</td>
</tr>
<tr>
<td>slides</td>
</tr>
<tr>
<td>computer based materials</td>
</tr>
<tr>
<td>O.H.P. transparencies</td>
</tr>
<tr>
<td>models</td>
</tr>
<tr>
<td>reprints</td>
</tr>
<tr>
<td>duplicated lecture notes</td>
</tr>
</tbody>
</table>
6.5 Some perceived advantages.

Several advantages of having the learning aids laboratory are perceived by the staff. Amongst these are firstly the fact that it allows "research and development work on teaching" and that it provides "teaching methods which are efficient and not available elsewhere". Secondly that staff are enabled "to learn - to produce better material by discovery and criticisms from students and colleagues". Another area in which the laboratory is meant to help is in that as the university library is far away from the departments' building, it provides a "handy reading/studying place", and in that it centralises departmental facilities that would exist anyway, e.g. computer, electronic calculators. It is also seen as advantageous that some materials are made available to students which cover materials presented in lectures and that suitable material from elsewhere is available too. Regarding students, staff feel that the laboratory is good for them because they are faced with "learning which is active and self-paced". Also because "students can assess their understanding of some subjects" when working in the laboratory.

7. STUDENTS

This section on students presents the learning aids laboratory as seen by them. It is based on interviews, observation and questionnaires.

7.1 Courses for which the laboratory is available.

Generally speaking, the learning aids laboratory is available for all undergraduate and postgraduate students in the Chemistry and Pharmacy departments. The approximately 700 students are distributed amongst the following degree courses: Ordinary and Honours in Chemistry and Pharmacy; Combined Honours in Chemistry/Biochemistry; Physiology/
Biochemistry/Pharmacology; M.Sc., M.Phil., and Ph.D. postgraduate courses.

7.2 Teaching effectiveness.

Students are taught, within the departments, through a diversity of teaching modes, some of which include the use of the learning aids laboratory. It became clear from student interviews that they had different preferences and in order to identify more closely their attitudes in this respect, the questionnaire included a question in which students were asked to rate a number of teaching methods on a four point scale in terms of their teaching effectiveness. The following table presents their views.

It is important to point out that as the distribution of student attitudes was not a normal one — in the statistical sense — but skewed to the right, the results are presented in two different ways: the number of students rating each of the categories are presented in the first column while the second column provides means, standard deviations and number of students answering that particular item.
TABLE VII - 3: TEACHING EFFECTIVENESS

<table>
<thead>
<tr>
<th>Method</th>
<th>1 = Very poor</th>
<th>2 = Not very effective</th>
<th>3 = Fairly effective</th>
<th>4 = Very effective</th>
<th>5 = No opinion</th>
<th>$\bar{x}$</th>
<th>$\sigma$</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional lectures without notes issued by lecturer</td>
<td>2</td>
<td>16</td>
<td>37</td>
<td>9</td>
<td>2</td>
<td>2.9</td>
<td>0.70</td>
<td>64</td>
</tr>
<tr>
<td>Conventional lectures with notes issued by lecturer</td>
<td>-</td>
<td>6</td>
<td>32</td>
<td>27</td>
<td>-</td>
<td>3.3</td>
<td>0.64</td>
<td>65</td>
</tr>
<tr>
<td>Audio tapes accompanied by printed notes</td>
<td>2</td>
<td>10</td>
<td>26</td>
<td>23</td>
<td>3</td>
<td>3.1</td>
<td>0.81</td>
<td>61</td>
</tr>
<tr>
<td>Audio tapes accompanied by slides</td>
<td>2</td>
<td>10</td>
<td>24</td>
<td>21</td>
<td>7</td>
<td>3.1</td>
<td>0.83</td>
<td>57</td>
</tr>
<tr>
<td>Slides plus printed notes</td>
<td>3</td>
<td>9</td>
<td>27</td>
<td>16</td>
<td>5</td>
<td>3.0</td>
<td>0.83</td>
<td>55</td>
</tr>
<tr>
<td>Films</td>
<td>4</td>
<td>16</td>
<td>22</td>
<td>15</td>
<td>3</td>
<td>2.8</td>
<td>0.90</td>
<td>57</td>
</tr>
<tr>
<td>TV. programmes</td>
<td>4</td>
<td>16</td>
<td>21</td>
<td>17</td>
<td>2</td>
<td>2.9</td>
<td>0.92</td>
<td>58</td>
</tr>
<tr>
<td>Books</td>
<td>4</td>
<td>14</td>
<td>31</td>
<td>14</td>
<td>-</td>
<td>2.9</td>
<td>0.83</td>
<td>63</td>
</tr>
</tbody>
</table>
7.3 Monitoring the use of the learning aids laboratory.

I monitored the use of the laboratory during a year -5 May 1976 to 1 April 1977- with the help of demonstrators and a form designed by the laboratory's organisers. Demonstrators filled in the form hourly on the half hour, indicating the number of student users in the laboratory. The form, which is included in the appendices (see appendix VII) was also used to record some aspects of demonstrators' activities (see section 9.1).

The table below provides a summary of students attendance of the laboratory. There is a column for each day, sub-divided to indicate the attendance in the morning (10.00 to 12.00 hours), lunch (12.00 to 14.00), afternoon (14.00 to 17.00) and the day's total (total column). Each row accommodates one week, the starting date being given at the left side. Sub-total by days and terms are given and the grand total by days are given on the bottom row, while the last column carries the totals by periods and weeks. The year's grand total is given on the bottom right hand corner.
<table>
<thead>
<tr>
<th>SUMMER TERM</th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
<th>SATURDAY</th>
<th>TOTAL</th>
<th>GRAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEK 3/5/76</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>4</td>
<td>13</td>
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<td>915</td>
<td>915</td>
<td>915</td>
<td>915</td>
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</tr>
</tbody>
</table>
Some interesting points to be noted from the table are:

a) Throughout the year the laboratory saw an increase in both opening hours and students attendance. Particularly notable is the doubling in attendance from the Autumn to Spring term, while the opening time increased only slightly.

b) Even considering that the laboratory was open for longer periods on these days, Tuesday and Thursday were the days with higher attendance.

c) The most popular period was on Tuesday afternoon.

d) The total number of student-periods, as counted by the method described, was 2,779.

7.4 Using the learning aids laboratory.

7.4.1. Regular and occasional users. Of those student users who filled in the questionnaire, 60% were from the Chemistry Department and 40% from Pharmacy. 40% were first year students, 29% second year, 21% third year and 10% postgraduates. 42% of them used the laboratory on a regular basis, that is between once a fortnight and three or more times a week. 58% used it occasionally.

7.4.2. Reasons for the use of the laboratory. Student users found it very useful and very helpful to use the learning aids laboratory. Useful because it allowed them "to get background knowledge to back up lecture notes" and because it played a very important role which is "comparable with that of the tutorial"; in a tutorial students "dissipate doubts about problem solving" and in the learning aids laboratory they "dissipate doubts on the lecture material". They found it helpful because "there is always someone who can help". Also they found it "great in comparison with more traditional methods..."
of teaching", in particular those who found some difficulties in following the lecture, e.g. taking notes. Students liked the opportunity of using the learning aids at their own pace, because "not everybody is very clever and some people are slower than other". Also the possibility of using some materials which although they "have not been made by the lecturers themselves are very relevant and similar" to their courses. In addition the laboratory "is useful in that it is conveniently close and laid out in such a way that the material required may be found easily without the search often required in libraries". Other reasons given why students use the laboratory were: 'to use the computer terminals', get past papers, work for essays, get a general outlook on specific topics, to complete experiments. With a view to quantifying the reasons given for the use of the laboratory, a question was included in the questionnaire which asked students to tick those uses which applied to them. The following table provides their answers and differentiates between regular and occasional users.

**TABLE VII - 5 : REASONS FOR THE USE OF THE LABORATORY.**

<table>
<thead>
<tr>
<th>Reasons Why You May Be Using The Laboratory</th>
<th>Regular</th>
<th>Occasional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>- to support the lectures</td>
<td>23</td>
<td>23</td>
<td>46</td>
</tr>
<tr>
<td>- to get help on difficult subjects</td>
<td>15</td>
<td>24</td>
<td>39</td>
</tr>
<tr>
<td>- to get past examination papers</td>
<td>21</td>
<td>29</td>
<td>50</td>
</tr>
<tr>
<td>- to get help from demonstrators</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>- to cover lectures you missed</td>
<td>6</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>- to discuss subjects with students</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>- to prepare essays, papers, etc.</td>
<td>10</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>- to use the models</td>
<td>10</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>- to use the computer or calculators</td>
<td>13</td>
<td>15</td>
<td>28</td>
</tr>
<tr>
<td>- to consult books and/or reprints</td>
<td>22</td>
<td>27</td>
<td>49</td>
</tr>
</tbody>
</table>
7.4.3. Efficiency of study. It would seem that regular and occasional student users of the laboratory were somehow divided regarding its impact on the efficiency of their studies. Quite a few regular users mentioned that the laboratory "has a real effect" on their study habits; moreover that they "have become habituated to its use". These students also considered that the laboratory "has had a considerable effect on their study efficiency", in particular those who found it harder to follow the lectures. In contrast, but not in opposition to this, a number of occasional users felt that the laboratory's impact 'depended on the individual', "on the subject and material available", recognised that "there is a strong case for the traditional side", and "whether or not they learn more, that is up to the individual really".

7.5. Some reservations.

There are four major areas in which students have expressed their reservations about and criticisms of the learning aids laboratory. These are regarding opening times, space, materials and staff and students awareness of the laboratory.

7.5.1. Opening times. Generally speaking students have mentioned that the laboratory is not opened long enough during the day and that its opening times are not related to their free time. In particular students who preferred to work in the evenings expressed dissatisfaction with the fact that the laboratory is not open at that time.

7.5.2. Space. Students felt that the laboratory is accommodated in a room which has become "too small to pack so many things". They also felt that there were too few tables for students' use, especially at peak times because most people like using the ones with blinds.
Students complained that at times they get disturbed in their work in the laboratory by talks between students or discussion with demonstrators, however they strongly felt that the tutorial help available should be maintained and that the way to get round the problem was the introduction of an inner laboratory quiet room, available for reading and quiet study only.

7.5.3. Learning aids. Although students recognised that the range of materials is quite wide and good for some lecture courses they, on the whole, consider that these are inadequate for many of their lecture courses, in particular courses offered by the Pharmacy Department. Generally speaking students felt that the laboratory is short on books, lecture notes and exam papers from previous years; also that some of these are out of date. Many students thought that one computer terminal connected to the university's computer was not enough for their needs, that its availability depended on whether Mr. Groves was available, and that there were not enough instructions for self-use.

7.5.4. Lack of awareness. Students were particularly worried about the low participation of staff in general in the laboratory and said that they seemed not to know about it, nor to be informed of what was available in it. Students complained that staff do not usually refer them to the laboratory and that as a consequence of this - as well as the absence of an index - they were not fully aware of what was available in the learning aids laboratory. It may be useful to quote from two different student interviews in order to illustrate their views. The first one is a typical view regarding staff participation and the second on students lack of awareness of the laboratory.

Student A: Members of staff never give material in the learning
aids laboratory, so possibly they don't realise what material is there or don't think it is significant ... Usage of it by students would increase if this material was brought to their attention by members of staff ... I don't think most people know what material there is in the laboratory so the sheets giving recent additions to stock which are put on Department notice boards should be complemented by a list indicating most of the available material relevant to Pharmacy or Chemistry students as appropriate.

Student B: "... unfortunately nobody said to us that there were things relevant to our course up to the starting of the second term ... I don't think that just in the second term all these things became available ... the most probable case is that they were last year also ...".

7.6 Non users.

The reasons that non-users of the laboratory had, were related to both not knowing about the laboratory and preferring to work in other places and/or times. In fact quite a few students mentioned that they prefer to use the library because they can find in it the information they need. Another "reason is that some do not do private study during the hours the laboratory is open - but at night" while some due to other commitments, do not have the time during the day. Some students said that they did not know about it mainly because they "have not been introduced to it".

8. LEARNING RESOURCES/AIDS.

Elsewhere there has been mentioned of the laboratory's learning.aids (see sections 4.3 and 6.1) and they are now viewed in more detail.
According to their expected use they can be classified into three different categories, although some may belong to more than one.

a) Materials to supplement and/or back up conventional lectures.

b) Materials to replace and/or act as an alternative to conventional lectures.

c) Materials for general background / interest.

8.1 New materials.

There are basically three ways in which learning resources are incorporated in the laboratory. These are: purchase from commercial firms and academics elsewhere; through a collaborative scheme developed by the Chemical Society Educational Techniques Subject Group, in which there are several chemistry learning aids laboratories participating; and by production within the laboratory.

Of the twenty staff members who returned the questionnaire, seventeen are using some learning material and the following table provides their answers to questions on their training in the preparation of learning aids and on the guidance they are getting for their production.

<table>
<thead>
<tr>
<th>TABLE VII - 6 : STAFF TRAINING</th>
</tr>
</thead>
<tbody>
<tr>
<td>item</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Have attended course for their preparation</td>
</tr>
<tr>
<td>Would like to attend such a course</td>
</tr>
<tr>
<td>Getting guidance for the production</td>
</tr>
</tbody>
</table>
8.2 Monitoring the learning aids use.

Two different methods were employed to monitor the use of the learning aids in the laboratory. These were: in the questionnaire students were asked to indicate what sort of material they used most and the second one was through structured observation. The schedule for structured observation is included in appendix VIII.

8.2.1. The questionnaire. One of the question in the questionnaire listed a number of learning aids available in the laboratory, against which students indicated those they used most. The table overleaf gives their answers.
The list did not include books, however 17 students indicated that these were the aid they used most.

8.2.2. Structured observation. During five weeks 28 February 1976 - 1 April 1976, the use of learning aids was monitored with the help of the demonstrators through a structured observation schedule, in which the numbers of students using different aids were entered at hourly intervals. This is presented according to weekly use in the next table.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Number of students (out of 72 replies)</th>
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<tr>
<td>Audio tapes</td>
<td>43</td>
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<tr>
<td>Video tapes</td>
<td>7</td>
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<tr>
<td>Films</td>
<td>1</td>
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<tr>
<td>Slides</td>
<td>24</td>
</tr>
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<td>Transparencies</td>
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<tr>
<td>Computer based materials</td>
<td>11</td>
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<tr>
<td>Models</td>
<td>16</td>
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<tr>
<td>Reprints</td>
<td>24</td>
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</table>

The list did not include books, however 17 students indicated that these were the aid they used most.
### TABLE VII - 8: USE OF LEARNING RESOURCES II

<table>
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<tr>
<th>ITEMS</th>
<th>NUMBER OF STUDENTS PER WEEK</th>
<th>TOTAL</th>
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<td>Audio tapes</td>
<td>28  17  24  13  6</td>
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<tr>
<td>Slides</td>
<td>-   2   1   -   -</td>
<td>3</td>
</tr>
<tr>
<td>O.H.P. transparencies</td>
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<td>-</td>
</tr>
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<td>11</td>
</tr>
<tr>
<td>Tape/Slides (unsynchronised)</td>
<td>-   6   2   -   5</td>
<td>13</td>
</tr>
<tr>
<td>Film loops</td>
<td>1   -   -   -   -</td>
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<tr>
<td>Film strips</td>
<td>1   -   -   -   -</td>
<td>1</td>
</tr>
<tr>
<td>Video tapes</td>
<td>8   7   3   6   -</td>
<td>24</td>
</tr>
<tr>
<td>Micro 16 Computer materials</td>
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<td>18</td>
</tr>
<tr>
<td>1905 E Computer materials</td>
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<tr>
<td>Models</td>
<td>-   3   -   4   2</td>
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<tr>
<td>Books</td>
<td>79  26  35  38  27</td>
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<tr>
<td>Lecture notes</td>
<td>14  13  27  10  18</td>
<td>82</td>
</tr>
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</table>

9. **Staff-Students Interactions.**

Within the laboratory activities there are two types of formal staff-student interactions; these concern the assistance available for students and the feedback activities carried out in the department on the whole and in the laboratory in particular.

9.1. **Assistance available in the Laboratory.**

Supervision of the laboratory is arranged in such a way that there is always a postgraduate demonstrator or a member of staff on duty both to
assist students with any problem or difficulty regarding either subjects or equipment and to keep the laboratory tidy. The form used to monitor the use of the laboratory was also used to record the time devoted by demonstrators to assist students; this is presented in the table overleaf, which in the left-hand column gives the time in minutes and the right-hand one the number of users involved. Information is given by day, week, term and the whole year that the monitoring lasted.

9.2. Some Difficulties.

There were the usual difficulties with the equipment, i.e. breakdowns, faults and not knowing how to operate it. Students also had difficulties with demonstrators. Pharmacy students did not find those from the Chemistry Department very useful because "they are Chemistry biased" and conversely students thought that some demonstrators were not very well prepared to assist them, "particularly with helping students with their work and problems which are outside the demonstrator field ... These have usually been related to practical work ... and some idea of practical work being undertaken in different courses could be beneficial".

9.3. Feedback.

Generally speaking formal feedback on all matters regarding departmental activities is obtained through a students committee, which has had specific discussions on improving the laboratory work, particularly its opening times and the possibility of incorporating in it a quiet reading room. There also exists a Learning Aids Group formed by chemistry staff members; this meets on occasions and students have been invited to participate in order to have a student-staff interchange of ideas about the laboratory work. At the time when the laboratory still had its technician, a questionnaire was issued to students, aiming to obtain more direct and formal feedback. It has not been possible to repeat
### Assistance to Students

<table>
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<tr>
<th>Time Devoted (in minutes)</th>
<th>Number of Users Involved</th>
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<td>5 49</td>
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<td><strong>Total</strong></td>
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<td>Friday</td>
<td>10 10 10</td>
</tr>
<tr>
<td>Saturday</td>
<td>03 03 40</td>
</tr>
<tr>
<td><strong>Week 4/10/76 Sub Total</strong></td>
<td>125 90 34 138</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6 hrs 27 min</td>
</tr>
<tr>
<td><strong>Week 5/17/76</strong></td>
<td></td>
</tr>
<tr>
<td>Monday</td>
<td>05 30 10 15</td>
</tr>
<tr>
<td>Tuesday</td>
<td>15 16 20 25 20</td>
</tr>
<tr>
<td>Wednesday</td>
<td>05 10 20 34</td>
</tr>
<tr>
<td>Thursday</td>
<td>05 05 35</td>
</tr>
<tr>
<td>Friday</td>
<td>15 5 15 14 25</td>
</tr>
<tr>
<td>Saturday</td>
<td>30 20 15 10</td>
</tr>
<tr>
<td><strong>Week 5/17/76 Sub Total</strong></td>
<td>220 166 23 132 27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17 hrs 39 min</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>2059 minutes to assist 499 students</td>
</tr>
</tbody>
</table>
this, because the laboratory now has not got "the necessary number of hands" to organise such an enterprise as well as others, such as for instance the organisation of an indexing system. In other words "some clerical assistance" appears to be desirable.

10. Fulfilment of aims as seen by those involved.

The list of aims of learning centres compiled from various sources, see section 11 in Chapter V, was included in the questionnaires to staff and students. They were asked to indicate how well the Aston learning aids laboratory fulfils those aims; this was done on a four point scale according to the following code: 4 = very well, 3 = fairly well; 2 = not very well; 1 = not at all. There was also a column for "no opinion". Results are given in tables VII - 10 and VII - 11.
### TABLE VII - 10: STAFF VIEWS ON AIMS

<table>
<thead>
<tr>
<th>AIM</th>
<th>Very well (4)</th>
<th>Fairly well (3)</th>
<th>Not very well (2)</th>
<th>Not at all (1)</th>
<th>No opinion</th>
<th>( \bar{x} )</th>
<th>( \sigma )</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>2.5</td>
<td>1.18</td>
<td>10</td>
</tr>
<tr>
<td>(ii)</td>
<td>1</td>
<td>3</td>
<td>11</td>
<td>-</td>
<td>4</td>
<td>2.3</td>
<td>0.62</td>
<td>15</td>
</tr>
<tr>
<td>(iii)</td>
<td>2</td>
<td>11</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2.8</td>
<td>0.73</td>
<td>18</td>
</tr>
<tr>
<td>(iv)</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>2.8</td>
<td>0.90</td>
<td>17</td>
</tr>
<tr>
<td>(v)</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>-</td>
<td>2.8</td>
<td>0.96</td>
<td>19</td>
</tr>
<tr>
<td>(vi)</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>-</td>
<td>3</td>
<td>2.5</td>
<td>0.72</td>
<td>17</td>
</tr>
<tr>
<td>(vii)</td>
<td>7</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>3.5</td>
<td>0.52</td>
<td>14</td>
</tr>
<tr>
<td>(viii)</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>2.6</td>
<td>1.09</td>
<td>14</td>
</tr>
<tr>
<td>(ix)</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>-</td>
<td>5</td>
<td>3.3</td>
<td>0.63</td>
<td>14</td>
</tr>
<tr>
<td>(x)</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>8</td>
<td>2.5</td>
<td>0.82</td>
<td>11</td>
</tr>
</tbody>
</table>
**TABLE VII - 11: STUDENTS' VIEWS ON AIMS.**

<table>
<thead>
<tr>
<th>Aim</th>
<th>Very well</th>
<th>Fairly well</th>
<th>Not very well</th>
<th>Not at all</th>
<th>No opinion</th>
<th>( \bar{x} )</th>
<th>( \sigma )</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) to provide a room in which students can discuss their work with other students.</td>
<td>4</td>
<td>12</td>
<td>23</td>
<td>17</td>
<td>7</td>
<td>2.0</td>
<td>0.90</td>
<td>56</td>
</tr>
<tr>
<td>ii) to provide a room in which students can discuss their work with demonstrators.</td>
<td>5</td>
<td>16</td>
<td>23</td>
<td>13</td>
<td>4</td>
<td>2.2</td>
<td>0.91</td>
<td>57</td>
</tr>
<tr>
<td>iii) to provide learning materials which can be an alternative or replacement for conventional lectures.</td>
<td>12</td>
<td>35</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>2.9</td>
<td>0.76</td>
<td>60</td>
</tr>
<tr>
<td>iv) to make the study of Chemistry, Pharmacy, etc. more attractive.</td>
<td>8</td>
<td>29</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>2.7</td>
<td>0.88</td>
<td>54</td>
</tr>
<tr>
<td>v) to encourage students to develop the ability to learn independently.</td>
<td>13</td>
<td>34</td>
<td>12</td>
<td>1</td>
<td>3</td>
<td>3.0</td>
<td>0.70</td>
<td>60</td>
</tr>
<tr>
<td>vi) to provide resources for students to prepare materials (essays, papers) for use in seminars, tutorials, etc.</td>
<td>13</td>
<td>25</td>
<td>19</td>
<td>1</td>
<td>5</td>
<td>2.9</td>
<td>0.78</td>
<td>58</td>
</tr>
<tr>
<td>vii) to provide access to crystal and molecular models.</td>
<td>35</td>
<td>16</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3.5</td>
<td>0.73</td>
<td>57</td>
</tr>
<tr>
<td>viii) to encourage and enable staff to develop improved teaching methods.</td>
<td>4</td>
<td>17</td>
<td>18</td>
<td>6</td>
<td>17</td>
<td>2.4</td>
<td>0.84</td>
<td>45</td>
</tr>
<tr>
<td>ix) to provide direct access to a computer and to a variety of electronic calculators.</td>
<td>22</td>
<td>19</td>
<td>6</td>
<td>-</td>
<td>14</td>
<td>3.3</td>
<td>0.70</td>
<td>47</td>
</tr>
<tr>
<td>x) to provide an alternative study place to the library.</td>
<td>13</td>
<td>27</td>
<td>16</td>
<td>4</td>
<td>3</td>
<td>2.8</td>
<td>0.85</td>
<td>60</td>
</tr>
</tbody>
</table>
Five of these aims were particularly relevant to the learning aids laboratory, see section 5.1 of this chapter. These are:

(i) to provide a room in which students can discuss their work with other students.

(iii) to provide learning materials which can be an alternative or replacement to conventional lectures,

(vii) to encourage students to develop the ability to study independently,

(viii) to encourage and enable staff to develop improved teaching methods,

(x) to provide an alternative study place to the library.

The following diagram presents comparatively the staff and students' attitudes to the five particular aims. Points near the diagonal indicate close agreement between staff and students.

**Diagram VII - 1: Agreement on Aims**
CHAPTER VIII : CASE STUDY - A SELF INSTRUCTIONAL BIOLOGY LABORATORY

1. INTRODUCTION

The third case study is on the Boyd Orr Self Instructional Biology laboratory of the University of Glasgow. As with the other two case studies, it is useful to enumerate those factors which contributed to the choice of this laboratory as a case study:

a) The general study was concentrated on science and engineering departments and the laboratory is concerned with Biology, while the other case studies were concerned with Physics and Chemistry respectively.

b) The laboratory is run by one member of the academic staff and is available to a very large number of students on an optional basis only, which makes it representative of one of the categories of learning centres described in section 7.2 of chapter V.

c) The laboratory organiser was willing to have an investigation into how the laboratory was working out.

d) The laboratory presents a peculiarity worth studying: the laboratory developer had left the department due to economic constraints, which produced a change in the management, though not in its philosophy.

This chapter is based on an interim report on the evaluation of the laboratory, which was primarily addressed to its organisers with a view to aiding decision making regarding its future. Following a brief outline of both the laboratory and the study, the main core of the chapter is based on a number of questions, some of which were the
ones the laboratory organiser wished to be answered. The answers to these questions, which are listed below, attempt to summarise the information obtained during the study. The following is the list of questions:

When and how did the laboratory start?
Why was the laboratory evaluated?
How was the laboratory evaluated?
How is the laboratory organised?
What is the philosophy of the laboratory?
What is the involvement of the teaching staff?
What materials are available in the laboratory?
Who can use the laboratory?
Did students know about the services provided?
How much and why do students use the laboratory?
What do students use?
Does the use of the laboratory help students in any way?
What were the students reactions to the laboratory?
How would students like to see the future of the laboratory?
In what subject areas would students like to see more materials?
What sort of media would students like to see more?

2. WHEN AND HOW DID THE LABORATORY START?

2.1. The laboratory.

The self instructional laboratory started in 1972 as one of the results of a project set up by the Department of Zoology in order to develop tape slide programmes on Developmental Biology and Animal Behaviour for the first year biology classes. Also some commercially produced materials were incorporated in it. After three years the
full time developer left the department and since then the laboratory has been manned by a member of the Zoology Department on a part time basis as his share of the departmental administrative responsibilities.

2.2 Growth of the laboratory.

The laboratory has continuously grown in space and learning materials, and presently comprises three rooms; various members of staff (academic and non academic) are involved in it and a wide range of learning resources are available on many aspects of the first year biology classes.

3. WHY WAS THE LABORATORY EVALUATED?

3.1 Factors contributing to the study.

A number of factors contributed to the study. Firstly the willingness of the laboratory organiser that the laboratory should be evaluated. Secondly the fact that the Zoology Department had not got the number of staff which would allow somebody to be dedicated fulltime to the laboratory. Thirdly, the fact that at the University of Surrey a research project was being carried out and the evaluation would provide a case study for such a project.

3.2 Setting up the study.

After discussion and subsequent correspondence the evaluation study was decided upon and an evaluation proposal was produced stating that the study would attempt to provide a sensitive understanding of issues connected with the laboratory work, particularly those connected with its use by students. The proposal is included in the appendices (see appendix I).
4. HOW WAS THE LABORATORY EVALUATED?

4.1 Evaluation approach.

The general evaluation approach used during the study was that described by Parlett and Hamilton (1972). In short, this is a multimethod approach and its primary concern is with accurate description and interpretation. It is a suitable strategy for investigations where a comparative and statistical study is inappropriate, as is the case with the self teaching biology laboratory. See chapter III for a detailed description of this approach.

4.2 Stages of the evaluation.

The study was planned in two stages, quoting from the proposal:

"The study will begin in the Summer term and continue throughout the Autumn term. An explanatory week long visit (Summer) will be followed by periodical focussed investigations (Autumn)."

4.3 First stage: exploratory.

During the exploratory week long visit the information was collected as follows:

Monday and Tuesday were left for both intensive observation of the activities in the laboratory and informal talks with some of its users (23 students). On Wednesday there were interviews with three members of the staff and in order to talk to the non-users of the laboratory I asked for authorisation to assist in one of the practical classes on the Wednesday afternoon, which was kindly given and eleven student non-users were interviewed.
In order to confirm and quantify the information obtained from these students a questionnaire (prepared in the evening of Wednesday and typed and multicopied on the morning of Thursday) was given out to the 268 Ordinary Biology students who attended a time tabled lecture on Thursday afternoon. 142 students returned it on the Friday and during the following week.

On Friday there was further observation in the laboratory and more formal pre-arranged interviews with seven students, and with the laboratory demonstrator.

4.4 Second stage: focussed.

The visits for the Autumn term had to be postponed until the Spring term; this was due to the fact that during the Autumn term, lifts were out of order and the self instructional laboratory, which is situated on a ninth floor, was not visited by students: "with the lifts being out of order one doesn't climb to the 9th floor all that often". The second stage of the study was concentrated on another week long visit to the laboratory and information was obtained in the following manner:

There was observation of the students activities within the laboratory. 17 student users were interviewed for about 15 to 30 minutes. Another 32 students were interviewed during their practical work, 18 of whom were non users of the laboratory. During observation and student interviews, particular attention (focussed enquiries) was paid to both the students' acquaintance with the laboratory and their interactions with their staff. Seven members of staff were interviewed, including a professor. The same questionnaire as in the previous term was
distributed to students, but to the medical class this time; 75 filled
in questionnaires were returned.

A follow up two questions questionnaire was also prepared: ordinary
biology second year students were asked to indicate how often they
had used the self instructional laboratory in their first year as well
as what subject matters covered by the learning resources they had
used. It aimed "to find out if there exists any relationship between
the use of the self instructional laboratory and student exam
performance". The questionnaire was administrated during a practical
class and had, therefore, a 100% response. 83% of the students were
attending that particular practical class.

5. HOW IS THE LABORATORY ORGANISED?

The laboratory is located in a mostly first year teaching building -
Boyd Orr- with only administrators and technicians as permanent staff.
Teachers come from service departments.

5.1 Departments involved.

Four departments are involved in the self instructional biology
laboratory. These are, with their approximate share of the biology
first year classes in brackets: Zoology (more than a third), Cell
Biology (less than a third), Genetics and Botany (about a third
between them).

5.2 Staff involved.

All from the Department of Zoology.
a) Laboratory organiser whose main concern is the provision of
new learning resources (including occasional displays on course related
topics) in consultation with staff members, in particular with the tutor in charge of the Ordinary Biology first year class.

b) Demonstrator, who sits twice a week (for an hour and a half each time) in the laboratory in order to provide help for students on any matters relating to their courses.

c) Part time secretary, responsible for the day to day management of the laboratory.

d) Graphics artist, mainly employed by the department, who assists with displays and the production of well designed notices.

e) 9th floor's janitor (not from Zoology, but from the Boyd Orr Building), who now and then enters one of the laboratory's rooms in order to keep order and ask non users of learning resources to leave the laboratory.

5.3 Links.

No formal links exist between the laboratory and the departments involved. All contact with staff is at the moment on a personal basis. Contact with students exists through the staff-student committee of the biology first year class. This deals with all sorts of teaching aspects one of which is the self instructional laboratory.

5.4 Space.

The laboratory is accommodated in three rooms:

a) Room 907 on the 9th floor of 135 squared metres, which is shared with the Chemistry Department, open five days a week from 9.00 to 17.00 hours. It has 24 student study places and is equipped with five tape players, 15 slide/film strip viewers and 2 film loop projectors.
b) Room 724 on the 7th floor of 120 squared metres, open from 9.00 to 17.00 hours from Monday to Friday. It has 12 study places and its equipment consists of microscopes.

c) Secretary's office on the 7th floor, which accommodates desks for the secretary and demonstrator.

5.5 Resources.

From the budget for the first year class teaching a small amount (£250 per year) is allocated to the expenses of the laboratory for consumables, repair of equipment and purchase of material and/or equipment, organisation of displays.

6. WHAT IS THE PHILOSOPHY OF THE LABORATORY?

The first year biology classes have very large numbers of students and a good many of them have never done biology before. Staff have realised that some of these students find it difficult in the first few lectures and that this kind of person may feel helpless and confused very early on. So what the laboratory is "trying to do is to get self teaching developed to a good extent such that two things happen."

6.1 Providing school level materials.

First of all, whenever materials come up that are relevant to the necessary background, they are made available for students use in the self teaching laboratory in order to support the lecture material. At the same time other materials are made available, which are more suited to the person who has done a lot of biology at school and "who is wanting to be pushed and who is finding lectures all a bit easy". In either case students are told that if they are interested, or are a bit lost, or want some extra explanations, they can help themselves by doing some extra work in the self instructional laboratory.
6.2 Providing supplementary materials.

The second thing which staff want to happen is that when, for one reason or another, students cannot finish their practical work, or want to do further study in a particular subject they are dealing with in any given week, they may go to the laboratory and find the appropriate materials. These are materials which are related to the course and may be used to support and/or back the materials presented in lectures.

6.3 Summary.

In summary: The main aim of the self instructional laboratory is to help student learning via an alternative way and to provide an extension for work outside the curriculum.

7. WHAT IS THE INVOLVEMENT OF THE TEACHING STAFF?

7.1 Lecturers of the first-year classes.

There are about 40 staff members involved in the teaching of the first year classes. There are various levels of involvement, such as: tutors in charge of classes, lecturers, laboratory demonstrators (staff and postgraduate students). As far as lecturing is concerned, it is shared by many people. Thus, in the case of the Ordinary Biology Class, lectures are given by eleven members of staff, who come from the service departments mentioned in section 4.1; while the lecturing for the Medical and Dental Class is done by another eleven staff members and for the Veterinary Class, by five members of the staff.

7.2 Production of learning resources.

The great majority of the non-print learning resources housed in the laboratory were produced or purchased at the time it was run by the
full time developer, who had the assistance of six staff members from the Zoology Department. Since then the growth in learning resources has been in print materials: books, reprints of published articles and transcripts of audio tapes, which are selected by the laboratory organiser in consultation with the teaching staff. Another area in which the laboratory has grown is in connection with the provision of materials used in practical classes, e.g. microscope slides, diagrams, etc. This is done by the laboratory organiser in collaboration with the tutor in charge of the Ordinary Biology Class.

7.3 Staff involvement in the laboratory.

The participation or involvement of the general staff in the self instructional laboratory is low, which has the implication that students do not get much information about it (see section 9). However, staff members have had a number of reasons for not participating in the laboratory. These range from being frankly opposed to the existence of the laboratory to lack of time for it. Strong opposition came from people who felt that "the philosophy of the university has got onto the wrong track" because too much information is being predigested for students; also because in the universities the primary resource is books, and these are already available in libraries. Another aspect mentioned by staff members in connection with their non participation in the laboratory was that the provision of additional material takes a lot of effort and time from what university is for, i.e. their own scholarship.

On the other hand, members of staff who are sympathetic to the laboratory and would provide materials for it have recognised that their involvement with the first year teaching, usually a couple of weeks for lecturers, does not give them enough time to get really
involved in the self instructional laboratory. However, one member of
the staff is planning to put one or more of his three lectures on
tapes and use the lecturing time for questions only.

8. WHAT MATERIALS ARE AVAILABLE IN THE LABORATORY?

8.1 Learning resources housed in the laboratory.

In room 907 there are 114 items of learning resources in the form of
cassette tapes, workbooks, film strips, notes, slides, film loops,
programmed texts, wall charts, and occasional displays. These cover
the following subject areas: Cell Biology, Genetics, Developmental
Biology, Micro-organisms, Plants, Plant Physiology, Animals, Animal
Physiology, Animal Behaviour, Environment, Social Biology, Techniques,
Evolution, Experimental Design, Quantitative Biology.

In room 704 there are materials relevant to the practical classes
i.e. slides, electron micrographs. It also houses a collection of
reprints and books.

All materials in these two rooms are available on open access, with the
exception of books which have to be obtained from the secretary, to be used within the premises.

8.2 Types of materials.

About half the materials available are of general background to courses,
and the other half for supporting and/or backing the lectures and
practicals.

8.3 Purpose of making materials available.

The laboratory is optional for the students and a handout
distributed to them at the beginning of the year states the main
purposes for making these learning resources available to them, as follows:

"Many students learn most effectively working at their own speed and in their own time. A library full of books is the traditional self paced learning resource, but there are now many ways of learning besides reading books. There are also many aspects of Biology that are difficult to appreciate from books alone. Our self instructional facilities aim to provide some of these new ways of learning and some of the biological material you can’t easily learn from books”.

9. WHO CAN USE THE SELF INSTRUCTIONAL LABORATORY?

The learning resources available in the laboratory may be used by all students taking a degree course with a biological core in it; they are not restricted to first year students. However, the learning resources are provided, in the first instance for the following first year classes (in order of greater relevance): Ordinary Biology Class, Medical and Dental Class, and Veterinary Class.

10. DID STUDENTS KNOW ABOUT THE SERVICES PROVIDED IN THE LABORATORY?

10.1 The survey.

All Ordinary Biology student-responders to the quantifying questionnaire (including non users) were aware of the facilities provided by the self instructional laboratory. The situation was different for the responders from the Medical and Dental Class, where 8% did not know about the facilities.
10.2 Student views.

Students mentioned that they got to know about the laboratory through firstly, the handout given out at the beginning of the year; secondly, through the practical schedules; and thirdly, through the occasional reference to it by staff members during lectures. Notice boards were thought to be of little use in communicating information about the laboratory due to the large amount of notes on them. Regular users of the laboratory mentioned during interviews that only a 'handful of the class' makes full use of the facilities available; that they do not get enough information from their staff, since 'they hardly mention the laboratory during lectures'; and that it is up to the student's own initiative to visit the laboratory and see what is available for particular lecture materials.

11. HOW MUCH AND WHY DO STUDENTS USE THE LABORATORY?

11.1 Use of the laboratory.

Of the 217 responses to the survey 66% of the students were from the Ordinary Biology Class and 34% from the Medical and Dental Class. As the use of the laboratory is different for these classes, the following table shows its use by classes and the total number of users is given on the right hand side of the table.
Table VIII - 1: Use of the Laboratory.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n  %</td>
<td>n  %</td>
<td>n  %</td>
</tr>
<tr>
<td>Regular users</td>
<td>142 142 212</td>
<td>70 70 212</td>
<td>212 212</td>
</tr>
<tr>
<td>(between once a fortnight to two or more times a week)</td>
<td>37 26 17</td>
<td>3 4 2</td>
<td>40 19</td>
</tr>
<tr>
<td>Occasional users</td>
<td>82 58 39</td>
<td>36 51 17</td>
<td>118 55</td>
</tr>
<tr>
<td>Non users</td>
<td>23 16 11</td>
<td>31 44 20</td>
<td>54 36</td>
</tr>
</tbody>
</table>

11.2 Regular users.

Regular users had the following two reasons for using the laboratory: to clear up half understood topics in the lecture and/or to complete work for the practicals. The fact that the laboratory is a handy and quiet place also contributes to its use. Students also use it, but to a lesser degree, to supplement their lectures, to see the displays, to get deeper insight into topics, and to catch up with missed lectures.

11.3 Occasional users.

Almost all non and occasional users said that lack of time is their main reason for not making use of the facilities. Some of them said that they prefer to study in other places, such as the libraries or at home, and a few of them because they prefer to learn from books.

12. What do students use?

12.1 Types of materials used.

Of the two types of learning resources housed in the laboratory -
those related to lectures and practicals and those related to background materials - the former ones are used in preference: 65% of the Ordinary Biology Class and 44% of the Medical and Dental Class. Only 11 and 17 students (7.6% and 19% respectively) preferred the background materials.

12.2 Subject areas used.

The subject areas covered by the materials used are as follows, with the number of Ordinary Biology and Medical and Dental users indicated in the left hand column and the totals on the right one.

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>O.B.</th>
<th>M.D.</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Biology</td>
<td>62</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td>Genetics</td>
<td>60</td>
<td>9</td>
<td>69</td>
</tr>
<tr>
<td>Animal Physiology</td>
<td>41</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>Quantitative Biology</td>
<td>40</td>
<td>-</td>
<td>40</td>
</tr>
<tr>
<td>Developmental Biology</td>
<td>39</td>
<td>28</td>
<td>67</td>
</tr>
<tr>
<td>Plants</td>
<td>38</td>
<td>-</td>
<td>38</td>
</tr>
<tr>
<td>Plant Physiology</td>
<td>36</td>
<td>-</td>
<td>36</td>
</tr>
<tr>
<td>Experimental Design</td>
<td>32</td>
<td>-</td>
<td>32</td>
</tr>
<tr>
<td>Animals</td>
<td>26</td>
<td>-</td>
<td>26</td>
</tr>
<tr>
<td>Micro-organisms</td>
<td>26</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>Evolution</td>
<td>22</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>Animal Behaviour</td>
<td>19</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Environment</td>
<td>15</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Social Biology</td>
<td>14</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Techniques</td>
<td>14</td>
<td>-</td>
<td>14</td>
</tr>
</tbody>
</table>
12.3 Media used.

As each item is available in one medium only, the student's choice of media is limited. The most popular is tape slide/film strip workbook programmes, while the most frequent is film loop. Popularity of media was as follows:

<table>
<thead>
<tr>
<th>Media</th>
<th>O.B.</th>
<th>M.D.</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape slide/film strip workbook</td>
<td>79</td>
<td>26</td>
<td>105</td>
</tr>
<tr>
<td>Tape cassettes</td>
<td>69</td>
<td>21</td>
<td>90</td>
</tr>
<tr>
<td>Displays</td>
<td>56</td>
<td>5</td>
<td>61</td>
</tr>
<tr>
<td>Materials for practicals</td>
<td>52</td>
<td>11</td>
<td>63</td>
</tr>
<tr>
<td>Film loops</td>
<td>52</td>
<td>19</td>
<td>71</td>
</tr>
<tr>
<td>Posters and wallcharts</td>
<td>45</td>
<td>1</td>
<td>46</td>
</tr>
<tr>
<td>Books</td>
<td>43</td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>Programmed texts</td>
<td>31</td>
<td>17</td>
<td>48</td>
</tr>
<tr>
<td>Reprints</td>
<td>18</td>
<td>7</td>
<td>25</td>
</tr>
</tbody>
</table>

12.4 Human resources.

Human resources in the form of tutorial help have become recently available in the laboratory, but this is not being used very much at the moment. Ordinary Biology: seventeen students indicated in the survey that they had consulted the tutor and there was a slightly larger number of students (19) who did not know about this service. A good part of the questions asked of the tutor were in connection with the work of Quantitative Biology. The situation for Medical and Dental students was radically different: 5 students indicated that they had used the services of the tutor, while 47 students "did
DOES THE USE OF THE LABORATORY HELP STUDENTS IN ANY WAY?

(This question has partially been answered by the paragraphs on why students use the laboratory and what they use in it).

13.1 Use of materials.

Generally speaking students felt that the provision of facilities in the laboratory was of great help and a useful addition to the lectures. In particular, students using it regularly found that the expansion of their lecture notes by means of going through a programmed tape slide or the visualisation of topics obtained from a film loop helped them to reinforce what they have learnt. They found the laboratory very useful since it allows them to do further work on those subjects (when available) in which they felt weak or which they found of particular interest. It was also found very good for people who had not done any biology before and such students felt that the laboratory permits them to build up a background more easily than just from books: "Bring them down to a simpler level and you can take your time and go over several times the bits that don't sink in right away". However, some students were aware that as the laboratory was used on an optional basis, what they learn by using learning materials is somehow related to those topics that they find most interesting and/or exciting.

13.2 Displays.

The occasional displays were also thought to be very helpful, specially because they called students attention "to things they don't
think of" and they contributed to a large extent to students' awareness of a number of topics related to biology, in particular to the prevention of certain diseases. However, students did not think much of the display topic and did not study the displays with great detail, mainly because they were not relevant to what was being done in their lectures at the time. On other occasions they were out of time, e.g., the display on parasites was a term before the topic was treated in lectures.

13.3 Use of the laboratory and exam performance.

In order to see if there existed any relationship between student exam performance and use of the self instructional laboratory, second year zoology students were asked (through a questionnaire, see section 3.4) to indicate how often they had used the laboratory in their first year. This was related to their marks on the Ordinary Biology exam.

According to the use of the laboratory, students can be classified into users (either regular or occasional ones) and non users, while according to the exam performance, they can be classified into three different groups: those whose marks are between 50 and 60% of the total mark; those whose marks fall between 60 and 70; and those students whose marks are above 70%. The following table presents the percentage of students in each group.

<table>
<thead>
<tr>
<th>Exam marks</th>
<th>Users</th>
<th>Non-users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 70 (7 students)</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>60 to 70 (27 students)</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>50 to 60 (62 students)</td>
<td>52%</td>
<td>48%</td>
</tr>
</tbody>
</table>
It is clear from the table that percentagewise there was greater use of the laboratory by those with better exam performance. It is difficult to determine the impact of the laboratory on the exam performance because, firstly students who did reasonable well on their class examinations in December, March and May were exempted from the degree examination in June (38% of the class), and secondly, because although the exam consisted of an essay type section and a multiple choice section, there was no correlation between exam questions and learning resources; that is, none of the exam questions were constructed on the basis of any topic covered by learning materials. On the other hand it may well be that better students—those who had higher marks—in any case case tend to use any facilities provided to a greater extent. However, considering how students reacted to the laboratory (see section 10.1 above and 14.3 below), it can be said that the use of the laboratory and exam performance are mutually influencing each other. In other words, they are aspects of an interaction.

14. WHAT WERE THE STUDENTS REACTIONS TO THE LABORATORY?

Most of the students consulted reacted very favourably to the self instructional laboratory, however a number of them had some reservations and a few students were against it.

14.1 Disagreement.

The disagreement came from students whose views on the laboratory were related to their study styles, which did not include the use of the self instructional laboratory. These views were, that some students find their lecture notes quite self sufficient, that the laboratory is not necessary as long as lectures are followed and the relevant books
Disagreement also came from students whose main interest was in other subjects, e.g., medicine, chemistry. Some students did not think the laboratory was of any use to them, or did not bother to use it.

14.2 Reservations.

Some of the main reservations that students had regarding their use of the laboratory were that it opened only from 9.00 to 17.00 hours, time which is almost fully covered by time tabled lectures and practicals as well as by other personal commitment; that a great sense of self discipline in their study methods is required in order to follow-up topics (or complete them if half understood) from the lectures as regularly as they would wish; that at some times the laboratory, specially room 907, may become rather noisy.

Other reservations that students had were in connection with the materials available and/or the laboratory itself: some students felt that there was not enough choice of topics and that some of the materials were at too deep a level, which made them useful only to "people really interested". Quite a few students complained that at times some of the equipment was not in proper working condition, that there were not enough instructions on how to use the equipment and that nobody was permanently available in order to provide help on these matters. This can be illustrated with an observational note, which I wrote when talking to non-users during one of their practical classes:

O.N. It is surprising how many students are unwilling to use or are put off from using the lab. 'simply because' they don't know how to operate the machinery and nobody is there to help them.
14.3 Agreement.

Most of the student users thought the laboratory was a very good idea and that it provided an excellent supplement to their courses, allowing them to both cover the course material more fully and facilitate deeper private study of topics arousing their interest. Some students found it particularly good because it permitted them to move away from always learning from books, which in turn made their study more interesting, specially for those students who found it harder to learn from books. This is illustrated by the following quote from a student interview, which is typical of these students:

"I haven't done any biology before and Miosis and Mitosis are taken for granted ... I have seen them in books, but it wasn't of much help ... I've got a fair idea after the tape slide programme".

Students valued the opportunity of working at their own pace, which helps them "with the hard bits" and makes it easier "to develop confidence" on the subject matter being studied. A few of the student regular users were pleased "to see some departments at university using their acquired knowledge and experience to help the students in their long toil". Even some of the non users considered the facilities very valuable, but they found it difficult to use the laboratory, because of time contraints.

15. HOW WOULD STUDENTS LIKE TO SEE THE FUTURE OF THE LABORATORY?

In general terms student users would like to see the laboratory expanded in a number of ways. Some of these expansions are:

15.1 Increase in opening times.

A large number of students indicated that they would like the laboratory to close at least a couple of hours later in the evening in order to
use it after the set time tabled lectures and practicals.

15.2 Increase of the number of study places.

There are times, in particular at lunch time, when the laboratory gets very busy and the study places and/or the materials are not readily available. This might also mitigate another students complaint, that is that they wanted to stay in room 907 to consult their own notes or books before, during or after using a learning resource and not be asked to leave the laboratory and go to the reading room.

15.3 Increase of learning resources.

Students would like to see more learning resources, both existing and new ones, incorporating books also in room 907, to enable students to consult them in combination with the learning resources. The majority of students strongly felt that they would like more of those materials closely related to their course, because in that way they would benefit most. They also felt that they would like more supplementary material to enable them to pursue topics of their interest.

Students feelings were divided regarding a possible provision of learning resources as an alternative to the lectures. In the survey, 61 students indicated that they would like this sort of material, in particular to catch up with missed, or half understood lectures, 51 students did not want it at all and 61 students were not sure.

Students also suggested to include, as learning resources in the laboratory, copies of the lecturer's notes, answers to the problems set in Quantitative Biology and more past examination papers with the answers freely available.
15.4 Increase of equipment.

Increase in the quantity of learning resources necessarily implies an increase in the appropriate equipment. However students were particularly concerned with the present equipment, which is frequently faulty and they would like to see it replaced and hopefully more of it available, including microscopes.

15.5 Increase of human resources.

Students would like to see the laboratory with more formal and permanent supervision. Although only a few students have used the services provided by the demonstrator, they would like the tutor to spend more time in it and to be informed of her timetable. They would also like to see their teaching staff more involved in the laboratory, e.g. to mention more frequently what items are available for specific topics treated in the lecture.

16. In what subject areas would students like to see more learning resources?

Students found it difficult to both determine and suggest particular subject areas of absolute difficulty in which to have more materials in the laboratory. The reason for this was that they thought that it is a variety of factors which may make them not follow a topic in a lecture, i.e. drowsiness, heating on full, illness, staff and students' personality, etc., etc. Nevertheless the question was put into the questionnaire and although few students replied to it, it may be significant because they were asked to make a positive suggestion, limited to the existing subject areas covered by the materials. Their suggestions are presented in the following table.
<table>
<thead>
<tr>
<th>Subject area</th>
<th>O.B.</th>
<th>M.D.</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Design</td>
<td>22</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>Genetics</td>
<td>15</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>Developmental Biology</td>
<td>14</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>Quantitative Biology</td>
<td>12</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Evolution</td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Cell Biology</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Animal Physiology</td>
<td>9</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Plant Physiology</td>
<td>7</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Environment</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Techniques</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Social Biology</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Animal Behaviour</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Animals</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Plants</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Micro-organisms</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

17. WHAT SORT OF MEDIA WOULD STUDENTS LIKE TO SEE MORE?

The questionnaire also included a question on the type of media, available in the laboratory, they would like to see more. Again the significance of their answers lies in the fact that students are positively suggesting:
### TABLE VIII. MEDIA

<table>
<thead>
<tr>
<th>Media</th>
<th>O.B.</th>
<th>M.D.</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>27</td>
<td>13</td>
<td>40</td>
</tr>
<tr>
<td>Materials for practicals</td>
<td>24</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>Tape slide/film strip workbook programmes</td>
<td>20</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>Tape cassettes</td>
<td>18</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>Displays</td>
<td>14</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Film loops</td>
<td>14</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Programmed texts</td>
<td>11</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Reprints</td>
<td>11</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Wall charts</td>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
</tbody>
</table>
CHAPTER IX: LEARNING RESOURCE CENTRES - INTERPRETATIONS

( COMMON FEATURES AND DIFFERENCES )

1. INTRODUCTION

Chapters II and III were concerned with the evaluation methodology I used during the study, while from chapter IV to VIII the concern has been in one way or another with departmental learning resource centres. In this chapter I intend to make some interpretations of the educational practices described in the previous chapters, which to some extent necessitates a review of the aims set out in the introductory chapter (see section 3 in chapter I).

The main purpose of my research work was to evaluate the use of departmental learning resource centres. Related to this was an exploration of students learning. A third aim of my work was the effort to communicate to staff involved in centres about a possible applicability to their own situation of some evaluation techniques I had used. Thus the chapter begins with a number of interpretative comments on matters which are somehow general and/or common to departmental centres and to the people involved in them. I next consider learning resources and review the impact that departmental learning resources centres have had on teaching and learning. My third aim is covered in the following chapter in which I state my conclusions on how staff in centres might apply some of the techniques I used, as well as providing some examples of their use and some suggestions and analysis which may facilitate their application.
2. LEARNING RESOURCE CENTRE

2.1 Size and type of centres.

One of the basic assumptions made by people who have developed learning resource centres, and which is also one of the relatively most important to them (see chapter V, section 6) is that "Recent technological developments make an increasing amount of information available to students in the form of learning resources". In the late 1960s people began planning places in which such learning resources could be made available to students use and by 1970 learning resource centres started being established (see chapter V, section 5). This development occurred simultaneously both in higher education institutions in Great Britain and within their individual departments; and there would seem to be a relationship between the size of institutions and the kind of learning resource centre developed in them. It is often (but not always) found that in small institutions the tendency is for centres which are available for a large proportion of their students, if not for them all, in the form of institutional, or faculty, centres. In larger institutions the tendency appears to be towards the co-existence of institutional and departmental centres. However, in not more than a handful of institutions are there more than one departmental centre, and these departments do use the institutional wide centres, in particular their library services and sometimes their production facilities and/or play back facilities, e.g. booths, machinery, etc.

2.2 Most common type of centres.

Section 7.2.5 of chapter V classified departmental learning resource centres into three groups - those run by individuals, or few staff
members and several staff members— and the most common type of these is that in which a few members of the teaching staff are involved, who produce and purchase learning resources for their courses, especially course related materials and to a large degree for first year courses. In contrast, the general tendency in institutional centres is to house materials categorised as of general interest and background to subjects. However some of them also house course related materials, the incorporation of which into the centre is facilitated by contacts between the library/resource centre and departments (see section 3 in chapter V). The evidence does not suggest any relationship between the size of the institution and the kind of material housed in its centre, other than the fact that contacts between library/resource centres and departments depend very much upon the centres' human resources (see section 9 in chapter IV and section 3.2.1 in chapter V); that is on how much their staff can discover in association with people involved in departments, about the needs of the latter.

2.3 Professional and practitioners.

A matter worth mentioning here is that institutional centres are usually run by 'professionals'; that is, people who are trained librarians and/or, sometimes, educational technologists (see section 3.2.3 in chapter V). Departmental learning resource centres are usually run by practising teachers who have an interest in improving their teaching—and consequently students' learning—via educational innovations. It should be noted that very few of them have any training in educational technology (see section 7 in chapter IV, section 7.2.1 in chapter V and chapters VI, VII and VIII).

There can be no argument about the necessity for libraries and/or
institutional learning resource centres to be run by professionals because of their wide range and highly specialised activities. However, whether departmental learning centres should be run by practitioners or professionals is debatable since there are perceived advantages and disadvantages for either. The evidence suggests that departmental centres can be run by practitioners, in fact most of them are, with relatively few problems and/or inconveniences (see section 9 in chapter IV and section 7.2 in chapter V). At the same time it is true that the appointment of a professional or 'organiser' (see section 5.1 in this chapter) facilitates a large measure the running of the centre. One of the major perceived disadvantages of having professionals in departmental learning centres is that some staff members who are new-comers to the work of the centre, as well as some others with some experience of it, are not prepared to do what they are expected or can not cope with certain demands, or are just frightened off by professionalism. To illustrate this, I include the following story told to me: a lecturer, who wanted to make an audio tape of one of his lectures went along to get professional help. He was told how this was to be done: script - rehearsal - recording. He was to prepare the script, which would be scrutinised by the professional and when all was in reasonable shape they would go along to the recording studio. Every thing would be done very professionally, but he was just frightened off by this and was not prepared at that stage to do that. In short: he was not prepared to have a professional looking over his shoulder.

In contrast, such people find it easier to have an approach, which for an audio recording would consist of borrowing a tape recorder, taking it home and making the tape in a reasonable quiet room. They can then listen to it and if they are not satisfied, they can do it again.
It should however be pointed out that there are also staff members who prefer to make their recordings in a very professional way. (See also section 5.1.3 in chapter VII).

2.4 Trends.

It has already been mentioned that departmental learning resource centres started being set up by 1970, since when the number of centres has increased year after year and continues to do so. In this growth there has been a slight tendency for more departments to be involved in a particular centre: Initially centres were set up by individual departments, but more recently a number of departments of some affinity, and willing to establish a centre, have joined efforts to do so. In other instances, departments have joined in with an existing departmental centre within the same institution (see section 7.1 in chapter V and section 4.3 in chapter VII). There would seem to be two basic reasons for this: Firstly certain first year courses are common, or sometimes similar, for more than one department, which permits students in those departments to use the same learning resources. Secondly, the present economic climate in education, i.e. economic constraints, makes it more difficult for people in single departments to establish a learning centre by themselves. However, it should be emphasised that single department centres continue to be set up.

2.5 Bandwagon.

The concept of a learning resource centre is a fairly recent one. It is one out of many educational developments of the last decade. (See section 3.7 in chapter IV for a brief description of a number of educational developments). Because of the often glamorous nature of resource provision it is an aspect of modern development that has
attracted the limelight and the concomitant 'bandwagoners'.' (Tucker 1975). It is in fact quite often said that learning resource centres are the latest educational 'bandwagon', but it is difficult to determine how true this strong statement is; it may be applicable to the very few centres that were established not because of considerations regarding the need they might have to satisfy, but rather because staff thought it a good idea or because the experience gained in other places was considered successful. This may be the case for those departmental centres that began operating with materials of general interest and/or background - which broadly speaking are obtained from commercial firms and as will be seen later, are used only to a limited extent. However, it should be borne in mind that it is easier to purchase materials than to produce them, so that it is easier to start a centre in this way. On the other hand the evidence indicates that when these centres have incorporated course related materials, their use by students has improved considerably (see section 9.3 in chapter IV and section 4.1 in this chapter).

So, if learning resource centres are 'the latest educational bandwagon', then it will only be after sometime, when their development has come to a halt and they are being pushed along by a faithful few, that it will be possible to discern how many departmental -and institutional- centres were a product of it. It may be useful to draw a parallel with programmed learning, which had widespread use at sometime (see section 3.7 in chapter IV and section 12.2 in chapter V) and is now used only when thought appropriate; in universities mainly for remedial work.
3. PEOPLE

3.1 Staff participation.

Only relatively few staff members in departments are involved or participate in one way or another in learning centres. This became evident during my visits to places and it was confirmed by the survey carried out (this is described in section 1 of chapter V). Thus on average there are 37 members of staff in those departments that have established learning centres and on average only 6 of these have produced materials for the centres and/or participate in them, e.g. by providing supervision. It should be emphasised that since averages hide wide differences, they are used here only to indicate a general trend. There are quite a few small departments with a relatively large involvement of staff members in the centres. On the other hand there are quite a number of large departments with a low ratio of staff participation. Another way of presenting this general trend is by adding up the numbers of staff members in departments with centres and those involved in them; that is, 594 and 124 respectively, which gives 20% of staff participating.

3.2 Reasons for low participation.

A number of reasons have been given by members of staff who have not collaborated with the activities of, or just not been interested in, the centre. The following list summarises some of their general reasons:

a) The time consumed by their research does not allow them to develop new and/or different teaching approaches.

b) They consider the traditional lecture as their best teaching situation.
c) More time is needed in order to appreciate the real effectiveness of the learning centres.

d) There are no tangible rewards for involvement in educational development, particularly in universities.

e) They find it difficult and time consuming to produce learning resources.

Participation of staff members in departmental learning centres is very much related to the presence in particular departments of those conditions and circumstances which encourage their participation. In opposition to this, the absence of some of these factors would somehow prevent participation in centres. The evidence suggests that the fundamental factor which encourages participation is the concern and/or interest of individual members of staff in improving their teaching and learning (see section 3.5 in chapter IV, section 4.1 in chapter VI and section 5.1 in chapter VII).

There are a number of other factors, which in turn depend upon various situations. There are factors depending on individual departments, such as for example the existence of a sympathetic Head of Department, the availability of resources, the existence of a favourable departmental atmosphere, i.e. the centre is recognised and valued by other members of staff, (see section 9.1 in chapter IV, section 4.1 in chapter VII, section 7.3 in chapter VIII).

There are also some factors that depend on the educational system and/or society. Since the late 1960s, students have become more involved with the planning and organisation of their courses, they quite often participate on course boards and other committees and show interest in
improvements in teaching (see section 3.1 in chapter IV and section 4.1 in chapter VII). Section 9.1 of chapter IV reviewed the case that educational developers are making for a better recognition by society in general and by higher education in particular. Their claim is that educational development should have a similar, if not the same, status as research.

3.3 Evaluation activities.

The kind of activities carried out in centres in order to obtain feedback from students and staff was mentioned in section 10 of chapter V. As far as evaluation of departmental learning centres in concerned, little has been done and/or published. For example, looking over the list of titles of the references provided in chapter IV - literature review of learning resource centres - one finds that very few of them are concerned with evaluation; in particular there has been little attempt to know what a learning resource centre is like for students. The literature reports mainly on questionnaire-type surveys of samples of student-users in particular centres, which in some centres are done quite regularly. It also reports on the statistics of the use of some centres and/or specific learning resources, as well as on a few experiments carried out which made use of centres, (see chapter IV and in particular its section 3.6).

Some people involved in departmental centres have mentioned the following as their main reason why they have not (or cannot) conducted evaluation studies: The time needed to do this is not compatible with their other activities. They have recognised that their centres have not been at work for a long enough period to justify the extra resources needed. They have also recognised that evaluation is necessary
before their centres are expanded and that this should be one of their future activities - if money and time are available. At the beginning of this chapter it was said that very few centre staff have training in educational technology and educational evaluation; this fact may partially explain the lack of evaluation studies.

The above remarks do not necessarily imply that centre staff are totally unaware of what students think of their centres. Most of the information that staff have is based on informal talks with student users. In some centres there are periodic meetings between staff and students, sometimes especially set up by the centre. In other instances they form part of the departmental organisation. The limitation in all this is that staff only know about what some of the users think, (see section 10.3 in chapter V). It may be useful to draw once again the reader's attention to the next chapter (X) which is concerned with suggesting how evaluation studies might be conducted, in the light of the present case study.

3.4 Staff views on fulfilment of centre aims.

Chapter V presented a compiled list of aims of centres and the staff views on their importance. The following table provides how well they thought their centres fulfilled the aims. Their answers were given on a four point scale: 4 = very well; 3 = fairly well; 2 = not very well; 1 = not at all. There was also a column for 'no-opinion'.
TABLE IX - 1: AIMS OF CENTRES.

<table>
<thead>
<tr>
<th>Aim</th>
<th>Mean ((\bar{x}))</th>
<th>Std Dev ((\sigma))</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) to provide a room in which students can discuss their work with other students.</td>
<td>3.09</td>
<td>1.19</td>
</tr>
<tr>
<td>ii) to provide a room in which students can discuss their work with staff/demonstrators.</td>
<td>2.42</td>
<td>1.26</td>
</tr>
<tr>
<td>iii) to provide learning resources which can be an alternative to or replacement of conventional lectures.</td>
<td>2.85</td>
<td>0.99</td>
</tr>
<tr>
<td>iv) to make the study of subjects, e.g. Chemistry, Biology, etc, more attractive.</td>
<td>3.06</td>
<td>0.54</td>
</tr>
<tr>
<td>v) to encourage students to develop the ability to study independently.</td>
<td>2.72</td>
<td>0.57</td>
</tr>
<tr>
<td>vi) to provide resources for students to prepare work (essays, papers) for use in seminars, tutorials, etc.</td>
<td>1.89</td>
<td>1.05</td>
</tr>
<tr>
<td>vii) to provide access to models, such as for instance crystal and molecular models and to model kits.</td>
<td>3.00</td>
<td>1.29</td>
</tr>
<tr>
<td>viii) to encourage and enable staff to develop improved teaching methods.</td>
<td>2.60</td>
<td>0.88</td>
</tr>
<tr>
<td>ix) to provide direct access to a computer and to a variety of electronic calculators.</td>
<td>2.06</td>
<td>1.29</td>
</tr>
<tr>
<td>x) to provide an alternative study place to the library.</td>
<td>2.75</td>
<td>0.91</td>
</tr>
</tbody>
</table>
The largest agreement, indicated by small standard deviations, was on aim (iv), making the study more attractive and (v), encouraging students to develop the ability to study independently, with (iv) considered fulfilled to a larger degree.

The following graph summarises the staff views on the importance and fulfilment of aims of centres. The vertical axis plots the importance that staff attributed to the aims, the horizontal one how well they thought the aims were fulfilled and the diagonal indicates the same rating for the importance as for the fulfilment. Each aim is identified by the corresponding roman number in the list above.

GRAPH IX - 1 : AIMS.
From the graph it is possible to see that the aims are grouped into two sets according to their importance to staff: five were rated above 3; that is, they are between quite important and very important. The second group of aims is below 2.55, but above 2.07; that is they were considered to be only fairly important. It is interesting to note the following two points:

a) there is a gap of nearly half a scale point between aims considered important and those thought to be less important,

b) none of the aims is below the scale point 2; that is to say that none of the aims were, in general, considered unimportant (1 = unimportant), which supports the list compiled as far as its identification by centre staff is concerned.

Of the five aims, which were thought to be important, there are two which were also achieved to a good extent: aim (vii) on providing access to models and aim (iv) on making the study of subjects more attractive. The other three aims were not achieved to the extent of the importance given to them. These aims are: (viii), on encouraging staff to develop improved teaching methods; (iii), on providing learning resources as an alternative or replacement of conventional lectures; and (v), on encouraging students to develop the ability to learn independently. This is consistent with the evidence that staff are rarely much encouraged to use departmental centres, and few of them use the centres for their teaching (see section 6.2 in chapter VII, section 7.3 in chapter VIII and section 3.1 in this chapter). Also, students ask for materials which are closely related to their courses and can be used as a replacement/alternative for the conventional lecture (see section 7.5.3. in chapter VII, section 16.3 in chapter VIII and sections 4.1 and 4.2
Regarding the less important aims, there are three that were more or less achieved according to staff's expectations, i.e. they lay near the diagonal in the graph. They are: aim (ii) on providing students with staff/demonstrators assistance; aim (x) on providing an alternative study place to the library; and aim (ix) on providing access to a computer and calculators. There was disagreement on two aims: aim (vi) on providing materials for students to prepare work, which was not achieved to the extent of its importance, and aim (i) on providing students with a room where to discuss their work, which was over achieved. These disagreements are also in correspondence with the evidence: on aim (vi) staff are recognising that the amount of course related materials housed in centres is not enough and the overfulfilment of aim (i) confirms that students do use the centres (see chapters VI, VII and VIII and section 5.4 in this chapter).

4. LEARNING RESOURCES

4.1 Types of learning resources.

One of the most important purposes of departmental learning resource centres is to make available to students a variety of materials, which include books and nonbooks ones (see sections 8 in chapter V, 4.3.1 in chapter VII, 8.3 in chapter VIII and 2.1 in this chapter). According to their expected use by students, the learning resources can be classified into three groups, which are, to a large extent, self explanatory. The figures in brackets correspond to the percentage of centres surveyed (section 1 in this chapter) which house that particular kind of learning resource.
a) General background or remedial material 90%

b) Supporting/backing to lectures 95%

c) Alternative and/or replacement of lectures 50%

There is an interesting point to be made in connection with both the provision of alternative and/or replacement materials and the use of centres by students: Most of these materials are those so-called 'made at home', that is materials produced by members of staff, and these are the ones most used by students (see section 4.2 in this chapter). It is also interesting to note that 40% of the centres that house alternative/replacement materials have produced practically all their materials; on average they have produced 97% of these materials with a standard deviation of 2.89.

Three major agents for the production of learning resources were identified in section 8.2 of chapter V: the department itself, academics elsewhere; and commercial firms. The only conclusion that can be drawn from the evidence is that to a considerable extent staff are producing learning materials to replace their conventional teaching and that the materials produced by the other agents - academics elsewhere and commercial firms - are generally made available to supplement teaching or as remedial; they are also used to replace the lectures, but to a much lesser degree.

The evidence suggests that there is no medium, either print or non-print, used more than another, according to their expected use by students (see section 12 in chapter V in particular, and sections 5.5 in chapter VII and 8.1 in chapter VIII). However, the frequency with which they appear varies radically (see section 7.4 in chapter V). Thus audio tapes are widely used for many purposes, while film loops,
for example, are largely used with a specific purpose, to support lecture material, and programmed texts are mostly used as remedial.

4.2 Most used materials.

A factor which determines to a large extent the use of departmental learning resource centres is the kind of materials they house. There seems to be a sort of proportionality between the materials and their use by students: centres are relatively more used as they have more materials of the alternative or replacement to lectures kind. The situation is quite different with the general background and general interest kind of learning resources, for which students have shown less preference. Broadly speaking the use of these materials (background and general interest) is related to how close students think they are to their courses (see sections 6.2 in chapter VI, 7.4 in chapter VII, 14.3 in chapter VIII and section 5 in this chapter), as well as to the staff priorities regarding their provision and/or encouragement to students to use them (see sections 8.2 in chapter V, 4.3 in chapter VI, 9.2 in chapter VII and 7.2 in chapter VIII).

Although not all centres started with materials of the alternative/replacement type, almost all of them are now providing this particular kind of materials. This may be a reason why the number of students using the centres has increased, and is increasing. There have been two basic ways by which centres have incorporated this kind of materials to their stock: by producing or purchasing relevant materials and through the incorporating supporting/background materials into course work. It may be useful to illustrate the latter with the experience of one centre, not one of those studied in depth and reported in chapters VI, VII and VIII. It began its work with materials mostly of the general interest/supporting kind, which were
basically obtained from commercial firms. As people involved in the centre have acknowledged, students did not use it much in those early days. After some time, some existing materials were introduced into the course work and students were told that the course work could not be completed if they did not work through such materials. After some reservation about this change, students in that department now regard the centre as one of the normal departmental facilities.

4.3 Transferability.

Learning resources are being transferred amongst departments of the same institution as well as between institutions. This happens in at least three ways: spontaneously, through links developed by institutions, and through publication.

4.3.1. Spontaneous transferability. This is mostly done by students in courses other than the one, or ones, for which the learning resources were in the first place made available, but who are in the same department or institution. Students undertaking lecture courses similar to those for which the centre is directly used, find out, in particular through friends and sometimes via notice boards, about the existence of such materials (see section 4.3.2 in chapter VII and section 2.4 in this chapter).

4.3.2. Transferability through links. There are very few examples of co-ordinated action for the production and/or exchange of learning resources amongst departmental centres. One instance worth mentioning and describing here is the work of the Educational Techniques Subject Group of the Chemical Society. The Group, which is associated with the Educational Division of the Society has two main aims:
"1. To provide up to date information to teachers and trainers on the methods, techniques and materials available for chemical education;

2. To originate new materials for use in chemical education".

(Hills and Moyes 1977).

There are about 15 Chemistry Departments that have developed learning centres or learning aids laboratories and they have produced a considerable range of learning resources. As the production of all desired material cannot usually be done within one department, as departments should avoid wasteful duplication of effort due to the production of identical or very similar materials, and in order that the location of existing materials should be known, the Group has set up a pilot scheme, supported by a small grant from the Chemical Society's Appeal Fund, which aims to exchange unpublished resource materials between departments of chemistry in universities and polytechnics. The original idea was that each of the 15 centres contributed at least one item to a pool which would then make available to them at least 15 new items. At present and after a little more than a year of work, the collection of materials produced in different chemistry departments is well over 15. (More details of the scheme can be obtained from the co-ordinator of the project: Dr. C.R. McHugh, School of Chemistry, Thames Polytechnic, London). Another instance, again in Chemistry, is the Chemistry Subcommittee of the Northern Universities Working Party for Co-operation in Educational Technology, which is working on joint publication of some materials for teaching chemistry, available to members of that subcommittee without charge other than just providing, for example, a blank cassette. (Details from Dr. Taylor, University of Manchester Institute for Science and Technology).
4.3.3. Publication of materials. A number of publishing companies have put learning resources onto the market and some materials produced in some centres are also available on the market. These are usually incorporated into centres to support lecture courses (see section 4.1 and 4.2 above). A similar situation applies to the materials produced by the Open University, which are produced for wide audiences and are also incorporated into centres, often as support/backing to lecture courses.

4.4 Technical developments.

As will be seen in section 5.1, the number of staff members participating in learning centres has increased with the course of the years and it is important to make the point that this has also been facilitated by some technical developments and improvements, which have enabled people in departments to prepare materials by themselves (section 7 in chapter V). This can be illustrated with the following three considerations regarding the use of audio recording, video recordings and computer based materials. Audio recordings were first used educationally in language laboratories; the advent of the cassette audio tape, portable record/play back machines has made it possible, to move away from this situation and enabled people in other educational fields to more easily make use of such recordings. Something quite similar has happened with educational use of television. At the beginning it was used in closed circuit systems, with playing back facilities centralised and managed from a control room; technical developments such as portable cameras, record/play back machines and video cassettes have enabled people in general and departments in particular, to make a greater use of television. The same sort of development can be presently observed in the use of computer based
materials as learning resources. Computing was initially used by very few people. Then Computer Science courses were developed and computing facilities became accessible in central units. The recent introduction of the stand alone graphics terminal (Tektronics 4051) makes it even more readily accessible for more people in an 'at home' situation.

It is interesting to note that these technical developments and improvements have meant that more people, especially staff members in subject departments, are preparing and making learning resources by themselves; however some do prefer to be supervised by professionals (see section 2.3 in this chapter). This greater involvement has meant that some academics are now involved in production of such materials, in addition to 'media people' or professionals. In some instances this has also meant that the quality of production is not as good as when done by professionals, but people involved in such 'amateurish' productions reckon that the quality is acceptable for the purpose and that there is always the possibility of producing materials in a more professional fashion (see, for example, section 5.1.3 in chapter VII, section 7.4 in chapter V).

5. IMPACT ON TEACHING AND LEARNING

My research had the exploration of student learning as an associated aim to the principal one -evaluation of the use of departmental learning resource centres (see section 3 in chapter I)-, but student learning cannot be seen in isolation from the departmental educational practice. This section is therefore concerned in general with the impact of learning centres on teaching and learning. The three case studies reported, (see chapters VI, VII and VIII), were concerned,
in some measure with what those centres were like for students and with their impact on their learning (see in particular section 6.2 in chapter VI, section 7 in chapter VII, and section 13 in chapter VIII). The case studies were also concerned with centre staff (see section 5 in chapter VI, section 6 in chapter VII and section 7 in chapter VIII) and section 3 of this chapter was also concerned with people involved in centres. However and as already mentioned this section is dedicated to some general considerations regarding teaching and learning and the learning centres.

5.1 Increased staff involvement.

It has already been mentioned that the origins of many departmental centres were related to the desires of a few members of staff (see section 5 in chapter V and section 4.2 in chapter VII). Since the centres were first set up, the number of staff members involved in them has increased. This has taken various forms, such as for instance assisting with supervision of centres and the provision of learning resources (see section 8 in chapter V, section 8 in chapter VII and section 2.2 in chapter VIII). However, quite a number of centres have found it necessary to appoint a person to be permanently in them in order to cope with the day to day running of, and management of, the centres.

About seven of the visited centres have someone on a full time basis. The posts are very dependent on particular situations and their characteristics also depend upon the people involved and on the development stage of the centres. Thus some centres have appointed full time technicians, or organisers and in one specific situation a teaching fellow has been appointed. None of the centres studied
in depth had such a person, but in one of them this was a perceived need (see section 4.4 in chapter VII). However other centres visited did have them and their main impact on centres has been that they are said to be "a very helpful developing influence", because they have been able -due to enthusiasm and time- to carry forward and/or implement ideas. They are in a position where they can quickly understand what people -staff and students- are trying to find or do what they want. They have developed means of keeping people in the department informed. They have also introduced systems of analysis of usage, indexing the materials available, up dating them. They have contributed to solve problems of co-ordination, administration and production.

5.2 Rethinking traditional methods.

The increasing involvement in departmental centres by staff members, (see section 5.1 above), their growing interest in educational developments (see section 3.3 in chapter IV), the encouragement given to staff to produce materials and even the pressure to do so simply because of the investment in staff, in equipment and space (see section 7.6 in chapter V, section 5.4 in chapter VII and section 5.5 in chapter VIII); these are factors, which are related to learning centres on one way or another, have contributed to the rethinking of conventional teaching such as the lecture and have enabled people to explore different approaches to their teaching. It should be emphasised that learning centres are one element contributing to the rethinking of the teaching (see section 3.7 in chapter IV for a list of teaching alternatives developed in recent years). The major aspect in the rethinking of the teaching by centre staff has been the move from student learning controlled by the teacher's pace towards a
greater control of the pace by students through the use of learning resources (see section 12 in chapter V, section 6 in chapter VI, section 7 in chapter VII and section 14 in chapter VIII). Learning centres have also aimed to encourage students to develop the ability to study independently; in other words, their concern has been to improve and facilitate students learning by the development of teaching alternatives, namely replacement of lectures by learning materials in centres, in which students are less dependent on the teacher (see section 6 in chapter IV, section 4.1 in chapter VI, section 5.1 in chapter VII, section 14 in chapter VIII and section 3.4 in this chapter).

5.3 Student use of centres.

From the case studies presented in chapters VII and VIII, which reported on centres that are available to a variety of courses on an optional basis, as well as from other similar instances, it became clear that the number of regular student-users of departmental centres is relatively low (see section 7.3 and 7.4 in chapter VII and section 11 in chapter VIII). 80% of the surveyed centres (see section 7.2.5 in chapter V) are in this situation; that is, available to a large number of students, almost always to all students in the departments, on an optional basis. However 19% of them are also used in connection with particular courses as well, with materials which are an integral part of the course work. About 20% of centres only have activities which are closely related to the course work and these are used by all students involved (see for example section 7 in chapter VI, which reports on a centre of this kind).

There are a variety of reasons that may explain the relatively low use of centres. For example, the fact that the departmental centres
have not become a fully accepted facility and/or activity in many
departments as well as the fact that not all members of staff in a
particular department are involved in a centre, let alone that some
of them do not know what the centre makes available to students (see
sections 7.5 and 7.6 in chapter VII, section 14.2 in chapter VIII
and sections 3.1 and 3.2 in this chapter). Also that some centre
developers find it difficult to have the amount of time they would
consider appropriate to be dedicated to their centres, since their
other activities -research, teaching and administration- do not
allow them to do so, (see section 6.1 in chapter VII and section 7.3
in chapter VIII).

5.4 Student response.

Generally speaking students have reacted favourably to departmental
learning resource centres and some of them -a minority- find their
use very valuable, (see section 6.2 in chapter VI, section 7.4 in
chapter VII and section 13 in chapter VIII). The impact that centres
have had on these students is clearly illustrated by the fact
that they have asked for more materials, particularly for those
closely related to their courses, (see in particular section 10.4 in
chapter V and sections on students on chapters VI, VII and VIII).
However some students have had reservations about their use and quite
a few do not like them at all or are just against the idea of
using them, (see again sections on students in the case studies reported
in chapters VI, VII and VIII).

5.4.1 Regular users. Section 5.3 above identified two types of
regular users, which correspond to the types of centres -available
on an optional basis or related to the course work--; that is,
students who use the centres if they want to and those students who use centres as part of their course work. In many instances there are overlaps between these two types of users. The following list summarises the major reasons why some students make regular use of departmental centres which are available to them on an optional basis. (By regular users is meant those students who use the centre between once a fortnight and twice or more times a week).

a) To clear up topics half understood in lectures,

b) to catch up with missed lectures,

c) to complete work for practicals,

d) to use easily digested materials,

e) to do own work, e.g. prepare essays, papers, use own notes,

f) to consult textbooks, reprints, lecturers' notes,

g) to supplement lectures,

h) to get assistance from supervisors,

i) to get a deeper insight into topics,

It is interesting to note that each of the reasons listed above is heavily dependent upon individual students. However, they can be easily classified into three sets, according to the purpose that students have in their use of the centres. Thus the first three are reasons which are accomplishing remedial purposes, while the bottom three are reasons which indicate students' use of centres in order to obtain and/or go further with the materials presented in a lecture. The three reasons in the middle correspond to either purpose. (The reasons have been order in the list according to the above classification rather than by students preference or ratings.)
For students preferences in those centres studied in depth see section 7 in chapter VII and section 11 in chapter VIII). It may also be useful to draw the reader's attention to section 6 of chapter XI, which is concerned with the impact of centres on student learning for both types of regular users — for course work, use and for optional use.

5.4.2. Occasional users. Departmental centres which are available to students on an optional basis have a large number of occasional users, (see section 715 in chapter VII and section 11 in chapter VIII). These students have had a number of reservations about the work of centres, ranging from lack of time to be spent in a centre to criticisms about the contents of some of the learning resources available. Again the following list attempts to summarise some of the reservations mentioned by students interviewed in various places, (see also section 6.2 in chapter VI, sections 7.5 and 5.6 in chapter VII and section 14.2 in chapter VIII which deal with the particular reservations that students had in those three case studies).

a) some students are unaware of what materials are available for particular courses,

b) use of learning resources is a very slow way of finding out information,

c) although tutorial help is usually available, students find the use of learning resources impersonal,

d) learning resources do not always produce any new light on the topics being studied,

e) some of the learning resources are at school level,
f) some staff members do not refer students to the learning resources available in the centres,
g) opening times are restricted to working hours (usually ranging from 9.00 a.m. to 5.00 p.m. and in between) which are almost fully covered by time tabled activities, e.g. lectures, practicals.

It is interesting to note from this last list that students' reservations about the use of departmental centres naturally divide into two distinct groups: those which depend upon the students themselves and those which depend upon the centres' organisation. Thus the first four reasons depend heavily upon the students' perceptions of the centres and the other three on the way the departmental centre is organised.

5.4.3. Non users. Students who have expressed themselves as being against the use of departmental centres have had various and different reasons for this. For example section 6.2 of chapter VI mentioned that a particular student did not like the use of the learning centre because it diminished his competitive view of the educational process. While 14.1 in chapter VIII stated that some students did not use the centre because their study methods were not compatible with its use. The following list attempts to summarise the reasons why some students have not come to use departmental learning resource centres:

a) they prefer to get information and/or to study from their own lecture notes and/or books,
b) they have no time left from their other commitments,
c) they prefer to study in other places, i.e. at home or in the libraries,
d) they prefer to study at a time when the learning centre is not open, i.e. evenings, weekends,

e) they did not know about the learning resources available for their courses in the centres,

f) they find no relevant materials for their needs.

It is particularly interesting to note that the great majority of reasons why students do not use departmental learning resource centres are closely related to the students views of, and styles of learning: reasons (a) to (d) are in this category, while the other two reasons are dependent on the centres; that is, upon their organisational and/or management styles.
CHAPTER X: LEARNING RESOURCE CENTRES - ENCOURAGING THEIR STUDY

1. INTRODUCTION

Communication with people involved in departmental learning resource centres was a permanent pre-occupation of my work in order to exchange knowledge of each other, but mainly to facilitate the evaluation study of the centres. In this connection and due to various reasons, a secondary aim was introduced to the work; this was to let people involved in centres know about some of the evaluation techniques I have used and their possible applicability to their own situation. To this effect I prepared a paper entitled "Evaluation Techniques: a description of their use in the study of university departmental learning resource centres". It was sent to a number of people involved in one way or another with departmental learning resource centres, seeking after their opinions and reactions to it. Later I prepared another paper for an Institute for Educational Technology seminar entitled "Trying to communicate with Practicing Teachers", which dealt with the reasons for the introduction of this new aim into my work, the reactions to the first paper of some of the staff involved in departmental centres, and some of my own reservations on the whole exercise. Both papers are included in the appendices (see appendix IX and appendix X).

In the light of the papers mentioned above and because departmental learning resource centres might profit from studying/evaluating/reviewing their activities, this chapter is aiming to suggest some ways that staff involved in departmental centres may follow in order to examine their centres. It begins by summarising some of the reactions to the circulated paper of the staff involved in centres.
Next it classifies the techniques I have used and suggests ways that may be followed to look at the centres by their staff. Finally the techniques themselves are described as well as providing examples and suggestions to facilitate their application.

2. REACTIONS TO THE PAPER

The paper "Evaluation Techniques: a description of their use in the study of university learning resource centres" presented a case study on the use of some evaluation techniques in a particular project. It had three main aims: Firstly, to briefly introduce a newly developed evaluation approach. Secondly, to discuss and highlight the advantages, disadvantages and appropriateness of some of the evaluation techniques. Thirdly, to illustrate the use of these techniques through concrete examples.

The paper was sent to a dozen people involved in one way or another with departmental centres. They were as follows: 7 people in charge of departmental centres, three staff members participating in centres and two educational technologists. My appeal for comments was successful from six people, four of whom are in charge of centres and the other two are staff participating in centres. I also had comments from my supervisor and two fellow research students...

People's reactions to the paper varied a lot and it is not possible to know the extent to which the suggestions it made have been used by them, simply because there has not been enough time for them to implement them. In order to illustrate their reactions I will quote five of their comments on the aims of the paper.

1. "I liked your three aims and thought you covered all of them as well as possible in the space available", 
2. "In general terms I feel that you should concentrate a little more on the results of the investigation rather than on their methods of collection".

3. "The paper assumed that the reader has read certain other books/papers which may not be so".

4. "The first paragraph of section 1 gripped me immediately. I thought it was a good start, and I thought all three reasons were extremely relevant and close to my heart. I also think you are likely to find many other readers with the same reaction. One small point though, the mention of a 'broker' who exchanges information between groups, made me expect for a little while that you were going to share with me some of the experiences you had obtained from the evaluations you have been working on in the past year. I was almost half way through the paper before it dawned on me that this was a misunderstanding on my part. It may be that other readers might have the same misunderstanding, or perhaps I am just self centred as far as my own interests are concerned when I am reading a paper ...

... and now moving on to the possibility of a member of staff evaluating his or her own centre; this would be a very difficult process. We have already tried this, on a small scale, on one or two occasions - and have run into sufficient difficulties to make us think again about the whole process. At present I believe it would require a very exceptional personality to have the detachment to evaluate a centre in which he or she was personally involved".

5. " ... We are not concerned with how the resources are used or whether they are effective. We simply tell people what is available and allow them to decide on their usefulness or otherwise. We don't have sufficient money or time to assess every learning aid".

There were also a number of reservations regarding some aspects of the paper. Some of these were that it did not consider "measured learning" other than students' self-appraisal; that some of the
techniques described, in particular open ended questions in interviews and questionnaires, may produce irrelevant information; that it was not clear in pointing out that an evaluation has to establish the competence of the student at the end of the day and to do so by using "objective instruments".

3. CLASSIFYING THE EVALUATION TECHNIQUES

There were four major evaluation techniques which I used during the study of departmental centres: observation (structured and unstructured), interviews (open ended and structured), questionnaires (which tested both facts and opinions and/or attitudes), and scrutinizing of departmental documents (for internal circulation and published ones). Chapter III has described these techniques in some detail (see in particular sections 4.1; 4.5 to 4.9 and 4.12 in that chapter); they were more briefly described in section 4 of the circulated paper (see appendix IX).

According to the type of evaluator-student interactions necessary for the application of these evaluation techniques, it is possible to classify them into two groups: "personal" techniques (observation, interviews) and "impersonal" techniques (questionnaires, scrutinizing of documents).

4. STUDIES CONDUCTED BY CENTRE STAFF

Section 5.1 in chapter IX stated that since departmental centres were started in about 1970, usually by a few members of a department, other people have become involved in them: an increasing number of members of staff have come to contribute to their supervision and to the production of learning resources. Postgraduate students now often
help with their supervision (see section 7.2 in chapter V) and more recently third year students on projects have also prepared learning resources (see section 3.6 in chapter IV). On the other hand, section 3.3 in chapter IX pointed out that some people in departmental centres "have recognised that evaluation is necessary before their centres are expanded and that this should be one of their future activities, if money and time are available". In sum: there exists the willingness to evaluate/review departmental centres and the people who supervise them. The sections that follow make an attempt to suggest ways by which this could be done.

The staff member acting as an evaluator would have to look at the centre as if he were an outsider in order to get a better appraisal of what he observes or hears. This may not be easy and there may be some problems, which may contribute to make the application of the techniques by centre staff more difficult, especially those of the personal kind. Staff may have biased perceptions of their own teaching, students may feel uncomfortable when talking to their staff on teaching matters, some students may be poorly qualified for the purpose, because they may not have sufficient experience/basis for comparisons. However, awareness of these problems as well as the desire to evaluate/study/review one's own centre should help to overcome them, especially if the purposes of the study/review are clarified. Such clarification would enable the staff member acting as an evaluator to ask specific questions at an early stage of an interview, which would tend to lead to specific answers from students.

I base these opinions on my experience gained throughout the study of departmental centres: students have shown themselves as willing to provide the information required from them. They also spoke quite
happily on their perceptions of the centre, which enabled me to know what the centres are like for students (see sections on students in chapters VI, VII and VIII, also sections 5.3 and 5.4 in chapter IX). For example by the end of an interview with a student, in which it was mentioned that one of the purposes of the study was the improvement of the services provided by the centre for students, he said: "Well ... I hope these comments and the comments of others will help you to improve the learning centre". Another student more explicitly pointed out: "Hope some of the suggestions I made will be implemented". This is an indication of the students' concern about their centres, which brings me to a more general point; namely that for some time now students have shown interest and concern about their instruction, (section 3.1 in chapter IV was dedicated to this). Their concern about teaching and learning is also indicated by their increasing participation on a variety of committees, e.g., course boards, faculty boards, library committees, etc.

5. APPLYING THE TECHNIQUES

It is important once again to draw the reader's attention to chapter III, which analysed the evaluation strategy and put into context the description of the investigative techniques. In practice the evaluation techniques are usually used in combination in order to permit an easy cross-checking of the information obtained. However, to facilitate the description of how the techniques may be applied by centre staff, they are analysed separately and a number of references are made to some of the instruments used during the study, which are included in the appendices.
Before passing on to the description of the evaluation techniques, two more points should be made. Firstly, the suggestions made are taken from my experience and there is a deliberately greater emphasis on those two techniques classified as personal - observation and interviews - simply because they are the ones which may present greater difficulties in their application.

Secondly, the following sections are introducing some of the uses of the different techniques in a fairly superficial manner and those who may wish to go further into them can be referred to numerous sources (see for example the references given in chapters II and III, and in particular those in section 4 of chapter III).

6. OBSERVATION

Section 4.1 in chapter III described observation as an immersion strategy; however it is also used in other ways. The very first thing which has to be clarified when using observation is what it is designed for. Thus unstructured observation may be used to get general trends of students' behaviour within a centre. For example, I noticed through this technique that students were very conscious of the centre as study place and behaved accordingly; thus they tried not to produce any noise when getting in and looking for the material they wanted, and in general talked to each other in whispers. More structured use of observation allows quantification of events. For instance, at one of the centres studied, in which no records of usage are kept, structured observation was conducted for a month (see appendix VIII) and from it, it became clear that books were the most used learning resource.
Observation is a technique which can easily be used alongside with others. For example it can be used in conjunction with interviewing: people may say something about the centre's activities which can easily be tested through observation, such as for instance, and following the previous example, when the developer of the centre told me that as they had produced a large amount of audio tapes, these were the most used material in that particular centre. However observation showed that although they were considerably used, they were not the most popular ones. Observation combined with interviewing can be used with questionnaires in order to check what people say. It also can be used the other way around: the staff member acting as an observer may witness something which needs to be followed up either in interviews or questionnaires. For instance, at one of the centres I visited, at certain times when the centre's supervisor and a postgraduate demonstrator were in the centre, students queued up for assistance from the supervisor in preference to the demonstrator. I followed this up in talks with the supervisor, the demonstrators and students and a clear cut answer came from them all: postgraduate students did not have the specialised knowledge on every topic covered by the materials available in the centre, although this was said with different emphasis and shades of meaning by different groups.

In another centre visited, which does most of the advertising of materials through notice boards, observation of the percentage of students that at any given time looked at a newly posted short list of materials threw considerable light onto the issue of students' lack of awareness on the materials available in the centre.

It is suggested that the staff-observer may profit from observing along the lines of the examples provided as well as from the observation
of particular aspects of any given centre. He may also profit from observing/attending meetings and lectures during freshers week to find out how the learning centre is presented to first year students; by whom and where the emphases are placed and so on.

7. INTERVIEWS

Section 4.5 in chapter III dealt with interviews and described two types of them: open ended and unstructured. My experience of interviewing people indicates that an optimal situation is somewhere between the two; that is, semi-structured. For this kind of interview a list of questions, which may not necessarily be asked in the way set out, is required. However, there are occasions when a very structured interview may be necessary; it would all depend on the type of information sought. (See section 4.8 in chapter III and appendices II and IV which provide examples of interviews schedules).

One of the major merits of interviewing is that it allows one to know the world of the participant in relation to the activities of the centres: it is quite likely that discrepancies between the perceptions of staff and students are discovered.

For example at one of the centres studied student-users complained that some of their staff did not usually refer them to work in the centre and that due to this they were not fully aware of what was available, in spite of the efforts made by the centre's developer to get information round to students and staff. In this connection one student said during a semi-structured interview:

"Members of the staff never give materials in the learning centre, so possibly they don't realise what material is there or don't think it is significant ... usage of it by students
would increase if this material was brought to their attention by members of the staff ... I don't think most students know what material is in the centre so the sheets giving recent additions to stock which are put on department notice boards should be supplemented by a list indicating most of the available material relevant to students".

It is suggested that the staff evaluator/reviewer talks to students, in particular on those aspects that from observation have not been completely cleared up. Also a round of talks with the teaching staff in the department on their attitudes towards the use of the centre may be quite illuminating and may produce different kinds of information to that obtained from, say a staff meeting, because in an interview situation there are different kinds of pressures and there are no other topics to discuss, as is the case in a departmental meeting.

Because interviews are the most personal of the techniques being described it may be useful, in order to facilitate their application by staff involved in departmental centres, to examine some of the principles of procedure that I have used when interviewing and some others which are not applicable to an outsider, as I was in the studies conducted, and which are discussed at full length by Simons (1977). First of all, for the case of the staff-observer, it should be emphasised that trying to discover the world of the students means that the staff members ought to go out to see the students rather than calling them to their office, thus preventing possible student feelings of being interrogated. The interview should be a piece of conversation, rather than an interrogation; this is so because the interview is a complex social interaction, in which the information sought is influenced by how the interviewees are prompted to talk, and how sympathetic and interested their interviewer is.
A third consideration is that the interviewee should be clear from
the outset of the interview about its purpose. When students know
that their information is for the improvement of their centre, they
quite happily volunteer to be interviewed, (see section 6.3 above).
In other words, there should be no doubt in the student's mind that
it is the centre which is under investigation and not they. At the
same time interviewees should be offered confidentiality about the
information they provide.

Fourthly the staff-interviewer should be aware of the differences
amongst individuals: there are some who are quite outspoken and do
not need much encouragement to provide information, while there are
others who are shy, or afraid of a staff member, and need a different
approach in order to establish the necessary confidence and trust for
them to speak more freely.

One way of getting the conversation off the ground is by asking at
the beginning of the interview about interviewees' areas of interest,
which may also help the interviewee to talk more freely as well as
providing the staff-interviewer with some elements in order to decide
on what type of approach to develop for that particular interview.
There is no one interview approach which may be 'successful' in all
circumstances.

Finally, "if the study involves a series of interviews, who sets and
shifts the topics may vary from interview to interview. What is
appropriate at one point may not be at another, as understanding and
perception change. At times the interviewer may want to feed in some
interpretation, at other times to take up a cue from the interviewee.
Towards the end of the study precisely the opposite tactics from
responding to the interviewee's initiative may be appropriate, ... In such a case the interviewer may want to be quite assertive about issues he would like the interviewee to comment upon" (Simons 1977).

8. QUESTIONNAIRES

Section 4.9 in chapter III distinguished between two types of questionnaires: feedback sheets and specific questionnaires. The former ones were especially useful in early stages of the studies to obtain students opinions on those aspects that staff think important. Specific questionnaires were mainly used to confirm and quantify information obtained from other sources, i.e. interviews and/or observation, in particular when the number of students involved made it practically impossible to talk to them all.

Constructing questionnaires of the specific-type should be based on that information already gathered from a few people and which present certain commonalities for them. For example, having talked to a number of student-users in one of the centres studied, it was possible to write down a list of the reasons they had for making use of the departmental centre; but there remained the question as to how representative these reasons were for the whole population of users. Thus I included the list in a questionnaire which was distributed to a much wider sample of students. The relevant question was of the type of fixed answer, in which the student had to put a tick rather than elaborate the answer and it was the following:
"The following is a list of reasons why you may be using the learning centre. Please tick those you agree with and add any other you have.

a) to supplement the lecture
b) to get help on difficult topics
c) to get past examination papers
d) to get help from demonstrator
e) to cover lectures you missed
f) to discuss subjects with students
g) to prepare essays, papers, etc.
h) to use the model kits
i) to use the computer or calculators
j) to consult books and/or reprints

Other reasons. Please list

k)

l)

Questions of an open ended type can also be constructed and included in a questionnaire, as can questions which are a combination of the two kinds. For example, in the same questionnaire as above, I included a question which was a mixture of the two types:

"Have you had any difficulties in finding or using any material in the learning centre?"

YES  NO

If YES, please give brief details."
It is suggested that staff evaluators construct their questionnaires in combination with other techniques and as a result of information previously obtained.

9. DOCUMENTS

The analysis of documents provide very useful information on, for example, how the centre was seen at its beginning and how it developed as well as throwing light onto practices that have been discontinued. (see section 4.12 in chapter III). This type of desk-research can also be of great help for the improvement of the services provided by the departmental centres. For example, in quite a number of them students have said that the opening times are limited to the working hours, which -they say- are almost fully covered with time tabled activities. An investigation of the time table of the courses for which the centre is available may lead to reorganise its opening times so that it would be open when a considerable number of students can use it; perhaps closing on certain mornings and/or afternoons and staying open until later in the afternoon/evening.

Another improvement that can be brought into the centres through desk type investigation is to work through the demonstrators' curriculum vitae and exhibit on a poster their specialities and interests together with the times they are available for consultation.
CHAPTER XI : CONCLUSIONS AND MAIN RECOMMENDATIONS

1. INTRODUCTION

All my work has been described and analysed in the previous chapters; that is, chapter I gave an overview of it, chapter II and III described and reviewed the research methodology I employed during the study, in chapters IV to VIII different aspects of departmental learning resource centres were presented, chapter IX was basically concerned with a more general description of their activities and the interpretation of those activities and chapter X presented suggestions for the study of centres by their staff. In this final chapter I will not attempt to summarise the earlier ones; rather I will write on those features of the departmental learning resource centres which to my mind were the relatively most important. These are:

- educational climate
- the evaluation approach
- the literature
- the use of the learning centres
- student learning
- links amongst centres

This chapter is to some extent prescriptive insofar as it includes a number of recommendations. These are made as a fruit of the experience gained throughout the study. In other words and paraphrasing the final report of the Nuffield Group for Research and Innovation in Higher Education (1976): Previously -the earlier chapters- I have seen my task as one of describing, interpreting and clarifying
alternatives, rather than making recommendations; in this final chapter I go beyond this.

It is interesting to note that the evidence I have got in the particular area of departmental learning centres largely supports that obtained in the much wider study by the Group mentioned above. For this reason it will be pertinent to quote some of their conclusions and recommendations.

2. EDUCATIONAL CLIMATE

Departmental learning resource centres are one of the products of a changing educational climate. Staff members in those departments which have established their learning centre are engaged in an almost continuous debate on their usefulness and effectiveness for students. Many sections throughout the report have been addressed to this situation: In chapter IV, section 3.1 dealt with the disenchchantment with the existing situation in the 1960s, while sections 3.6 and 3.7 presented a number of innovations in teaching and learning. Sections 4 and 5 of chapter V discussed aspects of this changing educational climate. In the three case studies, sections on students and staff also dealt with it. In chapter IX, sections 3 and 5 are particularly relevant. Because it summarises this educational climate in which departmental centres find themselves as well as the arguments involved, I quote here a rather longish passage from the conclusions of "Supporting Teaching for Change" by Hewton et al (1976). Although this referred to a study of institutional central audio visual units, there exists a clear parallel between these and departmental settings:

"The challenge to established patterns of working demands from teachers considerable re-thinking and re-planning the commitment
of extra time and energy, and the possible usurpation of
privacy by outside scrutiny. It is scarcely surprising,
therefore, to find a battery of defences raised against change,
some representing genuine doubts based on experience, others
ingenious rationalisations. The arguments run on familiar
lines:

a) The standard of teaching is not of paramount importance; any
spare resources should be devoted to research rather than 'frills'.
b) Students should not be spoon-fed - there is no case for
making their courses easier.
c) There is nothing particularly wrong with the 'status quo':
what is the point of wasting time and money on some new-fangled
set up which nobody is going to use?
d) Every suggested change has been tried before, and conclusively
proved not to work.
e) All gimmicks are ineffective: it is impossible to alter
people's attitudes simply by creating another committee, or
appointing a director of audio visual aids.
f) Curriculum development and educational technology may be
all right for the schools, but it is quite inappropriate in
higher education.
g) An academic's lecture room is his castle, and it is a gross
breach of his personal liberty to interfere with what he does
there: teaching is an individual activity; different people
do it in different ways, they have different strengths and
weaknesses, and no scheme to improve teaching can take account
of these personal differences.

There are however signs that the case for leaving things as
they are carries less and less conviction. Both teachers and
teaching are coming increasingly under pressure. Apart from
the ominous demands by government for increased 'productivity'
and less favourable staff-students ratios, the very nature of
the academic's work is no longer the same as it was. The
changes of the last decade have resulted in very large classes
in many subjects but dwindling numbers in others. Some
departments have had to find ways of making their courses more
popular. At the same time, the range of ability and the
diversity of interests of university students have increased: it is no longer the case that the same standard courses and methods of teaching are acceptable to all. Moreover students are becoming increasingly conscious of quality in teaching - how well courses are planned, what their content is, and how they are organised and assessed - and are less hesitant than they once were to make their views known to staff.

The evidence I have got and which is presented throughout the thesis strongly supports these conclusions from the Nuffield Group for Research and Innovation in Higher Education. For example, the first concern of the quote is with the defences raised against change and section 3.2 of chapter IX provides a list, which summarises the reasons that some staff have had for not participating in learning centres. Some of the defences quoted by Hewton et al and the list of reasons in chapter IX overlap: that research should get priority, that the lecture is the best teaching situation, that educational development is undervalued in higher education. On the other hand Hewton et al end their conclusions by saying that "there are, however, signs that the case for leaving things as they are carries less and less support". They then give some examples of this by referring to staff and students attitudes. Section 5 of chapter IX deals with the impact of the centres on teaching and learning, some of which again overlap with Hewton's conclusions: rethinking traditional methods, students attitudes.

3. EVALUATION APPROACH

The study of departmental learning resource centres has made it possible for me to try out a variety of evaluation techniques - observation, interviews, questionnaires (which test both facts and opinion or attitudes), scrutinising of documents- and these have all
been used to try to detect strengths and weaknesses, appropriateness
and applicability at different stages of the investigation so as to
make a better and more appropriate use of them. All this has made
me appreciate that when dealing with a real situation as in the
evaluation of a departmental centre, which could never be compared
in a simple way with other centres or other teaching and learning
situations, the adoption of the evaluation approach - described in
chapter III - proved to be suitable and very valuable for the purpose.
The extensive use of observation and interviews have also proved to
be of enormous value. Listening to how students and staff talk
about their departmental centre, talking in general terms to them and
observing their behaviour within the centres permitted me to obtain
a general picture of the situation and alerted me to many issues.
Further and more detailed interviews permitted me to focus upon those
issues which were relatively more important; keeping records of
interviews and observations helped a lot in deciding on what issues
to focus. When dealing with larger numbers of people, questionnaires
were very valuable in validating and quantifying the information
obtained from other sources. Scrutinizing documents provided me
with an insight into the past practices of centres which would
otherwise never have been brought to the surface.

I should like to draw the reader's attention to chapter X, which
reports on, and suggests, a way that staff involved in learning centres
might follow in order to conduct evaluation studies by themselves,
or their own reviews of the facilities available to students. Ideally
departments and/or centres should develop some sort of scheme to
enable them to do this on a fairly regular basis.
4. THE LITERATURE

It became clear from the literature that departmental learning resource centres began their development about 1970; that since then the literature has basically been concerned with their organisation and that very little attention has been paid to their significance to students and staff. As a result, the present evaluation study -based on the illuminative approach- is as far as I am aware the first of its kind for learning resource centres, and this has been recognised by a number of people involved in these centres.

The literature -as well as the evidence- suggests that the staff members who run centres, and also those who are participating in them, are those few who are enthusiastic about educational development; that they do not get enough tangible rewards for their involvement in educational innovations; that the time they have available to spend in their centres is not always what they would wish to spend. See for example section 9 in chapter IV, sections 3 and 7 in chapter V, 6.2 and 6.3 in chapter VII, section 7 in chapter VIII and section 3.1 and 3.2 in chapter IX. So what has been concluded by the Nuffield Group is supported by all this. Thus, "more opportunities should be given to staff for their professional development as teachers," and "the quality of time could be improved... by arranging blocks of time for certain activities, including teaching, so as to minimise the frustrating fragmentation of work", (Nuffield Group 1976), and in order to encourage staff members, who demonstrate enjoyment and skills in their participation in centres, they should be allowed to do more of this, "with a compensation reduction in their other departmental duties". (Simons et al 1976).
5. USE OF DEPARTMENTAL CENTRES

The evidence suggests that the students' use of departmental learning centres depends to a large extent upon their management style (see sections on students in chapters VI, VII, VIII and IX). Of the three types of centres described—those run by individuals, a few staff members and several staff members (see section 7.2 in chapter V)—there seemed to be proportionally greater use made of those centres in which the members of the staff are highly involved and in those run by individuals for particular courses.

The evidence also suggests that students' use of centres in part depends upon their philosophy (see sections 4.1 and 4.2 in chapter VI, 5.1 in chapter VII, 6 in chapter VIII); that is upon the sort of assumptions made for the provision of learning resources, (see section 6 in chapter V). According to this the learning resources were classified into three sets. They are:

a) general background to subjects or general interest,

b) remedial materials, and

c) course related or integral part of courses materials.

It was found that students do not work through learning resources simply because they are made available to them, as is often assumed; rather students react favourably and make great use of those materials which are closely related to their courses.

It might seem that commercially produced materials, or Open University ones, can be easily and safely incorporated to the centres' stock (see section 8 in chapter V and section 9.3 in chapter IX). However, such
materials are most unlikely to have been designed for the situation which a particular lecturer may have in mind. In order to enable staff to produce well-designed materials themselves, not only should help and advice be available in centres for staff, but a training scheme should also be developed for them by the centres or departments/institutions. It has been suggested by staff members that this may take, for example, the format of a number of meetings or seminars, and that this ought to meet staff needs to a large degree.

One way of increasing the number of course related materials is by getting more staff involved or interested in the learning centres, and in particular encouraging them to produce and/or incorporate materials into their courses which are course related. Also the appointment of a full-time organiser is advisable, if the departments can find the money.

It should also be borne in mind that students are particularly worried about the lack of interaction between them and staff, which sometimes results from the use of learning resources, (see in particular from section 12.1 to 12.8 in chapter V). It seems, therefore, that when resource based learning is designed or prepared, considerations should be given to provide students with a flexible scheme to meet the difficulties they may encounter due to the use of particular learning resources.

Another way of getting more staff -as well as students- involved in learning centres is indicated by the experience of some of the centres visited, but which were not studied in depth. Some organised some of their tutorials in such a way that a number of them were held in the centre. In this connection it is also desirable for centres to have a 'quiet area', or even better, a quiet room in which students
could work in the centre without being interrupted or disturbed, either by the kind of tutorial help normally available in them or by the time tabled tutorials held in them, as well as by discussions between students (see sections on students in chapters VII and VIII).

6. STUDENT LEARNING

The evidence from the case studies and from other instances in which learning resources were closely related to the courses or were an integral part of them, suggests that student-users' learning styles were modified and improved. Although this in many cases has meant extra work, students have tended to recognise, during interviews, that the extra work is rewarded; not necessarily with better examination results, but by gaining a better understanding, or some illustration and sometimes deeper knowledge, of the subject matter learnt. (See sections 6.1 and 6.2 in chapter VI, section 7.4 in chapter VII, section 13 in chapter VIII and section 5.4 in chapter IX).

Departmental learning resource centres, in particular those available on an optional basis, are used by a minority of students and it should be mentioned here that centres tend to be used to a larger degree by the more conscientious students; that is, those who put lots of effort into their study whatever the method of teaching used, (see section on students in chapters VI, VII, VIII and IX).

A considerable number of students - as well as some staff - have mentioned that they were fully, or sometimes partially, unaware and, in other instances, misinformed about what was available in their centres (see section on students and staff in the case studies). Departments and centres can do a great deal to ensure that students receive better information about the centres, including introduction
procedures for the first year courses. Handouts given out at the beginning of the year should include those specific materials in the centres available for students in particular courses. People—staff and students—should also be kept informed of any new additions to stock through an internal newsletter or via notice boards. Here again, this has been facilitated in some places by the appointment of a full time organiser. Short tours of the centre with small groups of first year students in their early weeks, to show them the facilities available and to explain, if necessary, how to use the machinery, are also recommendable. (See in particular section 14.2 in chapter VIII).

Students should also take initiatives, and be encouraged by their staff to do so in order to obtain information about the centres by holding, for example, meetings with their staff and to pass information to fellow students in later years. (See in particular section 7.5 in chapter VII).

7. LINKS AMONGST CENTRES

One situation which needs changing is that there are very few links amongst departmental learning resource centres. Moreover there would seem to be a tendency for them to operate in isolation one from another, which leads to restricted exchange of experiences and learning from one another. To this effect centres covering similar courses should develop means of communication amongst them, such as that developed by the Educational Techniques Subject Group of the Chemical Society, which has proved to be useful to their members and may be one way of improving the situation.
8. CONCLUDING NOTE

This thesis has been an attempt to describe and interpret the development and use of departmental learning resource centres, for which it has been necessary firstly to explain in full the concept of evaluation and the methodology I have used; I hope to have shown that they were appropriate for the purpose. Secondly to review some of the published literature on learning centres and which, I hope, has been sufficiently comprehensive as to provide a fair picture of what has previously been done in connection with learning centres.

The development and use of departmental learning resource centres have been described and interpreted at two different levels: general and particular. At a general level I have attempted to show that learning centres are one of the many educational innovations introduced in the last decade; that they are interrelated to other departmental activities; and that their use by students depends in part upon both their management style and the assumptions made regarding the provision of learning resources. At a more specific level, I hope to have shown that centres differ from each other in many ways, but that they have had a considerable impact on teaching and learning.

The last, but not least, concern of this thesis has been to make a number of suggestions regarding firstly, how centre staff may conduct studies or reviews of the activities of their centres and secondly, which feature of the departmental learning resource centres to my mind were the relatively most important. With these suggestions I hope to contribute to the decision making process by centre staff in connection with the future of their centres.
APPENDIX I

PROPOSED EVALUATION STUDY OF THE BIOLOGY SELF TEACHING LABORATORY

ZOOLOGY DEPARTMENT. UNIVERSITY OF GLASGOW

Resulting from a discussion and subsequent correspondence between Dr. Roger Downie and Mr. Mario Lopez, an evaluation study will be carried out of the Biology Self Teaching Laboratory of the Zoology Department at the University of Glasgow.

The following fourteen points sum up the agreements reached and outline the overall evaluation plan.

1. The evaluation study will be carried out by Mr. Mario Lopez of the Institute for Educational Technology at the University of Surrey, and in collaboration with Dr. Roger Downie of the Department of Zoology at the University of Glasgow.

2. The study will begin in the Summer term of 1976-1977 and continue throughout the Autumn term of 1977-1978. An exploratory week long visit (Summer term) will be followed by periodical focussed investigations (Autumn term).

3. The evaluation is not going to inspect or pass judgement on the Biology Self Teaching Laboratory, but study it with a view to provide a sensitive understanding of intended and unintended outcomes of the educational practice of the laboratory.

4. The general objectives of the evaluation will be:
   a) To monitor students and staff reactions to the Biology Self Teaching Laboratory.
   b) To describe and document the laboratory organisation.
c) To identify alternative methods of communication between laboratory staff and students.

d) To elucidate the perceived advantages and disadvantages to the two main services provided by the Self Teaching Laboratory (supplementary materials and course related materials).

5. The general evaluation approach to be used during the study will be that described by Parlett and Hamilton (in "Evaluation as Illumination: a new approach to the study of innovatory programmes", Occasional Paper 9, Centre for Research in Educational Sciences, University of Edinburgh, 1972). In short; this is a multi-method approach, making use of: observation; interviews; questionnaires; and relevant documents. Its primary concern is with accurate description and interpretation, and is a suitable strategy for investigations where comparative and statistical study is inappropriate (as in the case of the evaluation of the Biology Self Teaching Laboratory).

6. Access to the teaching and learning activities of the Self Teaching Laboratory is appreciated. As is access to exam results and other background documents. Dr. Downie willingness to introduce the evaluator to those involved with the laboratory, i.e. Professor, teaching staff, administrators, technicians and students is also appreciated.

7. A short account of the study will be produced by the evaluator for distribution to all those concerned and interested.

8. The evaluator is grateful for secretarial services offered.

9. Travelling and subsistence expenses will be covered by the World University Service (U.K.).
10. The information gathered during the study will be used in three different ways. Firstly, a brief account of conclusions and evidence will be submitted to the Department of Zoology at the University of Glasgow. This will be an open report in so far as it should be generally available for circulation within the Department. Secondly, should the work justify it, there will be a submission to a professional journal for a joint (Downie-Lopez) publication. Thirdly, a write-up of the evaluation will be used as a case study in the evaluator's Ph.D. Thesis.

11. If requested and whenever possible, written or verbal interim feedback will be provided.

12. All information obtained during the study will be treated as confidential. Individual quotes will not be identified, unless those concerned (after their own editing) wish otherwise.

13. A seminar on the evaluator experiences, if requested, will be given to the Zoology Department Educational Methods Group.

14. Questions concerning the wording of this outline or on its implications should be clarify before the study begins, and if agreed it should start in May 1977. It should be emphasized that this outline is still tentative and may be modify if circumstances dictate so.

I would like to take this opportunity to thank Dr. R. Downie for his helpful advice and suggestions, and to express the hope that this study will aid decision making regarding the future of the Biology Self Teaching Laboratory.

Mario J. Lopez
April 1977.
APPENDIX II

LIST OF QUESTIONS ASKED OF STAFF MEMBERS IN CHARGE OF CENTRES.
(The questions did not occur in the order they are listed below)

- When did your centre start?
- Who is in charge? Is it staffed?
- How is it staffed? By who?
- How many staff and students involved?
- Provision of equipment and space.
- What is the philosophy of your centre?
- Have you defined aims and/or objectives?
- For what students are materials available?
- On what basis are materials made available to students? (supplementary/background/course related/alternative to lectures?)
- What percentage of subjects (courses) are covered by materials in the centre?
- Are there any materials forming part of the assessment scheme?
- How is your centre funded?
- Who decides and apportions the budget?
- What is the budget?
- Do you know of similar work elsewhere?
- What relationship with library, computer centre?
- How do you introduce new materials in the centre?
- What percentage of them are produced by you and your department/your institution/commercial firms?
- Is there any booking arrangements for the equipment? materials? study places?
- Have you developed any catalogue/index of the materials available for students?
- What help do students get when in the centre?
- Learning resources of most use for your students.
- What have students gained by using the centre? How do you know?
- Can students borrow any materials/equipment?
- Have students encountered any problems? Use of equipment/materials.
- Do you know what staff and students think about the centre?
- How do you know?
- Do you get feedback from them? How? and why?
- Have you introduced any changes as a result of feedback?
- How do students get to know about materials?
- Any difficulties from students' point of view?
- Copying facilities.
- How commercial materials are selected?
- What are the production facilities?
- What guidance did you get and from whom?
- Who takes the initiative for production?
- How interested is the teaching staff in the centre?
- What percentage of them have produced materials for the centre?
Dear

A QUESTIONNAIRE ON LEARNING RESOURCE CENTRES

This questionnaire has been prepared as part of a research project concerning Departmental Learning Centres. Its aim is to provide a more sensitive understanding of what happens in such centres.

We hope very much that you will be willing to help us by spending a little time on the questionnaire. Most of the questions can be answered by putting ticks into the relevant boxes. In some cases, additional information is asked for. Please supply this if you can. You are at liberty to reword any of our questions if you think this necessary to enable you to answer them. We shall be pleased to have any other comments on matters relating to your centre and/or this questionnaire. We shall also be extremely grateful if you could enclose any other information you think appropriate, i.e. user's guide, internal papers, relevant documents.

We assure you that any information that you give will be treated confidentially and will not be used in any way that would identify you or your institution, without your permission.

When you have completed the questionnaire, please return it to us in the envelope provided, as soon as is compatible with your duties.

Professor L.R.B. Elton

M.J. Lopez
DEFINITIONS:

For the purpose of this questionnaire the following two definitions will be made.

a) LEARNING RESOURCES: materials - slides, audio tapes, video tapes, printed materials, lecture notes, etc. - which are designed as aids to learning either to supplement or replace normal teaching.

b) LEARNING RESOURCE CENTRE: the entire entity - organisation, staff, their philosophy and approach to teaching and learning, space, resources, etc. - which provides students with the learning resources.

1. Details.

<table>
<thead>
<tr>
<th>Number of students in the department</th>
<th>Number of staff in the department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Centre</th>
<th>Centre's starting date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area of Centre (in square metres)</th>
<th>Number of student study places</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Opening times of Centre in 1977</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TERM 1</td>
</tr>
<tr>
<td></td>
<td>TERM 2</td>
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<td></td>
<td>TERM 3</td>
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<td>Monday</td>
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<td>Tuesday</td>
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<td>Wednesday</td>
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<td>Thursday</td>
<td></td>
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<tr>
<td>Friday</td>
<td></td>
</tr>
<tr>
<td>Weekend</td>
<td></td>
</tr>
</tbody>
</table>
2. The following is a list of assumptions which may be made, either explicitly or implicitly, when starting a centre. Please tick those you made and add any others if you wish.

i) Recent technological developments enable an increasing amount of information to be available in the form of learning resources which enables students to supplement the more conventional presented material.

ii) Students have many different styles of learning and it is part of Higher Education to encourage students to find a learning style which suits their requirements.

iii) The centres can be of valuable assistance to students in learning and understanding their subjects.

iv) The assistance provided in the centre can also be a valuable supplement to the scheduled departmental tutorials.

v) Many subjects can be learnt better using audio visual methods.

vi) The learning resources must be regarded as a supplement to, not as substitute for, traditional methods of study.

vii) Learning resources have a very important role in teaching and learning methods.

viii) Weaker students can receive assistance with particular parts of their courses.

ix) Students can be better motivated through the use of learning resources.

x) Learning resources should be available to students as readily as books.

If any others, please specify.
3. a) The day to day running of the centre is responsibility of
youself only
a committee of ______ members only
yourself supported by a committee of ______ members
all staff in the department
If others, please specify.

b) Please tick the appropriate box(s) to indicate who provides supervision in your centre.
yourself only
staff
postgraduates
If others, please specify.

c) Please indicate your status and grade.

<table>
<thead>
<tr>
<th>STATUS</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>------</td>
</tr>
<tr>
<td>Technical</td>
<td>------</td>
</tr>
<tr>
<td>Administrative</td>
<td>------</td>
</tr>
<tr>
<td>Research fellow</td>
<td>------</td>
</tr>
<tr>
<td>If other, please specify.</td>
<td></td>
</tr>
</tbody>
</table>

4. The learning resources available in the centre may be used by
All students in the department
Students of particular courses
If particular courses, please indicate the percentage of students and courses.
Students        Courses
5. Please indicate the number of each type of learning resource available in your centre and tick the appropriate box(s) for which your centre has production facilities. Please indicate in the right hand columns the number and maker(s) of the corresponding hardware available for students use.

<table>
<thead>
<tr>
<th>SOFTWARE (slides, tapes, etc,)</th>
<th>HARDWARE (players, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Resource</td>
<td>Number</td>
</tr>
<tr>
<td>audio tapes</td>
<td>-------</td>
</tr>
<tr>
<td>sets of slides</td>
<td>-------</td>
</tr>
<tr>
<td>O.H.P. transparencies</td>
<td>-------</td>
</tr>
<tr>
<td>tape/slide (synchronised)</td>
<td>-------</td>
</tr>
<tr>
<td>tape/slide (unsynchronised)</td>
<td>-------</td>
</tr>
<tr>
<td>film loops</td>
<td>-------</td>
</tr>
<tr>
<td>film strips</td>
<td>-------</td>
</tr>
<tr>
<td>video tapes</td>
<td>-------</td>
</tr>
<tr>
<td>computer based materials</td>
<td>-------</td>
</tr>
<tr>
<td>models</td>
<td>-------</td>
</tr>
<tr>
<td>books</td>
<td>-------</td>
</tr>
<tr>
<td>programmed texts</td>
<td>-------</td>
</tr>
<tr>
<td>lecture notes</td>
<td>-------</td>
</tr>
<tr>
<td>reprints</td>
<td>-------</td>
</tr>
</tbody>
</table>

If others, please specify.

6. What percentage of all learning resources available in your centre falls approximately into each of the categories below?

   Alternative/replacement of lectures          -------
   Supporting/backing of lectures               -------
   General background                          -------
   If others, please specify.                  -------
7. Please indicate approximately what percentage of your learning resources is produced by the agents listed.

Your department
Academics elsewhere
Commercial firms
If others, please specify.

8. How many staff in your department have produced learning resources that are in use in your centre?

9. Is there in your department/institution any course for staff dealing with the preparation and/or use of learning resources?

YES  NO

If YES, how many staff have attended it?

If NO, do staff think there is any need for such a course?

Yes
Probably yes
Not at all
10. Do you have any financial support other than your department?

YES [ ] NO [ ]

If YES, please give details.

11. Please tick the appropriate boxes to indicate how you consider the support you are getting.

<table>
<thead>
<tr>
<th>Financial support</th>
<th>VERY GOOD</th>
<th>ADEQUATE</th>
<th>FAIR</th>
<th>UNSATISFACTORY</th>
<th>NONE AT ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumable expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staffing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technician</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerical/administrative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moral support from senior staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision of learning resources</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Assistance with supervision</td>
<td></td>
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<tr>
<td>Encouraging students to use the centre</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Have you sufficient space

a) for your present activities? YES [ ] NO [ ]

b) for anticipated developments within the next two years? YES [ ] NO [ ]
13. a) Are you generally satisfied with the service that you are providing in the learning centre?

   YES   NOT SURE   NO

   b) Are there any changes or developments that you would like to introduce but which you are unable to do?

   YES   NO

   If YES, please give details.

14. Are you getting any form of feedback from staff and/or students in connection with the learning centre?

   Staff         YES   NO
   Students      YES   NO

   If YES from staff, please say briefly how.

   If NO from students, please go to question 17.
15. If YES from students. Is this

Formal (interviews, questionnaires, etc.) □□
Informal (occasional talks) □□

a) If FORMAL. Is this through

Questionnaires □□
Interviews □□
Observation □□
Suggestion box(s) □□
If others, please specify.

b) If INFORMAL. Please say briefly how.

16. Please state briefly what sort of changes you have introduced in the centre due to any feedback obtained from students.
17. The following is a list of general aims of Learning Centres. Please indicate how important you consider these to be by putting a tick in the appropriate column.

<table>
<thead>
<tr>
<th>AIM</th>
<th>VERY IMPORTANT</th>
<th>FAIRLY IMPORTANT</th>
<th>NOT VERY IMPORTANT</th>
<th>UNIMPORTANT</th>
<th>NO OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) to provide a room in which students can discuss their work with other students.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii) to provide a room in which students can discuss their work with staff/demonstrators.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii) To provide learning resources which can be an alternative to or replacement of conventional lectures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv) to make the study of subjects, e.g. Chemistry, Biology, etc. more attractive.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v) to encourage students to develop the ability to learn independently.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi) to provide resources for students to prepare work (essays, papers) for use in seminars, tutorials, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii) to provide access to models, such as for instance crystal and molecular models and to model kits.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>viii) to encourage and enable staff to develop improved teaching methods.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ix) to provide direct access to a computer and to a variety of electronic calculators.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>x) to provide an alternative study place to the library.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please suggest other desirable aims and their importance.
18. How well do you think your centre fulfills the aims set out in the last question?

AIM

i) to provide a room in which students can discuss their work with other students.  

ii) to provide a room in which students can discuss their work with staff/demonstrators.  

iii) to provide learning resources which can be an alternative to or replacement of conventional lectures.  

iv) to make the study of subjects, e.g. Chemistry, Biology, etc. more attractive.  

v) to encourage students to develop the ability to study independently.  

vi) to provide resources for students to prepare work (essays, papers) for use in seminars, tutorials, etc.  

vii) to provide access to models, such as for instance crystal and molecular models and to model kits.  

viii) to encourage and enable staff to develop improved teaching methods.  

ix) to provide direct access to a computer and to a variety of electronic calculators.  

x) to provide an alternative study place to the library.  

Others.  

xi)
19. Is there anything else you would like to tell us about your Learning Resource Centre? (i.e. advantages, disadvantages).

20. If you wish, please comment on the nature of the questionnaire or give detailed comments on particular questions.

Thank you.

May 1977.
APPENDIX IV

VIBRATIONS AND WAVES COURSE - LIST OF QUESTIONS ASKED OF STUDENTS

(Questions did not necessarily occur in the order listed).

- What are your reactions to the course?
- Are there any particular good features?
- Any bad ones?
- What do you think you are getting out of the course?
- How are you learning?
- Is there any repetition from A level?
- Can you compare with other courses? How? and why?
- How interesting do you find the course? Could you compare it with other of your courses?
- Do you find the course difficult? Why? or why not?
- What about the time needed for it?
- How do you work in your group?
- In what ways could the course be improved?
- How is the tutorial session?
- Are you getting enough assistance?
- What about the resource centre? Advantages, disadvantages of its use.
- You have had to work through computer exercises. What could you say about them in terms of relevance for your general work for the course? What about their difficulty? What changes would you like to see in them? How related they are to the course material?
- Idem for laboratory exercises, print materials, film, tutorials, audio tapes.
- What do you think of the assessment scheme?
- What is your opinion of the three sets of aims of the course?
- Do you think they are being achieved?
- How often do you meet as a group?
- How could you describe your work as a group?
- What advantages and disadvantages can you say about your work in group?
- Are you working as you would like to?
- What improvements would you like to see in your group work?
- Are you working as a group for other courses? How? Why?
- What about the pressure to do the work?
APPENDIX V
STUDENT FEEDBACK FORM

The information asked for on this form is to be used only to improve the package and not to test you.

Package name (including version/draft number) ...........................................
Institution .................................. Department ..................................
Course (including year) ..............................................................................
Name ................................................................ Date ..........................
Working with (if applicable) .................................................................

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Strongly agreed</th>
<th>Agreed</th>
<th>Neutral</th>
<th>Disagreed</th>
<th>Strongly disagreed</th>
<th>Additional Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I found the notes easy to understand.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The notes are not essential.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I was enthusiastic about using the package.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Further explanation of the questions in the Program is needed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The results are clearly set out.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I got many meaningless results.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I got bored while at the terminal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>We spent a great deal of time in discussion after running the Program.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I'm interested in knowing more about the computer mode.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I feel that I have gained a good understanding of this topic through using the Package.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OTHER COMMENTS:

PLEASE TURN OVER
11. How long did you spend reading the notes before coming to the terminal?
   Hr. _____ Min. _____

12. How long did you spend running the Program as:
   an individual _____
   a small group _____
   a class demonstration _____

13. The time available at the terminal was:
   too short _____
   about right _____

14. What type of terminal did you use?
   Teletype _____
   VDU _____
   Graphics _____

15. Have you used this type of terminal before?
   yes _____
   no _____

16. Approximately how many times have you used a program before?

17. Did you receive any assistance from a demonstrator?
   yes _____
   no _____

18. Do you feel that the assistance was:
   Too little _____
   About right _____
   Too much _____

It would assist us in improving the Package if you could elaborate upon your replies or add any further comments which you feel would be useful.

THANK YOU FOR YOUR CO-OPERATION
APPENDIX VI


FEEDBACK SHEET FOR LABORATORY EXERCISE.

Please state the number of the unit: ............

Name (optional) ........................................

Please, rate the first four items on this questionnaire on the five point scale by ringing the appropriate number.

1. The difficulty in this exercise. easy 1 2 3 4 difficult 5
   boring 1 2 3 interesting 4 5

2. Your interest in this exercise. boring 1 2 3 interesting 4 5

3. Its relevance to your course. unrelated 1 2 3 related 4 5

4. Usefulness of the notes for this exercise. useless 1 2 3 useful 4 5

5. Were you assumed to have knowledge or skills that you did not have before you started?
   YES
   NO
   If YES please give some details.

6. Please write down any particular difficulties, which you had in this exercise.

7. Approximately how many hours did this exercise take you?
   HOURS MINUTES

Thank you very much for your co-operation.
APPENDIX VII
LEARNING AIDS LABORATORY
DEMONSTRATOR'S LOG (I)

DAY DATE PERIOD

ATTENDANCE. Give the total number of persons in the laboratory and computer room. Exclude only yourself and anyone in the inner office. The count should be carried out hourly on the half hour.

|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

ASSISTANCE TO USERS

Approximate time devoted to give direct assistance or advice

Number of users involved

DIFFICULTIES. Note any difficulties encountered by users in locating material or in using the laboratory equipment. Give name and department where a written communication would seem desirable.

GENERAL. List anything relevant to the laboratory that you think merits attention. Include any suggestions for new material and equipment.
APPENDIX VIII

LEARNING AIDS LABORATORY

DEMONSTRATOR'S LOG (II)

DAY_________________ DATE________________ PERIOD______________

ATTENDANCE. Give the numbers of users in the laboratory according with their activities.

a) Students working with:

    ______ audio tapes
    ______ slides
    ______ O.H.P. transparencies
    ______ tape slides (synchronised)
    ______ tape slides (unsynchronised)
    ______ film loops
    ______ film strips
    ______ video tapes
    ______ Micro 16 computer based materials
    ______ 1905E computer based materials
    ______ models
    ______ books
    ______ lecture notes (from the L.A.L. collection)

b) Students discussing their work______

c) Students having breaks/rests______

d) If any other activities, please specify.
APPENDIX IX

EVALUATION TECHNIQUES: A description of their use in the study of university departmental learning resource centres.

Mario J. Lopez,
Institute for Educational Technology,
Guildford, Surrey.

1. INTRODUCTION

Three factors have motivated me to write this paper. Firstly, I have had a few requests for some of the evaluation instruments I have used. Secondly, many staff in centres feel that there is a real need for evaluating their centres and thirdly because, as MacDonald (1974) says in his paper "Evaluation and the Control of Education", "... the evaluator acts as a broker in exchanges of information between groups who want knowledge of each other. The techniques of data gathering and presentation must be accessible to non-specialist audiences".

This paper has three main aims. Firstly, to briefly introduce a newly developed evaluation approach (Parlett and Dearden (1977). Secondly, to discuss and highlight the advantages, disadvantages and appropriateness of some of the techniques involved in the approach. Thirdly, to illustrate the use of these techniques through concrete examples.
2. BACKGROUND

2.1 Learning Resource Centres.

For some time now institutions in British higher education have been incorporating in their libraries non-book learning materials. A growing use of these so-called learning resources has recently occurred at departmental level. This perceived need for providing such learning resources has led to the establishment of departmental learning resource centres. Such a centre is not only the physical accommodation for the learning resources but the entire entity - organisation, staff, their philosophy and approach to teaching and learning, space, resources, etc. - which provides learners with the learning resources.

2.2 The evaluation study.

The basic purpose of the study has been to explore, analyse and portray educational practice in departmental learning resource centres, using methods similar to those in social-anthropology, as described in "Up to the Mark" by Miller and Parlett (1974).

The study began as an open ended exploration of the centres, trying to tease out staff' and students' general perceptions of their work. To do this, many centres were visited. Once a general view of them had been obtained the investigation developed towards more focussed enquires into emerging issues, trying to find out the reasons why they arose and their influence on staff and students.

It became clear from early visits that departmental centres vary enormously in organisation, administration and pedagogy. With the aim of providing examples of this complex situation it was decided
to conduct case studies in order to study a few of these centres in depth.

3. EVALUATION TECHNIQUES

3.1 A number of investigative techniques were used in the case studies. These ranged from: observation (unstructured and structured), interviews (open ended and structured), questionnaires (to elucidate facts, opinions and attitudes) and scrutiny of departmental documents—all these being used in an attempt to detect their strengths and weaknesses as well as their appropriateness at different stages of the investigation. This has made me appreciate that when dealing with a real situation, as in the case of the evaluation of a departmental centre, which can never be compared in a simple way with other centres, it is important to select a suitable evaluation strategy. Parlett and Hamilton (1972) in "Illuminative Evaluation: a new approach to the study of innovatory programmes" suggest that this approach "is not a standard methodological package, but a general research strategy. It aims to be both adaptable and eclectic".

Characteristically the approach has three main phases: (1) Open ended exploration (of the learning centre), (2) focussed enquiries into emerging issues and (3) interpretation of the information gathered. There are also two other stages in the strategy: the setting up and the reporting of the investigation.

3.2 According to the type of staff (evaluator) - student interactions necessary for the application of the evaluation techniques, it is possible to classify them into two groups: "personal" techniques (observation, interviews) and "impersonal" techniques (questionnaires, scrutinizing of documents). Two major factors may contribute to make
the application of personal techniques by centre staff more difficult:
their perception of their own teaching and the students' uneasy when
talking to their staff on teaching matters. However, awareness of
this problem and the desire (or necessity) to evaluate one's own centre
might help to overcome it. (Also, Stenhouse, 1975, discusses the role
of the teacher as a researcher in chapter 10 of "An Introduction to
Curriculum Research and Development".)

4. DESCRIPTION OF EVALUATION TECHNIQUES

In practice the evaluation techniques are used in combination to permit
easy cross-checking of the information obtained. However, to facilitate
their description, they are analysed separately and how and when they
were used is stated in each instrument included in the appendix.

4.1 Observation.

Observation is used as an immersion strategy for building a record of
on-going events and interactions through documenting the day to day
activities of the centre. Two main types of observation can be used:
unstructured and structured.

4.1.1. UNSTRUCTURED OBSERVATION is used specially in early stages of
the studies, but also in later stages in order to get a better
comprehension of earlier identified issues. For example, in one
centre it was observed that the supervisor consulted students about
how they were getting on with their work in the centre. This was
followed up with further observation and then pursued in student
interviews.

Observation as a technique is necessarily related to the technique of
recording observed events. In the context of the described
unstructured observation it was felt appropriate to record in the form of note taking, which was generally done during the observation.

4.1.2. TAKING NOTES. Three different types of notes can be taken: (1) observational notes; (2) theoretical notes; (3) methodological notes (Schatzman and Strauss 1973). An OBSERVATIONAL NOTE (O.N.) is one which tells who said or did what. This type of note is concerned with facts and their surrounding circumstances. In contrast, THEORETICAL NOTES (T.N.) attempt to conceptualise what has been experienced. Here the emphasis is on linking observational notes and explaining their causal relationships. METHODOLOGICAL NOTES (M.N.) are generally instructions, or sometimes reminders, for future actions, as for example an instruction to oneself to follow up in a formal interview something said in an informal talk. They may also be criticisms or reflections on the way the evaluation has up to then been conducted.

Appendix A provides examples of the type of notes taken during observation.

4.1.3. STRUCTURED OBSERVATION. This is used to monitor trends of student activities in the centres, in particular when it is necessary to quantify events.

Appendix B gives a sample of structured observation on students' activities in a centre through a form which had to be filled in every hour.

4.2 INTERVIEWS

Jointly with observation, the interview is a fundamental technique for evaluation (Cicourel 1967 describes, in "Methods and Measurement in
Sociology in various ways and situations in which the interview is a major technique. It allows a broad gathering of opinions, permitting people involved, i.e. professors, lecturers, technicians, administrators and students, to talk about problems and issues as they see them. Interviews also make it possible to be "responsive" (Stake 1974), since one can follow up newly stated issues, sometimes during the same interview, or to make a methodological note to pursue in the future.

According to the type of information or comments sought in interviews, they may be categorised into two groups.

4.2.1. OPEN ENDED INTERVIEWS are suitable for obtaining general views on the centres and are used at early stages of the evaluation.

Appendix C is an open ended interview schedule with students of a course taught through a learning centre, and was oriented to obtain the general students' feelings on the course. The points to be mentioned during it are written in the schedule.

4.2.2. STRUCTURED INTERVIEWS are used to seek out more factual information or for focusing on previously identified important issues.

Appendix D provides a more structured schedule for the interview with the course organiser, which was concentrated on seven aspects regarding the course.

Interviews may be carried out either with single individuals or with small groups, depending on the type of information wanted.

As in the case of observation, it is also helpful to record interviews, which can easily be done on magnetic tape. When this is not possible, notes can be taken during or after the interview. Transcribing the
tapes, processing and classifying the information on them contribute to the data profiles obtained from note taking.

4.3 QUESTIONNAIRES

Two factors may contribute to the use of questionnaires. Firstly, the need for quick feedback, and secondly, the need for sustaining and validating information previously obtained from other sources.

4.3.1. FEEDBACK SHEETS are specially useful in early stages of the evaluation to check with students those aspects that staff think important. It should be pointed out here that although feedback sheets provide quick information, this is not always as relevant as expected due to their isolated use. They are more useful when used as a result of earlier information.

Appendices E and F are samples of feedback sheets. These are also taken from the evaluation of the course taught through a learning centre.

4.3.2. SPECIFIC QUESTIONNAIRES. These are mainly used for checking those aspects that students think important. Used late in the evaluation they permit one to confirm and quantify information previously obtained, specially when the number of students involved makes it impossible to talk to them all. These are of two types: free and fixed answers, the first result from open ended questions in which answers have to be elaborated on (this sometimes produces new and perhaps unexpected comments). In the latter ones the responder has only to insert ticks or numbers into the relevant boxes. Some of these questionnaires may also include attitude check lists.

Appendix G is a sample of a questionnaire administrated at the end of the evaluation of a learning centre. This was basically used to
confirm information obtained through interviews with a sample of students.

4.4 DOCUMENTS

Innovations do not happen overnight. In the case of departmental learning resource centres the examination of proposals, departmental committee minutes, handouts, and other documents provides useful information. They may, for instance, give the historical perspective of how the centre was seen at its beginning by its mentors. The documents also provide indications on aspects of the past of the centres which might otherwise not have been obvious from the evaluation.

Appendix H is an extract from an old handout of an evaluated centre, which was no longer used, but which threw a light onto present practices that could not have been obtained otherwise, i.e. The opening times of the centre had decreased since then and at the time there was a stronger emphasis on the computing facilities of the centre.

5. CONCLUDING CONSIDERATIONS

5.1 The intensive use of interviews and observation proved to be of enormous value. They permitted the learning centre to be viewed as an integral part of the general departmental teaching and learning situation. Listening to how students and staff talked about departmental centres, talking to them in general terms and observing their behaviour within the centre permitted me to obtain a general picture of the situation and alerted me to many issues. Further and more detailed interviews permitted me to focus upon those issues which
were relatively more important. Keeping records of interviews and observation helped a lot in deciding on which issues to focus.

5.2 The combined use of the techniques was very important for the cross-checking of the information and indeed facilitated it. For example, interviews were sometimes used to check information obtained through observation or scrutiny of documents. Also when dealing with a large number of students, questionnaires were used late in the evaluation and were very valuable in confirming and quantifying information obtained from just a few people in interviews. All this strengthened tentative findings.

5.3 Since centres were first started in about 1970, usually by a few members of a department, other people have become involved in them. An increasing number of members of staff have come to contribute to the supervision and production of learning resources, postgraduate students now often help with their supervision, and more recently third year students on projects have also prepared learning resources. Hopefully this increased involvement, the willingness of staff in some centres to know how their centre is working out, and this paper, will lead to more formal internal evaluation studies.
6. APPENDICES

This paper has made reference to a number of examples of evaluation techniques. They were originally included in a section of appendices. They are omitted here because they overlap with examples provided elsewhere in this thesis. Similar examples will be found in chapter III or in the appendices as follows:

Appendix A: "Extract from field notes".
Section 4.3 of chapter III includes a selection of field notes.

Appendix B: "Demonstrator's log."
Appendix VIII presents a form for structured observation.

Appendix C: "Schedule for an open ended interview".
Section 4.6 in chapter III includes an extract from an open ended interview schedule.

Appendix D: "Schedule of a structured interview".
Section 4.7 of chapter III presents an extract from a structured interview.

Appendix E and F: "Feedback sheets".
Appendices V and VI are samples of feedback sheets used during the evaluation of a course taught through a learning centre.

Appendix G: "Questionnaire".
Section 4.11 in chapter II includes a questionnaire administrated at the end of the evaluation of a learning centre.

Appendix H: "Extract from a document".
Section 4.12 in chapter III provides an extract taken from an old handout not longer used, of an evaluated centre.
APPENDIX X
INFORMAL SEMINAR: TRYING TO COMMUNICATE WITH PRACTISING TEACHERS.

INTRODUCTION

The purpose of my research work has been "to evaluate the use of departmental learning resource centres in higher education institutions in Great Britain". Related to this was the communication with people involved in such centres in order to exchange knowledge of each other. In this respect and due to various reasons, a secondary aim was introduced to the project; this was my effort to let them know my feelings about a possible applicability to their own situation of some evaluation techniques I had used. In the next 20 minutes or so I will attempt to report on this effort, aiming to motivate discussion and exchange of experiences amongst all of us on this and similar matters.

I will try to explain the reasons for the introduction of the aim in question into my work. I will then describe a particular activity that I carried out trying to fulfil it and will give some reactions to it of the staff involved in centres. Finally I will examine some of my own reservations on the whole exercise and — perhaps — draw some conclusions.

REASONS FOR THE SECONDARY AIM.

First of all then, the reasons for introducing the secondary aim on communicating to staff involved in centres about the applicability of evaluation techniques to their own situation. I can recall at least four reasons for this; firstly the fact that it
is very often pointed out that educational research in general has had almost negligible impact on practising teachers. It is also often pointed out that this is due to lack of interest on the part of the teacher. Far from that, my experience gained throughout the study has been that teachers are interested in improving their teaching and value research results that seem relevant to them.

In the particular case of departmental learning-resource centres staff feel that there is at present insufficient evidence for supporting their existence and that evaluation studies are needed.

Secondly, I have visited many centres through both my participation as an observer member of a C.N.A.A. working party and personal contacts. Thus becoming known to people involved in departmental centres, some of whom were particularly interested in knowing how their centres were working out, but did not have the resources to do so, which include people, money, time and sometimes methodology.

Thirdly, quite a few of them have made requests for some instruments I have used, in particular for interview schedules and questionnaires, but mainly for the latter.

Fourthly, the fact that I found very interesting what MacDonald says in "Evaluation and the Control of Education", and I quote:

"...The basic value is an informed citizenry, and the evaluator acts as a broker in exchanges of information between groups who want knowledge of each other. His techniques of data gathering and presentation must be accessible to non-specialist audiences. His main activity is the collection of definitions of, and reactions to, the programme ...

"
In addition to all this my experience with the particular methodology I have used—which broadly speaking followed that described in occasional paper number 9 by Parlett and Hamilton—has been quite satisfactory insofar as going about doing the work, mainly because (a) it is organised in five phases: setting up the study, open ended exploration, focussed enquires, analysis/interpretation and reporting; and (b) because no techniques have privileged status in it.

It is important to make the points that teachers in the situation described were concerned to understand better their centres and that these needed to be studied and I thought that some sort of communication from my part with people involved in centres might help them to conduct studies by themselves, or help them to just review their centres activities.

I have tried to explain the reasons why I have made the effort to communicate with people involved in learning centres and would now like to describe how I have done this.

DECIDING ON A MEDIUM

I decided that the medium for this communication should be a paper to be sent to people involved in departmental learning resource centres; rather than just submitting it for publication in a professional journal. However, publication was to be considered after both knowing some reactions to it and some necessary modifications.
There were three factors which contributed to this decision; firstly because both within centres in particular departments and between different centres, the interactions, and consequently the exchange of knowledge of what goes on in centres, amongst people involved is almost nil. Be it said in passing that these two types of interactions became subjects of focussed enquires during my investigation.

Secondly because it would provide ground for testing an implication from a suggestion made by the innovative approach, namely that reports --and papers-- should be circulated amongst interested parties before publication.

Thirdly because the paper itself would constitute a sort of experiment since it was not a prescriptive package with a set of instructions, but rather the presentation and illustration of the evaluation techniques used in a particular study. In other words it was the presentation of a case study on the use of some evaluation techniques.

THE PAPER

The paper had four major sections: 1) introduction, 2) background, 3) presentation of the methodology and evaluation techniques and 4) some concluding considerations. In the introduction I quoted some of the reasons I had for writing the paper and set out its aims. I said:
"This paper has three main aims. Firstly, to briefly introduce a newly developed evaluation approach (Parlett and Dearden 1977). Secondly, to discuss and highlight the advantages, disadvantages and appropriateness of some of the techniques involved in the approach. Thirdly, to illustrate the use of these techniques through concrete examples."

The background gave brief information on what is meant by a learning centre as well as on the study I have been involved in. The methodology was presented as a new approach to the study of innovative programmes, stressing that it is not a standard methodological package, but a general research strategy, and which is adaptable and eclectic.

It should be clear that the paper considered the fact that the audience involved in the exercise were people who would be studying a situation in which they themselves were involved and before describing and illustrating the techniques I had used most, the following consideration was made regarding their possible application by people involved.

"According to the type of staff (evaluation)-student interactions necessary for the application of the evaluation techniques, it is possible to classify them into two groups: "personal" techniques (observation, interviews) and "impersonal" techniques (questionnaires, scrutinizing of documents). Two major factors may contribute to make the application of personal techniques by centre staff more difficult: their perception of their own teaching and the students' uneasy when talking to their staff on teaching matters. However, awareness of this problem and the desire (or necessity) to evaluate one's own centre might help to overcome it."
The description of the techniques was made bearing in mind that:

"In practice the evaluation techniques are used in combination to permit easy cross-checking of the information obtained. However, to facilitate their description, they are analysed separately and how and when they were used is stated in each instrument included in the appendix".

I finished the paper with the following concluding notes:

1. The intensive use of interviews and observation proved to be of enormous value. They permitted the learning centre to be viewed as an integral part of the general departmental teaching and learning situation. Listening to how students and staff talked about departmental centres, talking to them in general terms and observing their behaviour within the centre permitted me to obtain a general picture of the situation and alerted me to many issues. Further and more detailed interviews permitted me to focus upon those issues which were relatively more important. Keeping records of interviews and observation helped a lot in deciding on which issues to focus.

2. The combined use of the techniques was very important for the cross-checking of the information and facilitated it. For example, interviews were sometimes used to check information obtained through observation or scrutiny of documents. Also when dealing with a large number of students, questionnaires were used late in the evaluation and were very valuable in confirming and quantifying information obtained from just few people in interviews. All this strengthened tentative findings.

3. Since centres were first started in about 1970, usually by a few members of a department, other people have become involved in them. An increasing number of members
of staff have come to contribute to the supervision and production of learning resources, postgraduate students now often help with their supervision, and more recently third year students on projects have also prepared learning resources. Hopefully this increased involvement, the willingness of some staff in some centres to know how their centre is working out, and this paper, will lead to more formal internal evaluation studies.

REACTIONS TO THE PAPER

Having given the reasons for introducing the described aim and the way I chose to communicate it to people involved in learning centres I will now attempt to summarise some of their reactions to the paper.

The paper was sent to a dozen people involved in one way or another with departmental learning resource centres and Prof. took to a seminar in West Germany a shorter version of it, which was made available on request to people involved. The people who received the paper were as follows: 7 people in charge of departmental centres, 3 staff participating in centres, 2 educational technologists and 9 west germans.

The educational technologists and the west germans have not replied so far. In fact my appeal for comments on the paper has been successful from 6 people, four of them are in charge of centres and the other two are staff members participating in them. I also had comments on a draft of the paper from Prof. and Vivien.
People's reactions to the paper varied a lot and in order to illustrate them I now quote five of their passages.

1. "I liked your three aims and thought you covered all of them as well as possible in the space available".

2. "In general terms I feel that you should concentrate a little more on the results of the investigation rather than in their methods of collection".

3. "The paper assumed that the reader has read certain other books/papers which may not be so".

4. "The first paragraph of section 1 gripped me immediately. I thought it was a good start, and I thought all three reasons were extremely relevant and close to my heart. I also think you are likely to find many other readers with the same reaction. One small point though, the mention of a 'broker' who exchanges information between groups, made me expect for a little while that you were going to share with me some of the experiences you had obtained from the evaluations you have been working on in the past year. I was almost half way through the paper before it dawned on me that this was a misunderstanding on my part. It may be that other readers might have the same misunderstanding, or perhaps I am just self centred as far as my own interests are concerned when I am reading a paper ... ... and now moving on to the possibility of a member of staff evaluating his or her own centre; this would be a very difficult process. We have already tried this, on a small scale, on one or two occasions - and have run into sufficient difficulties to make us think again about the whole process. At present I believe it would require a very exceptional personality to have the detachment to evaluate a centre in which he or she was personally involved".

5. "We are not concerned with how the resources are used or
whether they are effective. We simply tell people what is available and allow them to decide on their usefulness or otherwise. We don't have sufficient money or time to assess every learning aid.

There were also a number of reservations regarding some aspects of the paper. Some of these were that it did not consider "measured learning" other than students self appraisal, that some of the techniques described, in particular open ended questions in interviews and questionnaires may produce irrelevant information, that it was not clear in pointing out that an evaluation has to establish the competence of the student at the end of the day and to do so by using "objective testing".

MY OWN RESERVATIONS

Now, my own reservations on the paper. After receiving all these comments and having read the paper on a number of occasions I have come to the conclusion that it suffered from two major limitations. The first one is that it did not make it quite clear that the methodology described is concerned with gathering information in order to enable people to draw their own conclusions and that this is not in contradiction with them conducting their own studies.

The second major reservation I have is that the paper was a bit divorced from the research subject, it did not provide the reader with illustrations and/or examples of the type of information I have obtained through the use of those described techniques; that
is I did not illustrate how they would benefit from applying the techniques. I should have said that I see no reason why a staff member studying or reviewing a particular centre would not have got similar kind of information and/or answers from students when asked about the centre, as I did. For example observing activities in a particular centre I noted—as perhaps anybody else would—that books were the most used learning material, which was confirmed via other techniques (i.e. interviews, questionnaires) and which was contrary to centre's leader feeling that audio tapes were the most used ones. Another example I could have provided is in connection with interviews. Some of the student-users of this particular centre complained that their staff do not usually refer them to the centre and that as a consequence of this—as well as the absence of an index—they were not completely aware of what was available. In this connection one student said:

"Members of staff never give material in the learning centre, so possibly they don't realise what material is there or don't think it is significant ... Usage of it by students would increase if this material was brought to their attention by members of staff ... I don't think most students know what material is in the centre so the sheets giving recent additions to stock which are put on Department notice boards should be supplemented by a list indicating most of the available material relevant to students".

Other examples could have been included either to illustrate these and other techniques.
CONCLUSIONS

And finally the conclusions. Any possible conclusions should be regarded as tentative due to the paper's small span. However, the following two remarks can be drawn as a way of conclusions:

a) Although people have not had enough time to apply some of the guidelines set out in the paper, I consider that the 50% replies, I have got from those people I contacted directly is percentagewise very satisfactory, in particular if one considers the climate still a bit unfavourable for this type of things.

b) The exercise has been worthwhile because an improved paper could be written and in fact it will be a part of one of the chapters of my final report.

January 1978
APPENDIX XI: REFERENCES


Beggs, D. (1964), "Organisation follows use ... the Instructional Material Centre". Audio Visual Instruction, November.


Corfield, G. (1975), "Learning Aids Laboratory Users' Guide". Department of Chemistry and Biology, Sheffield Polytechnic.

Corfield, G. (1976), Personal communication.


Cowan, J. (1975d), "A Study of the feasibility of resource-based learning in Civil Engineering Education". Department of Civil Engineering, Heriot-Watt University.

Cowan, J. (1976), Personal communication.


Cronbach, L. (1963), "Course Improvement Through Evaluation". Teacher's College Record, 64.


De Bernardis, A. (1967), "To Carrel or not to Carrel? That is the Question". Audio Visual Instruction, May.


Diederich, M. (1975), "Observation of Audio Tutorial Centre Activities". Educational Technology, October.


Duncan, C.J. (1976), "Pictures and Words for Self Tuition". Times Higher Education Supplement, 4 June.


Eraut, M. (1975), "Should Curriculum Decisions Be Made 'for' or 'by' the Independent Learner ?". In Furniss and Parsonage (1975).


Hansell, M.H. (1976), "Resources Room: a survey of its first year of operation". Mimeograph. Zoology Department, Glasgow University.


Hodgson, V. (1977), Personal communication.


Lawes, E. (1971), "What is a Resource Centre?". Times Education Supplement, 11 June.


MacDonald, B. (1971b), "Briefing decision makers". In House (1973c).


Malcolm, A.H. (1973), "A Resource Centre ... is a state of mind". Glasgow: Scottish Educational Film Association.


Parlett, M. (1977), Seminar given at the Institute for Educational Technology, University of Surrey.


Seeley, M. (1976), "Newsletter, May". Chemistry Department, Queen Elizabeth College.
Stake, R.E. (1967a), "Toward a Technology for the Evaluation of Educational Programs". In Stake (1967b).
