Learning difficulties in the context of core design studies: an action research approach

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Additional Information:

- A Master's Thesis. Submitted in partial fulfilment of the requirements for the award of Master of Philosophy at Loughborough University.

Metadata Record: https://dspace.lboro.ac.uk/2134/33034

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LEARNING DIFFICULTIES IN THE CONTEXT OF

CORE DESIGN STUDIES: AN ACTION RESEARCH

APPROACH.

by

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A masters thesis submitted in partial
fulfilment of the requirements for the
award of Master of Philosophy of the
Loughborough University of Technology.

July 1984.

C. by Howard Denton 1984
ABSTRACT.

This study adopted the principles of action research in order to investigate the broad problem of those students who experienced learning difficulties within the core design studies course at a Leicestershire upper school. The action research approach enabled a closely focused examination of the problem area in a manner which whilst not externally valid, offered the maximum value to that particular school.

The research was essentially developmental, in that, rather than starting with a clear hypothesis and intended method, a general problem area was indicated. Subsequent directions followed on from the two initial directions which were:

a. A clarification of the problem area using interview techniques.

b. A case study over a period of two terms, aimed at gaining insight into learning difficulties experienced in design education.

As a result of the interviews, together with further reflections, classroom observation and reading, the hypothesis was generated that, in fact, many of the learning difficulties in design may be generated, or at least amplified, by the course structure itself. The investigation then opened into a broader study of under-achievement and its pathology within that particular setting, leading to the development of a new course structure and associated teaching techniques designed to maximise individual potential and minimise learning difficulties within the mixed ability groups of core design.
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Introduction.

This work effectively began in mid 1982 and has evolved into an action research project, in that, as Halsey (1) offered, it is "a small scale intervention in the functioning of the real world and a close examination of such intervention." The reader should be clear that this work has been developmental rather than conforming to the classical paradigm of hypothesis followed by experiment. It is also situational in that it looks at one piece of the "real world" (that is the core design course at Burleigh), rather than attempting to be externally valid. (Further information on Burleigh and core design can be found in appendices 1 and 2).

The background lies with the development in 1980/81 of a new mode 3 CSE design syllabus at Burleigh which was a considerable development over the previous single subject CSE's, in that it offered the student opportunities to learn through the experience of design, but also, as we shall see later, laid the foundations for a reform of working methods in the department as a whole.

The need for an effective design course as a part of the core curriculum of every school cannot be underestimated, however, in this work there is only space for the briefest of justifications.

1. Design is one of the few areas that looks at "real" problems, that is problems on a personal level that a student can directly relate to and work through in a practical sense. This is particularly important for the lower ability student who may have difficulty relating to more remote or hypothetical problems in other subject areas.

2. Design adopts a more holistic view of human knowledge and experience. This is particularly important as we now recognize the difficulties caused by the traditional separate subject curriculum. Design links mathematical, scientific, aesthetic and commercial concepts and can also give the student the opportunities that the DES (2) feels many curricula lack - the opportunities to develop not simply knowledge of facts but also attitudes, skills and concepts.

3. Design introduces the concept of degree into education. Many subjects
deal with a very narrow concept of "right and wrong" ie $2 + 2 = 4$ every time. Design offers the student a view of the real world where decisions are usually a case of judging grey areas rather than absolutes.

4. Design can also be seen as the potential "missing link" to the two great failures of British industry: communications and creativity.
   
a. If design is core, meaning all students experience it, we have a common language across the commerce/science divide of industry. All students will have some concept of the process of production and have a common language in graphical communication.

b. Creativity can be improved by core design in two ways. Firstly we steer students away from the idea of knowledge being packed away into discrete boxes within the curriculum with little or no transfer. This, traditional, system is at the root of much inflexibility of thinking which is limiting the creativity of our traditionally trained engineers and designers. Design takes a much more holistic view and helps break down barriers. Secondly, design can develop in students, thinking skills which promote creativity in all fields.

Having established the new mode 3 design syllabus we, as staff, recognised that a system of continual review and feedback was necessary for any course so that it may be an active thing able to react to changes in situation. We also realised that it was going to be necessary to gradually improve the course by the elimination of errors and by gaining insights into good practice. At the time it was felt that an informal system of review was all that was necessary, with members of staff able to bring up points either at design staff meetings or casually at break times. Certainly this system works up to a point, it was the spur to this work. However a more structured mechanism is sometimes needed, probably on a regular basis, if we are to avoid the problem of staff being too close to the problems to recognise them. Such a structured mechanism could be a form of assessment by an outside visitor, who, by his detachment, may see things the departmental staff have not recognised. Such a formalised assessment system is naturally threatening to staff, but if approached correctly, as a topic for research in itself, could be of great benefit.

The "informal" and subjective view that became the impetus for this work was that within the new design course there was a sizeable minority of students who clearly had difficulty mastering the concepts and sometimes the practicalities involved in design. These learning difficulties manifested
themselves in various ways, some not immediately obvious, and it was clear that whilst many were caused by physical, neurological and psychological problems, (see later statement on learning difficulties) many were apparently caused, or at least amplified, by the course itself or associated factors. An instance of this was the number of students of reasonably high intelligence who were working to C.S.E. standard in design whilst being well up to 'O' level standard elsewhere. It was perfectly clear that we had some problems. A large minority were experiencing learning difficulties within core design; were under achieving and some were becoming openly disaffected. Whilst this situation alone merited investigation we should be clear that it also deserved attention due to two other effects that it caused:

a. Many of our learning difficulties manifested themselves in disaffection (see disaffection later). It only required a few such students to monopolise a teacher's attention so minimising the time available for others. These students also lowered the working ethos of the area so affecting other students.

b. Again the extra work-load that students with learning difficulties placed on teachers, whether from disaffection or the need to draw out a neurotic student, greatly increased the stress load on staff, in turn reducing efficiency. Therefore the group as a whole suffered.

The problem was clearly complex. On a superficial level a number of students were becoming disaffected and sometimes disruptive, with the consequences indicated. Examined more closely it was evident that there were going to be no simple answers; the forms of learning difficulty were numerous; the ways they expressed themselves varied from the painfully obvious to some that could be easily missed.

The situation was an intricate interaction of an almost infinite number of factors of which the central ones were: the student and his background, attitudes, abilities etc; the teacher and his particular background; the new course; Burleigh as a whole (for we can never divorce any subject from the curriculum as a whole); and many other factors from the hidden curriculum to the psychological effects of the poor prospects for employment.

As indicated, the approach eventually adopted has been one of action research, essentially a practical approach as there was little to be gained from an academic study at arm's length. It was important that triangulation
techniques such as participant observation were used to try to unravel some of the complex knots and try, where possible, to develop the course in a positive manner. There were clearly many factors outside the control of the staff; for example, the poor prospects for employment causing depression amongst students, but nevertheless there were areas we could work on. It was important not try to do this on my own, as an outsider, rather it was necessary to act as a catalyst to help the department develop and maximise the educational potential of the course. The reader should not underestimate this point, the teacher of design usually works as a part of a team and whilst this form of teaching has many advantages it does suffer the disadvantage of needing a continual open liaison within the team to ensure common aims and a degree of awareness. It was, therefore, important to involve the team as a whole.
Research philosophy.

My thinking and actual use of research methods has developed considerably during the course of this work. The methods eventually used are mapped out later but at this point, that it would be valuable to take the reader through a description of how that method evolved.

Educational research has tended to have a "bad press" among teachers. The primary reason is that much research has strived to emulate the physical sciences in its external validity. In order to approach this goal the educational researcher has had to concentrate his aim so precisely that we have the effect, when viewed in isolation, of a vast amount of time being spent "proving" something of little consequence. The researcher tended to adopt the classical paradigm as described by Parlett and Hamilton (3) and whilst this is useful for finely isolated variables for which objective data is required, in the context of education it has its drawbacks.

The most obvious drawback is that we simply cannot isolate variables in the highly interactive situation of a real classroom. It is possible to take a student out into a laboratory and, in a highly artificial manner, try to hold all variables steady whilst the one the researcher is interested in is manipulated. However we can never really succeed, and then this data has to be reapplied to the real classroom.

A second drawback is that the researcher is led, by the classical paradigm, to concentrate on those variables it is easier to measure. An example of this is the vast amount of work around the concept of I.Q. which is easy to measure (if we ignore the debate around it). Atkin (4) summed up the dangers when he said:

"Let us not assume that what we can presently measure necessarily represents our most important activity."

The third drawback of the classical paradigm is that it demands an initial hypothesis which is tested by the research, ie. the research follows a hypothesis. One can make the point that research, particularly of an observational type, rigorously applied, is necessary in order to be able to understand the workings of any system. Only then is it possible to generate hypotheses based upon that observation. In other words hypotheses and research into educational topics need to be based upon sound observational
research rather than research following hypothesis.

My initial reading and thinking tended to centre around the classical paradigm and a general hypothesis that many of the learning difficulties at Burleigh were either caused or amplified by the design course. This initial hypothesis was followed by another which stated that by "improving" the course we could minimise the learning difficulties. I believed, at the time, that it may be possible to create broad variables and then by means of a quazi experimental design evaluate the broad variable "course material". As I read further and looked into the problems of such a design based on the classical paradigm I realised the vast number of limitations. Even at a quazi experimental level I was denied the flexibility I needed, the highly complex variables limited accurate observation and I could expect problems with experimental mortality amongst the students with learning difficulty being observed due to the frequency of absence and suspension. Samples, their size and make up were a further drawback as was subject sensitisation with a pre-test post-test design. Even with a Solomon three way experimental design where two controls were used to minimise subject sensitisation the close knit community at Burleigh would cause information to be passed and so reduce the internal reliability of such work.

If new course material had been developed and the classical paradigm used to evaluate its impact as originally intended, I would have been prevented from altering and developing that trial material as it was used. This is unrealistic, any innovation needs alteration as points arise in actual use.

The classical paradigm also tends to blinker against any items of interest which could have arisen of a subjective or anecdotal nature because of concentration on the specific variables of the experiment.

Clearly the classical paradigm was limited in its usefulness in this work, what was needed was to be able to look at the situation at Burleigh in a broad sense, to be able to analyse and develop the course in a manner which recognised the individuality of the situation.

I have come to believe that there is great danger in looking upon education as a "process" that can be applied to a uniform raw material. The classical paradigm lets us feel that it is possible to break education down into a number of crisp objectives which can then have learning programmes designed about them and be eventually evaluated much as programmed learning systems.
Whilst this may be possible, to a degree, I must agree with Eisner (5) who said:—

"The dynamic and complex process of instruction yields outcomes far too numerous to be specified in behavioural or content terms in advance."

The skilled and sympathetic teacher can, by being fully involved in the learning process, help a student gain far more from any lesson than is possible from programmed learning, but these things will often be aspects that the classical paradigm finds it difficult to assess and, therefore, usually ignores, i.e. those attitudes and concepts which go to making a "whole" and interactive person rather than simply a possessor of facts.

At this stage my thinking started to move towards Parlett and Hamilton's social anthropological paradigm which I tend to call the "alternative paradigm." It should, of course, be made clear that the two paradigms proposed, the classical and the alternative, whilst represented as competing can, in fact, be complementary. These paradigms are used simply to help classify a very complex range of approaches to research into a manageable concept.

The alternative paradigm has a great advantage in that it is flexible; recognises its own lack of external validity but allows one to look deeply at the specific learning situation of core design at Burleigh. It recognises that it is impossible to separate any innovation in the classroom from the overall learning situation; it is a part of it, and will, inevitably, set off a chain reaction that must, in turn, affect the initial innovation. With the classical paradigm one can easily become led by the method, the alternative paradigm focuses on the situation.

Whilst using the alternative paradigm it would no longer be possible to represent this work as externally valid. I feel, however, that other teachers, if they wish, may take this work and apply it to their own particular situation. The work may not be strictly externally valid but it does have external value.

What was evolving in my initial reading was an action research project as defined earlier following Halsey. My thinking had formed into an initial diagnostic phase followed by an intervention, i.e. a therapeutic stage. It would now be appropriate to give the reader an insight into the approach by
briefly giving an overview of the research as it developed. That section will then be followed by a closer look at the methods used within this alternative paradigm and particularly an examination of their limitations.
Overview of Research Directions.

If the reader refers to the flow diagram we can see that at any one time there were several parallel courses, so a simple, chronological description is difficult. The following notes are intended to supplement the flow diagram and will be expanded upon, in detail, in the main body of the work. The two main areas, initially, were the interviews and case studies.

The interviews were intended to enable a general picture to be obtained on the topic of students with learning difficulties in design at Burleigh. To this end three sources of information were used.

1. Interviews with students who were identified, by staff, as suffering from any form of learning difficulty in design.

2. Interviews with all design staff on the general topic of students with learning difficulties in design.

3. Interviews with staff in other curriculum areas with interest in students with learning difficulties. This was an attempt to gain a picture of approaches used by staff in those areas.

From these interviews it was possible to generate factors and compile lists. These lists were then condensed into key "areas of concern" for each group. It was then possible to juxtapose the lists and 10 areas naturally presented themselves. These are the "10 areas of concern" mentioned in the flow diagram. These 10 areas were subsequently simplified to four broad areas in order to present logical directions for further development in the work.

One area that merited additional investigation at this, initial stage, emerged from the student interviews. This was the concept that I termed "learning resistance", that is a student who whilst he or she may be of moderate to high intelligence resists learning in one particular area, in this case design. This became apparent with the number of students referred by staff as having a learning difficulty of some form in design and yet, it was discovered, were entered for 'O' levels in all or most other subjects.
This idea was followed up firstly by looking at the fifth year 'O' level design entries in the 3D department. That year the department was experimenting by entering all students for 'O' level design who were taking 'O' levels in other subjects. The number of entries was compared with the number that staff felt were deserved entries on a performance to date basis. The results indicated a reasonable proportion who would not have been entered on the old criteria. (Details in main body).

This quick measure, using immediately available data was followed by analysing the student self assessment forms (again readily available information) from 3 tutor groups and working out weightings for each subject depending on what had been written. A very subjective technique, admittedly, but of interest. Again it was possible to gain insight to learning resistance by looking for the number of students who felt positively about all subjects but one or two.

To clarify the picture a simple, but very flexible, questionnaire was designed to look at what degree of importance students placed on the following group of subjects: English, Maths, Design, Humanities, French and Science.

This questionnaire was used longitudinally in that samples were taken from all age ranges from nine to fifteen years in order to see how attitudes develop. The results of this questionnaire were then backed up by a number of interviews with students at Burleigh based on their own response to the questionnaire. The results of these interviews were factored and condensed down like those of the initial interviews. It was possible to then link the "ten areas of concern" factors to give another perspective on the problem and increase my degree of confidence in the importance of these points.

At this point (the end of term one) it was possible to write a feedback article (appendix 3) to design staff based on the points from these interviews and ask for further assistance in developing the work.

During that first term, work was also being done, in parallel, on two case study groups. That year the department had gained on timetable, one extra teacher per housegroup in the 4th year. The curriculum area coordinator wanted to use these teachers to form withdrawal groups of learning
difficulty students from across the whole department. After consultation with the curriculum area coordinator and other design staff, it was decided to spend the first half of the term observing mixed ability groups with myself and the extra teacher "floating" and observing. By half term we had listed those students who we, and the subject teachers, considered may need withdrawal in the two house groups being studied (2 x 5 periods per week). At this point discrete groups were set up; one being run by a 3D teacher and the other by an art teacher. There was no attempt to influence the approach of these experienced teachers - only observe. The next one and a half terms were spent in participant observation using my notes, teacher observations and student observations, together with an attitude and self concept questionnaire, to build up a picture of the group dynamics in each particular, and very different situation.

Towards the end of term one it was apparent that there must be two changes in direction to the work.

1. It was then necessary to concentrate my efforts within the 3D course rather than looking at core design in all three aspects: art, 3D and fabric and fashion. This was necessary firstly to achieve more in that area and secondly because my experience in art and fabric was limited.

2. The second change was that it was important to look at mixed ability teaching in 3D design. It had been apparent whilst following the case studies that even with those students with learning difficulties removed from the main teaching groups the course was not suited to all the students remaining; there were difficulties arising that were not immediately apparent at the start of the course. It was necessary to look at the way mixed ability teaching operated within 3D design and, in conjunction with staff, to try to improve its practice. This point was also backed up by the results of the investigation of learning resistance which indicated that learning resistance was a relatively minor problem and that it was a more general poor attitude and associated under-achievement that was primarily to blame for poor performance within the mixed ability groups.

This last point linked with one of the four broad areas which arose from the
initial interviews, the need to examine the course structure. This was done by forming a working party of teachers which over the period of the second term, produced a suggested course structure which incorporated thinking on the points listed in the feedback document.

At this point in time it was decided to attempt to evaluate some aspects of the proposed course structure. This was done by adopting one element of that structure and running it as a form of case study.

The third broad area from the initial interviews, that of high/upper school links and an 11-16 curriculum was dealt with by a series of interviews with all high school heads of design and 3D staff. This part of the study began in an open ended manner with numerous possible further directions. As a result of the interviews and their analysis it was decided to simply note developments, which were felt to be positive in all schools, and not attempt any form of intervention programme as this may have been counterproductive due to the delicate balance of relationships involved.

The fourth broad area from the initial interviews was that of the working and educational environment within design at Eurleigh. The initial interviews indicated a number of factors which were limiting achievement. The initial intention was to look into this in greater depth, however, at that time the department as a whole became involved in a major re-think of its working environment and so it was decided to simply pass on the relevant information from the initial interviews and allow the department to proceed at a more suitable pace than would have been possible had developments been linked to this work.
A DISCUSSION OF THE DEFINITION OF LEARNING DIFFICULTY USED IN THE CONTEXT OF THIS RESEARCH.

The working definition used is covered under the following sections:

a. A brief summary of the context (relates to appendix 2)
b. A brief summary of learning difficulty, the range considered and developments during this work.
c. The 1981 education act and its consequences for this work.
d. Learning difficulties, a closer examination in the context of this work.

a. In considering a statement of that range of learning difficulty examined in this work it is first necessary to put the issue into context.

At Burleigh design is taught in a mixed ability, team taught group and so the question has to be asked - "what degree and type of learning difficulty can be incorporated into these groups before we deprive the students of the special help they need and also jeopardize the progress of other students? This is clearly no easy question to answer, indeed it is central to the whole work and cannot be answered at this point in a simple manner.

Mixed ability teaching has many advantages, primarily in a sociological sense. It offers the student another level of learning above the strict subject matter of the area under study. Students can become more aware of others, learn to cooperate and understand those of a different background.

We should also remember that whilst a student may need the specialist help of a withdrawal group for, say, English and Maths that same student may be able to cope reasonably well in the core design course. To withdraw or set here would be a further reinforcement of his "failure".

Nevertheless, even on a superficial level mixed ability teaching has its problems. Firstly it needs staff who believe in it and whilst it would be wrong not to approach curriculum development until all staff were in agreement, it is certainly true that at Burleigh a reasonable
A proportion of staff are less than enthusiastic with this concept. Secondly a greater work load is involved in the generation of suitable resources, there are few "off the shelf" packages for upper school design as operated at Burleigh. Thirdly there is the organisational nightmare of a wide range of student abilities all working on individual solutions to given briefs. Ongoing assessment and control is difficult. Many of the less committed students use this fact to avoid work, often forming cliques with students of similar ability, attitude, and background and so negating one of the principle reasons for using mixed ability teaching. The fourth area that is apparent is that it is easy for a member of staff to spend a disproportionate amount of time on certain, often disruptive or slower students, the brighter student can then be held back and we have education for the norm rather than a stretching of each and every student to his or her full potential.

These drawbacks may seem to be a good case for a return to setting but I do not believe this to be the case, all these drawbacks can be minimised by a more imaginative approach to the teaching of design as I hope to show in the main body of the work.

A further factor that it is necessary to remember when considering the definition of learning difficulty used in this work is that in core design at Burleigh within the 3D area two groups are team taught by staff working from a central open area and using facilities in the department as appropriate. Team teaching in this context means that project work topics have been selected by the 3D team as a whole and the two staff, within each house group, work together to present the work and guide its development, students go to whichever member of staff is most convenient or to the one they relate to better. It offers a greater degree of flexibility, puts the different expertise and experiences of two members of staff at the disposal of the student, helps teachers with a degree of informal inservice training but of course, has the disadvantage of less close control over individual students. Those students with an attitude type of learning difficulty can "use" this system and the student with a neurotic/withdrawing learning difficulty can just as easily be "lost".

If the reader also refers to appendix 2 he should have a reasonable background from which to relate the points on learning difficulty that follow.
2. BRIEF SUMMARY OF LEARNING DIFFICULTY USED IN THIS RESEARCH

The 1981 Education Act (6) defines learning difficulties as follows:

"Any kind of learning difficulty which prevents him (the student) from making full use of educational facilities of a kind generally provided in schools."

The Act also makes the point that such students also have:

"a significantly greater difficulty in learning than the majority of children of his age."

This is clearly a very broad definition and one with which it was reasonable to commence this work. The range this definition covers can be seen by the five main categories of special needs suggested by the DES (7).

1. Students with limited ability, who may be moderately mentally handicapped.
2. Students of average ability, but for a variety of reasons have limited attainment in language and literacy.
3. Students with severe and specific learning difficulty eg. in spelling or writing.
4. Mild and moderate sensory and physical disabilities.
5. Students with emotional and behavioural difficulties.

It should be noted that any one student may fall into more than one of these groups.

The proportion of such students in any one mixed ability group at Burleigh will obviously vary and whilst the pastoral system may warn the teacher of some difficulties eg. epilepsy or severe behavioural problems, it cannot easily spot those transient and situational problems caused by the multiplicity of factors in operation in the school and classroom.

We will go further into these learning difficulties later, this short section is only intended as an overview. It should be noted, however, that as this is an action research project the emphasis placed on these difficulties varied and developed over the course of the study.

We should also remind ourselves at this point that we should question to what degree these learning difficulties may be primarily teaching difficulties. Are we, as teachers, educating effectively?
As an action research project one of the main aims was to try to achieve some practical improvements for students with learning difficulties at Burleigh. It was clear, even at a subjective level, that the various difficulties would not be amenable to one global approach and it was, therefore, necessary to look in more detail at some learning difficulties than others. This will become clear as the work unfolds.

3. THE 1981 EDUCATION ACT - ITS CONSEQUENCES FOR DESIGN AT BURLEIGH.

The main effect of the 1981 act was to require LEA's to make provision for students with special needs within the state system where reasonably possible.

The reasoning behind the act is that many students, handicapped either emotionally, physically or mentally could, with some planning, take their places in normal schools and thence in society. Many such students and their parents would prefer this to be the case in order to prevent or minimise the degree of isolation the handicapped suffer which is in turn amplified by special schooling. We can also see that such a policy has the advantage of sensitizing "normal" (though we should not use such polarized terms) students to the fact that these people exist, are real people and are capable of contributing to society.

There will, of course, be problems. The spirit of the act will need financial backing in order to make necessary physical changes in the fabric of the schools and also to give teachers inservice training into these aspects.

We should be aware that as students, who would have previously attended special schools, first join normal schools, there will be stress on those students and that stress may well amplify their learning difficulty. Many may come across hostility from other students in that unthinking way children often have. This, however, is a short term problem, given time and sensitive handling the situation proposed by the 1981 act will seem quite normal.

We can see that the 1981 act is, as it takes effect in schools, going to increase the proportion of students with learning difficulties, though only by a small amount. Indeed this is coming about now with a small
number of ESN(H) children rising through the high schools into Burleigh. We, as teachers, need to be aware of this and plan accordingly. How will it affect the way we teach? I do not see these changes as necessitating great disruption at all, but firstly we need to be sensitised to them and secondly we must use the opportunity to look again at what we are doing and its appropriateness for students who will be the citizens of the turn of the century.
If we now go back to our working definition of learning difficulty based around that of the 1981 act and the DES 5 areas we can see that most areas are focused around a disability that is special to that student and usually of a physical or neurological nature. Whilst emotional and behavioural difficulties are mentioned these are largely seen as factors particular to that student. We need to be very clear that these emotional and behavioural problems are, in the experience of many teachers, the largest group of learning difficulty and that these problems are usually situational and often transient. By this it is meant that the complex sociological situation of the child's environment makes conflicting demands. Often a particular combination of circumstances will fire off a pattern of learning difficulty, this pattern may pass and the difficulty subside, though often leaving scars.

There may well be a physical, neurological or emotional problem at the base of the student's problems but the situational factors can amplify them dramatically. The case studies described later have shown several students who, in one particular group, are well behaved and learning well, whereas in others are in continual trouble and are certainly under-achieving. On discussion with the student it is rarely the subject matter that causes the behaviour but the dynamic social situation.

Social background is a very powerful influence. Areas peripheral to learning difficulty, but of interest, such as truancy are often supported by some parents who "need" the student at home. Cooperation with teachers may not be a social norm in many families.

Jackson and Getzels '59 and Berk, Rose and Stewart '70, quoted by the OU E281 text claim that their studies indicate that dissatisfaction with school usually stems from predispositions learnt before school. This may seem to conflict with the view just expressed and yet Frey (9) says behaviour is largely determined by immediate classroom environment and the positive and negative interaction within. There is no conflict, however, when we realise that what we have is a latent learning difficulty, developed, often outside school but which is amplified by a situation in school. The DES 5 areas are convenient, therefore, but vastly oversimplify the real situation. Having established that learning difficulties are an interactive concept
rather than a simple and static one we can move on to look at those specific learning difficulties that the teacher is likely to meet.

1. The first area was the slow learner and ESN(H). The Schools Council (10) defines slow learners as the 15 to 20% with the lowest attainment. These students are usually in need of remedial help in maths and language but may well be able to cope, at a simple level, on a design course. It should be noted that slow learners are not defined by intelligence, it is speed of attainment rather than absolute attainment. The ESN(H) child is usually defined as of low ability, with an IQ of 50-70. The main worry in this area is the pygmalion effect of low teacher expectations based on superficial judgements. Whilst there have been difficulties replicating the original work the basic effect is, I feel, substantially true.

As already indicated, whilst the ESN(H) child may well have gone to a special school before the 1981 act we can expect a number to start working through the system to the upper schools. Within an average group of mixed ability students we might expect perhaps 3 slow learners, this clearly has implications for mixed ability teaching. We must remember that in many ways the slow learner's response in terms of conventional communications skills used in schools may lead to the teacher seriously underestimating ability and so by the pygmalion effect expect less of the student.

2. The second area proposed by the DES is that of students of average ability, but who, for various reasons, have limited attainment in literacy and language. The milder forms of disabilities such as dyslexia could produce such effects and as the majority of education is via the medium of the written word that student is clearly at a disadvantage. This would then lead on to the experience of frequent failure and to the compounding of learning difficulties with attitude and emotional problems. By the time a student reaches the upper school, in his fourth year of secondary education, any original problem may have been compounded to a potentially severe disability. Early diagnosis of such problems is clearly the answer followed by effective remedial help, but the beginnings are often misinterpreted as laziness and by the time the student reaches his final years at school remedial help is ineffective.

3. The third section refers to severe and specific learning difficulties. Again a problem such as dyslexia is not related directly to intelligence but
unless identified early in a child's life the early failures will scar him for the future.

In some respects design offers such a student a chance to prove his ability as the emphasis on the written word can be so much less. Nevertheless, the teacher should be aware of the problem and be sensitive to it. We might also include some perceptual disabilities in this area where the student finds it difficult to organize sensory inputs into a rational whole. An extreme case of this is autism, but milder forms are possible in a normal school. Again such students are often missed or wrongly diagnosed as lazy or of a low ability. Teachers are simply not being given the training, either initially or inservice, to diagnose these problems.

4. The fourth area was given as mild and moderate sensory and physical disabilities. On a sensory level the most obvious are degrees of deafness and visual problems such as colour blindness, shortsight and petit mal epilepsy etc. Deafness, especially in its milder forms, is often mistaken as daydreaming in that the student may not hear his name called, for example. Deafness is often misinterpreted as low intelligence and once again the self fulfilling prophecy begins, low teacher expectations, failure, etc.
5. The fifth area, emotional and behavioural difficulties is clearly the biggest as far as the teacher is concerned. In this area we have problems such as maladjustment and disruptive behaviour which cause stress and extra work for the teacher. Disruptives also have a marked effect on the remainder of the class, at the lowest level preventing work continuing and at the worse encouraging bad behaviour in others.

The two main perspectives on emotional and behavioural problems lie around anxiety and the neurotic/antisocial spectrum. The OU text E201 (11) lists 2 forms of anxiety:

Anxiety 1. This is related to the specific task, for instance anxiety in mathematics is very common and is a cause for concern at many levels. It has been suggested that this type of anxiety often stems from mental arithmetic questions in the classroom. This can lead to failure in a very public place. Such teaching methods are surprisingly common and whilst quick response questions like that in class can have their uses teachers must be more sensitive to the problems they may cause. The result for many students is a learnt anxiety which in turn lowers results and once again a vicious circle develops.

Anxiety 2. This is on a personal level and has a general effect. Its causes may vary from psychological to the side effect of drugs or certain allergies but its effects are general and preclude great success at school. The OU text E201/9 suggests that the student who appears unconcerned with poor performance is often using a learnt protective mechanism to conceal a high personal level of anxiety.

The second perspective on emotional and behavioural difficulty is to use the neurotic/antisocial model. The neurotic is generally taken to be a withdrawing individual, very quiet and intro punitive in that he will tend to blame himself for his difficulties and failures. Under the pressures of mixed ability teaching such students are often missed or at least receive less help than they need. Strategies for helping these students more are suggested in the main text.

The other extreme of this model is the antisocial student who is aggressive and usually extrapunitive in that he tends to blame others for his problems, primarily staff. This student tends to receive a great deal of the teacher's time in order to control him and achieve an output of
reasonoble work. This time, of course, is at the expense of other students.

This particular form of learning difficulty is usually linked in terminology with terms such as disruptive, defined by the NAS survey (12) of 1975 as "behaviour, short of physical violence, which interfered with the teaching process and / or upset the normal running of the school." Another allied term is disaffected which is generally understood to be a student who develops an unfavourable attitude to learning but in a less overt manner than the disruptive student.

This leads us into the area of attitudes. The neurotic/antisocial model is largely seen in psychological terms but disaffection is largely a question of attitude. The adolescent years are well known as a period of developing attitudes, often becoming anti-establishment in their various forms. Disaffection is one of these and is characterised by its development in the final years of secondary education from an otherwise "normal" development. Neurotic/antisocial behaviour usually forms much earlier, though again, it can develop and harden from a mild form that may not have been noticed.

One particularly interesting form of attitude that became increasingly prominent was one which has been termed in this study, "learning resistance". This particular attitude is characterised by a student who is reasonably intelligent, indeed often very intelligent, but who has a resistance to a certain subject. Typically such a student will be doing "O" levels in all areas except for say, design. The basic reason given at interview is that design is not relevant or necessary for that student's career intentions and that he resents being forced to do core design which he sees as non-academic and of no consequence. There is usually evidence of parental agreement with these views. This concept of learning resistance is explained more fully in the text but again one should beware making snap conclusions, often such resistance may be an underdeveloped physical manipulation skill which leads to negative feedback in practical areas and hence a poor attitude in that area.

Stott (13) sums up the area of emotional and behavioural difficulties by proposing three possible areas which lead to such problems:

1. Effectiveness deficit. That is learnt failure, the student then tends to avoid new demands and may go so far as to be unwilling to practice
existing skills.

2. Failure of temporal integration. That is living for now, the student is easily distracted, cannot plan or work at a complex level.

3. Social attachment deficit. Here a normal student would expect help from adults, a position of trust is normal. In a case of poor adjustment hostility and rejection of adults and their mores is usual.

For the teacher, whilst being able to help a student with learning difficulties is often very difficult and mainly unrewarding, being aware of potential problems and how they arise is essential. In the last few years of compulsory education it is often difficult for the ordinary teacher in a mixed ability setting to help a student with learning difficulties of the type discussed, but on the other hand a sensitive, informed approach can help prevent compounding what may be a small difficulty into a serious problem.

The areas of learning difficulties discussed above are not exhaustive, but they are reasonably comprehensive. It was necessary to examine them, albeit briefly, in order to understand the opening scope of this work. It should be noted, as already mentioned elsewhere, that the considerations of time have forced a limited overall scope to this study and so some of the learning difficulties mentioned in this section will receive a brief, and often only theoretical, mention, usually because they were not present in any of the case study work, or manifested themselves in only small numbers.
RESEARCH METHODS ADOPTED AND THEIR LIMITATIONS

An understanding of the research methods used in a study, their variations and limitations, are vital if the work is to be of any value to others. In this case, an action research approach using triangulation techniques was adopted in order to gain a holistic view of the area.

Any situation in social research is extremely complex and the researcher who approaches it can be led to concentrate on an easily measured aspect, using a single method of data collection rigorously applied, as is often the case in the classical, scientific paradigm. Such an approach may have two main effects which the technique of triangulation attempts to counter:

a. A single method may act as a directional device, limiting the researcher to one narrow viewpoint. To fully understand any situation we clearly need perspective and this can only be achieved by the use of a minimum of two viewpoints.

b. The single method may also assume an importance greater than the problem. This "method boundness" is very common in research where the academic rigours lead researchers to concentrate on achieving such a watertight method that they often lose sight of the original objective. This is not to advocate lax methodology, however, simply to warn of the dangers of method "blinkers" preventing us from observing other interesting phenomena.

As this is an action research project, there is no attempt to claim any degree of external validity. What it is hoped to achieve, however, is work with which the teacher will feel confident and find of value.

Triangulation, therefore, is basically a technique whereby we use several methods to investigate a situation. If the results of these methods all indicate a similar conclusion we can have far more confidence in that finding than if a single method was used. Triangulation also helps the researcher to maintain a holistic view and avoid method boundness.

Within this work the main methods have been the interview, questionnaire and case study. Within these general methods participant observation, teacher notes, and profiling techniques have been used. The following
notes are intended to discuss the methods adopted in principle only and to highlight their limitations. The details of their actual application follows in the main body of the work.

The case study

The case study aims to gather information not by direct questioning but by observing a situation over a period of time in order to build up a picture of the complex interactions that make up that situation. There are two basic type of observation:

a. Participant observation.

b. Non-participant observation.

In participant observation the researcher attempts to become a member of the group, a part of the situation, in order to be as close as he can to the particular, subjective, perspectives of the participants. The researcher may go as far as going "undercover", a classic example being Patrick and "A Glasgow gang observed."

As indicated it is important to look closely, because human relationships are very complex and as Cohen (14) indicated, perceptions are "subjectively structured, possessing particular meanings for its inhabitants". The outsider, looking at the same situation may well perceive something quite different.

The non-participant observer remains aloof from the situation and may well use techniques such as video and various sampling techniques to build profiles and meaning from the activity he observes.

In this particular case a middle course was adopted. It was not possible to become a member of the group as Patrick had done for obvious reasons, but on the other hand I let it be known that I was not a teacher. This was done quietly, by telling students when asked that I was not a teacher but a researcher who was looking into the design course. I did not play an authoritarian role, deliberately avoiding any form of censure in dealings with students. The students very soon came to accept me as a harmless outsider who they could talk to openly, indeed they no longer moderated their language within my hearing! A measure of acceptance?
There was more to be gained from participant observation than from non-participant observation, indeed it would have been very difficult to stay aloof from the groups and any hidden observation was prevented by the structure of the buildings.

The actual gathering of data was done primarily from notes made during and immediately after each session. To these were added notes made from debriefing sessions with staff on an irregular but fairly frequent basis. To these perspectives were added notes made from tape recorded interviews with the students one and a half terms into their course and the results of a battery of questionnaires looking at: attitudes to school; self concept in design and self esteem. Together these methods gave four basic perspectives in each case study of approximately two terms duration.

We must be clear on the drawbacks to participant observation, however. Firstly my very presence influenced the situation. This was expected and became clear when staff remarked that the work rate and standards of behaviour were better when I was present. This could, of course, be tested but it would prove little of value as it was anticipated. Certainly, despite my "cover" I was still an adult in the area and effectively my interaction with students reduced the teacher/student ratio and improved control, particularly as it was those students with learning difficulties including behavioural problems, that were being observed predominantly.

Secondly, my view of the situation in the case studies was clearly subjective and those of the teachers and students also. Together, however, they started to build a recognisable pattern. Nevertheless, it could never be claimed that these studies built any form of picture that was externally valid, indeed, as we shall see in the main body the two case study groups were very different.

A third drawback was that no quantifiable data was generated from these case studies, other than the attitude battery. Whilst it would be possible to use sampling techniques to build up profiles as a form of data there would be little point on a study of this scale, the case study
groups being very different and numbering 9 and 5 (though flexible). Despite these points a great deal of useful information was gained from the techniques applied, this information may be of direct interest to other teachers, though their situation will be very different.

The interview

Various interview techniques have been used in this study and have been found to be both very useful sources of insight but also potentially very misleading.

The interview could be defined as a meeting organized and prepared by the researcher with the aim of gaining information from the interviewee for research purposes.

A typology of interview can be built up if we look at two broad aspects:

a. interview style.

b. question organisation.

Cohen recognises four types of interview of which only three are of direct relevance to this study:

a. The structured interview has its content and sequence carefully organised into a schedule which is followed strictly by the interviewer.

b. The unstructured interview is a more open, flexible system and may be carried out in a less formal manner. This does not mean it is less carefully pre-planned.

c. The non-directive interview is derived from therapeutic or psychiatric interviews. Such an interview is characterised by minimal control by the interviewer in order to enable the interviewee to fully express his feelings.

If we turn to question organisation we can see that these primarily relate to the structured and non-structured interview.

a. The fixed alternative question. Here the interviewee is required to
consider two alternatives. Eg. "Do you think all students should take design? YES or NO."

b. The open ended question offers a framework for the interviewee to respond around with the minimum of restraint. Eg. "At Burleigh all students take design, what are your feelings on this?"

c. The scaled response asks the interviewee to give a considered response to a question by some form of scale. Eg. "How important do you feel it is that all students take design? Circle the statement closest to your view." VERY, MODERATELY, NOT PARTICULARLY, NOT AT ALL.

We should be clear that the way in which a question is both worded and presented can influence the reply. It is possible to word questions in such a way that they imply the "correct" answer; complex questions and the use of negatives are to be avoided.

Careful thought is needed in building a schedule. It is possible to use a variety of question types but consideration must be given to the manner in which the researcher wishes to gather data. The open ended question yields data in a very different manner to the fixed alternative and scale items.

Above all, it is vital to run pilot interviews in order to identify problems in presentation, questions and data extraction.

If we now look at this breakdown more carefully we can examine some typical interview types, including those used in this study, and consider both their advantages and limitations.

The structured interview may be compared with the questionnaire. Often employed when several interviewers are used, it can minimise the bias introduced. This is usually done by using fixed alternatives and scale questions and ensuring their presentation in an identical way.

Such a methodology offers data that can easily be handled statistically. The principle drawbacks of such a technique are as follows:-
a. Offers little flexibility so losing the principle advantage of interview techniques.

b. Such rigid questioning is often superficial and can irritate. The respondent may wish to qualify an answer rather than give a yes or no.

c. It is time consuming but avoids the problem of percentage return of the questionnaire.

The unstructured interview is intended to be more open, a flexible system that can also be less formal in its approach. This flexibility is its key advantage, the interviewer can use his schedule of questions far more freely to probe areas deeply and to ensure the interviewee fully understands the question, a major drawback of the structured interview carried out with numerous interviewers. This style also gives the interviewer more opportunity to relax the interviewee, an important point as anxiety is bound to be present to a greater or lesser degree, especially when an adult interviews a student. If the interviewer wishes to gain insight into a student's perceptions of education he must be prepared to spend time, be flexible and establish a rapport with that student. Here we see one of the major drawbacks of all interviews and particularly the unstructured type, they require a great deal of time and the information gleaned may often not be of an easily organised nature.

The interview, particularly the unstructured type, is very interactive, that is its great advantage, but this, of course, leads to a greater degree of subjectivity and bias on the part of the interviewer. Indeed it is perfectly possible for two people to completely misunderstand each other due to their own particular definitions of terms being different. This is not always spotted. We should also remember that the interviewer has his own particular perspective and this will tend to bias his interpretation in a consistent direction, especially with open ended questions. The interviewee in his turn will tend to perceive questions in his own particular frame of reference introducing another form of bias.
A further factor is that people do not always react in an entirely rational manner; factors such as emotion and complex interpersonal relations will colour an interview. The interviewee will often be defensive and unwilling to reveal his true feelings to the interviewer despite reassurances; and we should never forget, especially when dealing with children and those of a lower ability, that we are making an assumption in presuming that child has insight into why he behaves in such a manner.

The non-directive interview would use questions at a minimum, and those primarily of an open ended type. This technique is mentioned because while it is primarily a counselling technique that should be handled only by those with experience in that area, it comes very close to the way in which some interesting insight into certain student's feelings about life and education were gained. This will be explained more fully in the appropriate section.

However, briefly, while involved in case studies opportunities arose to sit down with a small number of students and whilst working and chatting generally, to gently give the conversation a push in a certain direction by a careful, open ended question. Such a technique in a relaxed and informal atmosphere often led to some very interesting observations. It should be noted that such situations were difficult to engineer and whilst very rewarding are bedevilled by questions of reliability such as those discussed above and also the fact that more than one student was present and so the interaction was far more complicated. It would also have been fairly easy for a group of students to "string along" the researcher. Nevertheless, as long as these limitations are considered this technique has value.

In order to draw this overview of interview techniques into the context of this study we could summarise the techniques used in the study as follows.

(The precise methodology will be described in the relevant section of the main body):

1. Semi-structured interviews. Used with students while discussing their reaction to the design course in the initial stages of the work. These were as informal and as relaxed as could be made, considering they were fifth form students and had known me as a teacher. A schedule of questions that were primarily open ended were necessary to encourage the less forthcoming students to talk, otherwise it was hoped the interviews would be as open ended as possible in order to get as many perspectives as possible.
The data generated was used in the form of factors extracted from the tape recorded interviews which were listed and then condensed into main areas. A very subjective technique, but it has value.

2. Unstructured interviews. Used with staff of both the design department and other departments including high school staff. Here the aim was to establish as little direction as possible and simply open with a general indication by asking them to talk about their thoughts on the education of students with learning difficulties in their areas. Again the aim was to generate factors from the interviews and it was hoped that a lack of specific direction in the interviews would be rewarded by an increased range of factors outside those anticipated.

3. The third type, the non-directive, was, as previously indicated, used in the case studies.

We might summarise this brief section on interview techniques by stating that they have been of value and have illuminated areas not considered in the earlier thinking. The interviews were not used to generate hard data, in the form of statistics, but primarily to illuminate those factors which were central to certain situations.

Interviews were used to follow up those occasions where questionnaires have been employed, an example being the "subject importance" questionnaire used to give insight to the concept of learning resistance. Here they have generated a qualitative dimension above the quantitative data of the questionnaire itself. One should remember, however, that whilst the results appear rewarding there are a great many questions about the reliability of such methods. Results should be considered with circumspection.

**Questionnaires**

Questionnaires have been used twice in this research. Firstly as a pre test / post test instrument on attitudes and self concept within the case study groups. Secondly as a means of following up the concept of learning resistance raised in interviews. Further details are contained in the main body but here it is intended to briefly examine the advantages of questionnaires for this research and understand the limitations.
The questionnaire, if correctly constructed and administered can be a reliable means of gaining quantifiable data. In this work each questionnaire has been used in conjunction with other techniques following the principles of triangulation.

There are, however, a good many limitations to the questionnaire, even those administered directly and not suffering from a percentage returns problem.

1. The questions need to be defined carefully. Similar rules apply as those covered under interview technique. We must offer questions that are carefully based on our aims; which are clear to the target population; are unambiguous and concise.

2. We should avoid leading questions, remembering that students are well versed in the art of giving the teacher what he wants to hear and have numerous strategies for identifying the underlying theme.

3. Avoid the over complex, technical or middle class idiom. Constantly remind yourself of the need to communicate effectively. Over complex or otherwise poorly understood questions are bound to lead to poor reliability.

4. Avoid the multiple question and those using negatives, such factors easily confuse. In a similar vein we should avoid an overlong questionnaire and particularly the use of open ended responses as they will try the patience of the respondent. Unless the respondent is being paid the questionnaire should be short, to the point, clearly understood, and based primarily on the fixed alternative and scale type question. Such replies are also easier to translate into data.

5. We must, as in the interviews, be aware of the limitations of self report data from students, especially the younger ones who may not understand the questions or really be able to account for their actions.

6. The presentation of a non-postal questionnaire needs to be very carefully organized. In this work the questionnaires were presented to each group by myself and a point was made of maintaining an identical style. Different delivery styles may cause interaction effects between presenter and respondent, so reducing reliability. As an illustration it was important to
present the "subject importance" questionnaire in a neutral area such as a tutor group room. To present it in a particular subject area would influence the student and so reduce reliability.

Before any questionnaire is used it is necessary to pilot it. In this work each questionnaire was piloted in other, similar, schools to prevent the pilot influencing the results at Burleigh. The degree of pre test / post test sensitization on the attitude and self concept scales would be expected to be minimal with one term inbetween, though clearly we should consider whether the degree of maturation for children of that age may be significant over that time.

In this work considerable lengths were gone to to maximise reliability of questionnaires by following the above points but it must be pointed out that the results of the attitude and self concept scales were very disappointing in that they did not tally with the, albeit, subjective opinions of the specialist teachers or myself. I have no great confidence in these particular measures, although as a part of the overall triangulation they were of use.

Profiling.

The following notes are intended to briefly cover the general principles and limitations of profiling as an instrument of research used in this work. A fuller discussion on this and the use of profiling in design education generally is covered in the main body.

Profiling and the use of student personal records of achievement are very much an issue in education today. They have largely developed from the problem of assessing the lower ability, non-exam student but have developed as teachers have seen their potential for all levels.

This work has deliberately avoided going into depth with the current arguments as to the questions of internal reliability and external validity of profiles as a means of assessing children, the approach has been to look at profiles:
a. As a measure of an individual's progress and feeling for the course specific to this research. It was not intended for outside use.

b. To give feedback as to how the case study approaches were progressing.

c. To give some idea as to the motivational potential behind profiling.

The development of a good, externally valid profile as a scheme of assessment is clearly a major topic for research in itself.

The development of the profile used.

In this case, after the initial reading, the concept and possible forms of profile were discussed with the two case study teachers who would have to use them. Reassurances were given that I would help generate the time for them to operate the profiles at the appropriate time. It was pointed out that it was important that staff should fill in the profile with the student in order to maximise the feedback potential both to the student and myself. The teachers were debriefed after they had discussed the profile with the student.

The form of the profile and personal record card was arrived at in consultation with staff. It falls into three broad areas:

a. Profile - scaled items.
These were intended to cover the broad areas: attitude to teachers, students and work; thinking skills; self control; safety.

These areas were chosen as it was felt that they were central to the aims of design education. To extend the list would have made it a difficult instrument for hard pressed staff to complete.

It was decided to use a fairly simple scale for each item as can be seen from the green card (appendix 7). Such a scale, using items on an "always" to "never" basis is a little clearer than a 0 - 5 scale but nevertheless has a degree of ambiguity that would render it unreliable, in that staff perceptions will differ. A clearer but more complex criterion referenced scale was rejected for this work as being too complex.
b. Comments.
It was not originally intended to include such an item, deliberately trying to avoid written reports due to the increased load they placed on staff and their extreme subjectivity. The two members of staff, however, insisted that they had the opportunity to make some notes on the areas listed.

c. Student personal work record.
This was intended to give insight into how a student reacted to the work he had done. I asked for it to be filled in ideally once every two weeks or at least at the end of each completed piece of work. The staff were to encourage each student to write a little about how he felt about the work, though not to "push" a reluctant writer.

It should be understood that this was not, in any way, felt to be a watertight scheme. However it was workable enough to put into practice and learn from. Actually using the profile in case study groups would give information for the research as a whole and also give a good insight into profiling as a scheme of assessment.

Limitations.

1. The primary limitation was the reliability of teacher completion. The scale used was very crude but easy to use by staff, an important point.

2. Teacher perceptions of the student would tend to lead to a "halo" effect, in that success in one area of the profile causes staff to rate the student more highly in areas that he may not deserve. This could also work as a reverse halo effect when a student is perceived as having, for example, a poor attitude.

3. The student is made more aware of continual assessment if a profile is used and may produce a "hawthorn" effect, that is working harder simply because he is being watched. This is appreciated but the frequency of use of the profile agreed in consultation with the staff who used it (half termly) gave students time to forget about it and so reduce the hawthorn effect.

4. Another limit to reliability has been the way in which the student personal work record was operated. It was very apparent that with one group, the cards tended to be forgotten about, primarily due to the pace of work in that group, whereas in the other group they were done more frequently and
with little prompting. If the cards were used as an external reference source it would not be possible to compare the two groups accurately because of this.

5. We must also consider the reliability of any self report data from students, especially those who may be suffering from emotional problems. Such information may be of help in dealing directly with that student but could not be used for external referencing.

Before we leave this discussion of profiles the reader should be reminded:

a. The actual use will be expanded on later.

b. The profiles were not intended for external use and that their limitations were understood. They would, nevertheless, be of use as another perspective within the triangulation technique.
INITIAL INTERVIEWS.

As previously indicated the diagnostic phase of the work opened with interviews and case studies. Whilst the former will be dealt with first it should be remembered that both methods were operating in parallel.

The interviews were intended to give as wide a perspective as possible on the problems of students with learning difficulties in design. To assist in gaining different perspectives the various interviews were kept as open as possible, though particularly with students a degree of structure was necessary.

The initial sources of information were threefold:

a. students.
b. design staff.
c. other teachers with a particular interest in learning difficulties.

Notes were taken from tape recorded interviews and used to isolate key factors, initially from each interview, then from each section. Finally the lists of factors were then juxtaposed and areas of commonality looked for in order to identify the most suitable ways forward.

1. STUDENT INTERVIEWS.

The eventual sample consisted of 33 fifth form students who were selected by staff on the basis of "having any form of learning difficulty." All staff were carefully briefed on the full range of learning difficulty in the working definition to avoid staff preconceptions weighting the sample.

The interview techniques described below were used until it was clear that there were few, if any, new factors coming to light. Interviews tended to be in the order of a ten minute collection and settling down time followed by twenty to thirty minutes of recorded discussion.

In order to learn by experience two pilot runs, each of three interviews, were used before starting the main series of interviews.
Pilot one.

The first interviewees were chosen as indicated above. All fifth year students knew me as a teacher even if they had not actually been taught by me; it was particularly important, therefore, to spend time in relaxing them and giving assurances of confidentiality. An empty workshop was used to hold the interviews, not very comfortable, but it was convenient, the student was on familiar ground and not too far from friends. Offices were not used (with a few exceptions) as they held associations with disciplinary action for many students.

The interviews were tape recorded, though permission was asked first. During the whole series of interviews and others later in the work, only two students voiced a preference for not using the tape recorder, in these cases direct notes were taken. The tape recorder, when permission was given, was only switched on after the initial settling in period and with the knowledge of the student.

For the first pilot run a simple schedule was prepared to help students respond without giving too much direction. In use it was emphasised that they were free to add points or mention other aspects they felt important. The work was described as looking at the core design course for difficulties experienced by students.

The first schedule fell into two broad areas:

a. What was wrong with the course?

b. In what ways might it be improved?

The questions were a mix of fixed alternative and open ended types. The fixed alternative answers were followed up by encouraging the student to explain the reasons for the response.

a. Do you find the work relevant for your future?
   Do you feel we give you too much or too little work?
   What do you feel about the pressure staff put on you in design?
   Can you identify particular things wrong with the course?
   What do you feel about the teaching styles used?
   What do you feel about the type of projects set?
b. How would you like the course changed?
   Would it be better if we concentrated on skills for jobs?
   How much emphasis would you place on skills for home and leisure?

Each question was reworded until the student indicated that he or she understood.

Observations.

The pilot sample of three was small, but this technique is very time consuming and considering the time and resources available it had to be adequate. The exercise was, nevertheless, valuable. The following points were incorporated into a second pilot run.

It was clear that some form of schedule was necessary for students. It was very difficult to get a discussion going with two of the three students who were only willing to give positive, negative or "I don't know" type answers. The schedule gave them some direction and yet did not prevent the third student from adding her own personal perspective as it had been hoped.

Clearly it was necessary to spend a great deal of time relaxing students before tape recording. After the first pilot the technique adopted was to go up to the student without the teacher and, in as friendly a manner as possible, explain that I was not a teacher at that school any longer, that I was looking at the design course as part of my research and that I was "randomly" choosing students. This was, admittedly a "white lie" but was preferable to saying that they had been nominated by staff as having a learning difficulty. It promoted cooperation and preserved the relationship of student and teacher. An empty workshop was usually used for the interviews for reasons already mentioned and some time was spent talking generally before starting the interview and using the tape recorder. It became clear that students soon relaxed with the tape recorder and became less self conscious. The questions used in the first pilot had been a little blunt and it was necessary to reword the second schedule to encourage expansion and yet give the less forthcoming students a possible straightforward reply. Questions were introduced to try to break down the work done
in the department and find which areas were relevant or interesting to the student. The degree of teacher attention received was mentioned by two of the pilot interviewees and so a question was introduced on this together with questions on freedom of project choice, project length and lesson length, all points raised during the pilot interviews.

**Schedule pilot 2.**

1. How is school going for you? Do you feel positive or negative on the whole?
2. How about design, do you enjoy it, hate it, or feel indifferent?
3. Do you think that the work you do in design will be of use to you in the future?
4. What do you feel about the project approach we use?
5. Would you prefer it if we varied the approach more? eg research projects, evaluation projects, structured work, group work etc. (each point was explained, if not understood).
6. Would you change the type of project we use? If so how?
7. When doing project work how important do you think the design part is?
8. How do you feel about the amount of teacher attention you get?
9. How important do you feel the following would be: a vocational design course; home skills within a design course; leisure skills within a design course? Could you put them in a rank order?
10. Would you prefer more or less design on timetable? Can you explain your reasons?
11. Is a qualification in design important to you?
12. Which type of lesson length do you prefer? 2+2+1, 2+3, all 5 together?

**Observations.**

Again this schedule was piloted for three students. The understanding appeared better, though it was necessary to reword questions if the student seemed less than happy. The schedule was adopted as it stood although it should be emphasised that it was used in a flexible manner, enabling interesting aspects to be pursued.

The sample was chosen to include roughly equal numbers of male and female, plus students from all areas of the course. The method used was identical to that of pilot 2, notes were made from the recordings and from each set of
notes the key points were extracted. This is, of course, a highly subjective technique, but providing it is seen within the context of triangulation it has value.

Seventy five separately identifiable points were raised over the thirty three interviews. These points were simplified down to eleven and then to the eight areas shown below in no order of priority. No tally of the frequency with which points were raised was kept, the aim was to look for general areas to follow up at that stage.


Each of these broad areas can be defined by the detailed breakdown of points which can be found in appendix 8.

2. **STAFF INTERVIEWS.**

The techniques used in the student interviews were also applied to the staff interviews. Even though in a position of authority the teacher feels threatened by a researcher and this was the case even in this work where all the staff knew the researcher as a teacher. It was just as important to spend time relaxing staff as it was with students.

The only major difference in technique was that notes were made directly rather than using a tape recorder. Strangely enough several staff had mentioned that they would rather notes were taken rather than a tape recorder used when the procedure was explained whilst fixing appointments. Direct note taking, supplemented immediately after the interview was adequate with staff as the flow of discussion was more easily maintained.

The aims of the interviews were as follows:

a. To discuss the problems of students with learning difficulties on the core design course.
b. To discuss what developments were needed.
c. To discover opinions as to whether students with learning difficulty needed withdrawal or not.
d. In the case of staff from other curriculum areas to learn about the approach taken in respect of learning difficulties in those areas.

The interviews proceeded in parallel, all 17 design staff and 7 from other curricular areas were interviewed. The technique used was that after describing the general aims of the work the teacher was asked to talk generally from their own point of view. It was hoped that in that way a number of perspectives would arise, covering the area better than a closely structured schedule. Supplementary questions were, of course, asked to clarify points as they arose.

With such small numbers a pilot run as such was not carried out, rather a form of snowballing technique was used to apply points learned from one interview to the next.

Results.

Identical methods were used to raise a series of factors and rationalise them down as the student interviews. Nine general areas emerged:

1. Teaching materials and methods.
2. The teaching environment.
4. Assessment.
5. Design skills and building a positive self concept as a designer.
6. The concept of an 11-16 curriculum in design.
7. Feedback systems.
8. Teacher load.

The detailed breakdown can be found in the appendices.

The next stage of the work was to juxtapose the two lists of factors from student and staff interviews. Certain areas of commonality were immediately apparent and it was possible to propose 10 areas of common concern. Of course the selection of the key areas and their comparison were highly subjective, but nevertheless, this technique does have value in a study of
this type providing the limitations are remembered and the reader does not attempt to draw too wide a validity.

The final 10 "areas of concern" were as follows:

1. Motivational factors.
2. Design skills.
3. Teaching methods and materials.
4. Assessment and feedback.
5. The 11-16 curriculum.
6. The teaching environment.
7. "Selling" design.
8. Community factors.
9. Teacher load.
10. Finance.

Discussion.

As has been indicated previously the aim of the student and staff interview series was to open as wide a perspective on the problems of students with learning difficulties in design as possible. The intention was to use the information gained in order to develop the design course and, both directly and indirectly, staff understanding of the problems that relate to this area of education.

One of the first problems to become clear during the student interviews was that a number of students who had been "labelled" as having learning difficulties by staff were following non-exam or CSE courses in design and yet were taking 'O' levels in most other subjects. This is not to say staff were wrong, there was a learning difficulty, but one which appeared to be a case of attitude to a specific subject, in this case design, rather than a low ability. This point is clearly important and was followed up in detail. The report on this specific aspect can be found in the next section (learning resistance).

A second point that required further investigation was the central role that the Leicestershire system of high and upper schools played. Many of the factors mentioned by both staff and students related to the limitations of the transfer at 14. These factors fall in no fewer than 7 of the 10 common areas of concern, namely:
1. Motivational factors- i.e. having to learn a new approach and structure in upper school design which was very different to that experienced at the high school.

2. Design skills- i.e. the fact that girls had no design experience in a 3D area due to their single sex high school caused difficulty. This will be reduced in subsequent years as the high schools are now co-educational.

3. Teaching methods and materials. The very different approach used in the upper school 3D department demanded far more individual work and so many students were limited in the progress they could make due to the amount of time staff could give them and frustration often set in.

4. Assessment. Students resented the sudden examination pressures of an upper school.

5. Selling design. Again the aims of design in the upper school did not seem to relate, in the eyes of students, to those of their high schools. This caused confusion.

6. Teacher load. As with assessment, the great strain of examination work became very clear, many staff blaming high school staff for "not preparing" students well enough.

7. 11-16. This brings together several of the previous points. Anger at what students perceive as lack of logical development across the transfer caused disaffection to a degree. It was interesting, however to note that what many students meant by development was, in fact, "bigger jobs" (from one interview). This statement is symptomatic of the craft approach within the 3D area of the previously boys only high school.

This aspect of the limitations of transfer at 14 was clearly important and it was decided to follow it up initially by going to the high schools and interviewing the heads of design and all teachers of 3D design. The results of these interviews can be found elsewhere in this work.

A third point that provided the main direction after these initial staff and student interviews was that the majority of factors could be dealt with
under a general heading of "course structure." This tied in with one of the initial, tentative, hypotheses of the earlier reading, that "many of the learning difficulties were caused or amplified by the course and that if it were reworked many of the learning difficulties may be minimised." The reader may refer to the relevant section to read that area of follow up to these initial interviews.

The situation at that time could best be summed up as follows:

1  A. COURSE STRUCTURE. Includes aims
2 and objectives, design skills,
3 teaching materials and method,
4 assessment, 11-16, motivation.
5
6 INITIAL INTERVIEWS -- 5 OF-----B. HIGH SCHOOL VISITS. Follow up
7 CONCERN 11-16 curriculum problems.
8 C. ENVIRONMENT/SUPPORT. Teaching
9 environment, teaching load,
10 finance.
11 D. LEARNING RESISTANCE.
LEARNING RESISTANCE.

As indicated earlier, one of the most interesting points raised in the initial student interviews was that of learning resistance. (Defined in this work as a resistance to learning in one or at the most, 2 areas of the curriculum when attitudes in all other areas are positive.)

From those initial interviews several questions needed to be answered in order to clarify the concept of learning resistance:

a. Did it exist in any significant number of students?
b. To what extent did it exist in core design?
c. To what extent did it exist in other subjects?

In order to gain insight into these areas a number of approaches were used. Some utilised existing data, some generated data.

1. A quick measure using 'O' level entries in 3D design.
2. Using fourth year student self assessment forms.
3. The development and use of a student "subject importance" questionnaire.
4. A series of interviews to follow up the results of the questionnaire.

It should be emphasised that learning resistance was a tentative phenomena, though an interesting one. This section of the research was developmental, each stage being based upon the results of the previous one.

1. A quick measure using 'O' level entries.

The first perspective used was gained quickly by use of a combination of readily available data and data gained by questioning staff. Within the 3D department a student had normally been entered for 'O' level or CSE based on his or her performance in the fourth year, the decision as to which, being made at the end of the fourth year. During the period of this study the department was entering all students who were entered for mainly 'O' levels in other subjects, as well as those who "deserved" entry on the old criteria. The reasons, for this change of policy, were an experiment to try to improve motivation amongst some students.
Data was gained by firstly listing this year's 'O' level entries based on the new criteria and then asking subject teachers to say which students would have been entered on a strictly "deserved" basis.

Results

Total entry for 'O' level = 65 (160 taking 3D design) Total "deserved" entry = 38
By subtraction those not "deserved" = 27

On these criteria 41% of the 3D 'O' level entry is not deserved and could be said to be exhibiting some form of learning resistance to design.

Discussion.

The fact that apparently 41% of this group would not have been entered for 'O' level on the old "deserved" criteria indicates a fairly large degree of some form of resistance or a negative attitude to design.

The results were interesting and, frankly, worrying, but clearly the technique was too crude to draw precise conclusions, further investigation was needed and the following questions answered.

a. Are those students resisting design only, or do these attitudes demonstrate a wider disaffection?

b. What is the picture across the ability range rather than concentrating on potential 'O' level candidates?

2. Student self assessment forms.

A second perspective was then obtained, again using available data. This particular technique cannot be claimed to be very reliable, indeed it was highly subjective, but nevertheless had value as a part of the overall perspective.

In this case use was made of fourth year student self assessment forms
which were completed as a confidential exercise between student and tutor in week 8 of the first year at Burleigh as a part of the normal tutoring procedure. The confidentiality offers hope of honesty in reporting but there are many drawbacks, notably the interpretation each student placed on staff instructions to write a few lines as to how they were progressing and settling into each subject area.

Method.

After gaining permission to use these forms from tutors the technique adopted was to read each student's subject comment and to sum up the comment with either a + for positive feelings, a - for negative feelings or a 0 for no strong feelings either way. Weightings of 1, 2 or 3 were also added to indicate strength of feeling.

These results were then tabulated for analysis. The detailed tables are to be found in appendix (12), here in the main body only overall results are shown.

The tables were analysed in two ways: (the following comments referring to the individual student listings to be found in the appendix).

a. Horizontally, by looking along each student's entries and noting those whose comments were listed as positive for all subjects except one or two. Such students were labelled as having a learning resistance. More than two negative or two negatives plus 0's were taken to mean a more general negative attitude rather than the specific concept of learning resistance under consideration.

b. Vertically, by looking down each subject column it was possible to get a measure of student attitudes to those subjects. The full sample of 60 only applied to core subjects of maths, English and design.
Results.

Compound table. (refer to appendix for detailed breakdown).

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>HORIZONTAL (L.R.)</th>
<th>VERTICAL (attitude)</th>
<th>SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>English</td>
<td>1</td>
<td>41</td>
<td>7</td>
</tr>
<tr>
<td>Maths.</td>
<td>2</td>
<td>35</td>
<td>9</td>
</tr>
<tr>
<td>Design.</td>
<td>2</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>French.</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Geography.</td>
<td>3</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Commerce.</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Movement.</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>S.P.E.</td>
<td>1</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Typing.</td>
<td>1</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>History.</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry.</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Physics.</td>
<td>0</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Biology.</td>
<td>0</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

Discussion.

The most immediately apparent point is that, by this technique, design has very little learning resistance with 2/60 whereas many options carry a greater learning resistance, for example 2/17 for chemistry or 3/15 for geography.

Before we can go on with an analysis of the results, however, it would be as well to consider some of the limitations of this technique.

1. The students had been at Burleigh only 8 weeks. Attitudes will not have been mature, and may be primarily based on high school experience.

2. Whilst the sample of 60 was apparently of mixed ability they all came from a house group that had no students studying three sciences in options.
Those students taking three sciences had been placed in two other house groups. We cannot presume, of course, that all higher ability students study three sciences, indeed many may take arts or humanities but clearly the removal of such a group of students did have an effect as the school only allows fairly strong candidates to attempt three science subjects at examination level.

3. The reliability of self report data cannot be considered to be high. Together with this we have the question of student interpretation of staff instructions when filling in the form.

4. What exactly were the comments? A measure of the students' degree of success in that area; staff/student relations; attitude to subject; etc?

5. The technique for extracting the data was highly subjective, although reliability was improved by the fact that only one person analysed the comments so minimising interpretive variations.

6. As the students were not known to me the "halo" effect did not apply when analysing comments.

If we bear in mind these limitations and so avoid putting too much significance into this particular method we can nevertheless use the data gained as part of the overall technique of looking at learning resistance.

Certainly this data could be said to be a closer measure of learning resistance than that gained by looking at 'O' level entries, in that a clearer measure of attitude across the curriculum was obtained for each individual student.

The results indicate that learning resistance is not as strong as first indicated by the 'O' level entry method. In that method we had 27 students out of a sample of 65 with what could be described as a poor attitude to design (and possibly a range of other subjects). In this case we have only 2 out of 60 cases of a specific resistance to design and only 4 out of 60 cases of a negative attitude to design (with a further 12 ambivalent scores).

The samples were, of course, very different but the contrasting results
suggested further investigation was necessary together with more reliable techniques. The method decided on was to design a questionnaire which could be followed up with in-depth interviews.

3. Subject importance questionnaire.

The main aim of this questionnaire was to remove one of the problems of using readily available data, namely the ambiguity of exactly what it reported. It was intended to gain some measure of student attitudes to design and other basic subjects in order to be able to obtain a measure of learning resistance more precise than had been possible in the previous techniques.

The questionnaire was used over an age range of 9 - 15 so that some impression of the way in which attitudes develop could be deduced.

It was decided to use a questionnaire which asked students to simply put a weighting of "subject importance" against 6 major areas of the curriculum. The weighting used was:

1 = very important.
2 = reasonably important.
3 = not very important.


1 1 2 2 2 3

This technique is far simpler to use and much more flexible in generating data than any form of "order of priority". Indeed, asking anybody to put those 6 subjects into an order of priority is both unrealistic and unreasonable. Many would consider some to be of equal importance. It would be a very difficult task for a child.

Once the questionnaire had been completed the weighting technique would enable us to gain data in several ways. Firstly the results would be compiled in a tabular form for each age range, eg:
We could then use the data as follows:

a. Horizontally, to spot those students who appear to rate only 1 subject at 3 and a maximum of 1 other at 2, the rest being 1's. This would equate to our earlier definition of learning resistance. For example student number two in the sample above resists science, student 3 has a generally low attitude.

b. Vertically, for each age range, to give us a total score for each subject which can then be averaged out. The closer the score to 1, the more important, the closer to 3, the less important.

c. By looking horizontally across the averaged totals for each year we can establish accurately an order of "subject importance".

d. By comparing this order of subject importance for each year for age ranges from 9 - 15 we can see how attitudes develop.

e. The data could then be followed up by interviews of a smaller sample in order to gain insight into student reasoning, to qualify the quantified data.

Method.

1. In each case the questionnaire was administered by myself, in as identical a manner as possible to minimise interaction effects between presenter and sample.

2. In every case the questionnaire was administered in a "neutral" room, usually a tutor base, in order to minimise the effect a specialist classroom may have had.
3. No indication was given that I was a teacher, or, that I was interested in any particular area.

4. Before the papers were given out the following statement was read out slowly and clearly:

"We are trying to help someone find out what children (the word 'student' was used with older children) think are the most important subjects at school. I'm giving you a piece of paper with a list of 6 subjects on it and after I've made sure you all understand it I want you to write down a number under each subject which tells me how important you think it is.

The numbers are: 1 = very important, 2 = reasonably important and 3 = not very important.

Please remember there are no right or wrong answers, it's not a test, so don't write your name on the paper but just answer as accurately as possible without talking to your friends."

5. The papers were then issued and firstly read by the students. The paper was then read out aloud to ensure even poor readers had understood.

6. Each subject was explained briefly. This was important as primary children would not have experienced design themselves. All subjects had a simple description read out so that no bias was seen towards a particular subject. When all students indicated they understood the paper was completed.

7. A pilot was run at a junior school not used in the main data to prevent subject sensitization. The pilot was run with a group of 9 year olds and the children were verbally checked immediately afterwards to ensure they had understood. No changes in design were necessary.
### Results.

<table>
<thead>
<tr>
<th>Age</th>
<th>Sample</th>
<th>E</th>
<th>M</th>
<th>D</th>
<th>S</th>
<th>H</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>third year junior</td>
<td>9</td>
<td>55</td>
<td>1.7</td>
<td>1.36</td>
<td>2.09</td>
<td>1.58</td>
<td>1.76</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>forth year junior</td>
<td>10</td>
<td>49</td>
<td>1.44</td>
<td>1.34</td>
<td>2.22</td>
<td>1.77</td>
<td>2.06</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>first year high</td>
<td>11</td>
<td>25</td>
<td>1.12</td>
<td>1.08</td>
<td>2.28</td>
<td>1.68</td>
<td>1.64</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>second year high</td>
<td>12</td>
<td>26</td>
<td>1.42</td>
<td>1.26</td>
<td>2.19</td>
<td>1.50</td>
<td>2.03</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>third year high</td>
<td>13</td>
<td>24</td>
<td>1.16</td>
<td>1.00</td>
<td>2.33</td>
<td>1.25</td>
<td>2.16</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>fourth year upper</td>
<td>14</td>
<td>43</td>
<td>1.11</td>
<td>1.13</td>
<td>2.46</td>
<td>1.60</td>
<td>2.16</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
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<td>2</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>fifth year upper</td>
<td>15</td>
<td>37</td>
<td>1.08</td>
<td>1.08</td>
<td>2.37</td>
<td>1.59</td>
<td>2.08</td>
</tr>
<tr>
<td>rank order</td>
<td></td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

**total sample = 259**

**number showing L.R. in each subject** (from individual papers).

### Discussion.

The data obtained allows us to look at both learning resistance and attitudes to "subject importance", however, before we go on we should be clear of the major limitations.

1. Students will interpret "subject importance" in different ways. It was made clear to them that it was possible to list all subjects as important or visa versa, if the student felt that way. It would be interesting to replicate the work using phrases such as "subjects you try hardest in", "subjects important to your future" etc.
2. The sample sizes per year were small, though in each case the groups were of mixed ability and the questionnaire carried out in neutral rooms as previously indicated.

3. The high school results were obtained at a Coalville school, whereas all the other results were carried out in the Loughborough group of related schools. There may be local factors at work within these results.

4. The small numbers, particularly in the high school sample, mean that to those students French, for example, may mean one particular teacher and so that student/teacher relationship may play an important part in what the student reported on the questionnaire. This, of course, applies to all subjects. A far greater sample size is necessary to minimise this effect and ensure a larger pool of specialist teachers.

5. The simplicity of the weighting system makes the application of the learning resistance definition rather crude. A wider range of weightings, for example 0 - 5 would make a finer selection of those students with learning difficulties possible.

6. There is no indication as to why learning resistance, if that is what it is in this case, exists. It may well be simply a student/teacher negative reaction in one particular subject rather than the student's attitude to the actual subject itself. The importance of personal relationships within education is a complex but important area of research in itself.

7. This data quantifies the situation, bearing in mind the limitations, however it was necessary to use interview techniques to qualify that data.

Despite these limitations this data was, in many respects, more reliable than that previously used and the following observations were possible:

1. Whilst many students do not consider design an important subject only a small number fit the definition of learning resistance, that is 9 from a sample of 259. Out of that 9 the technique used cannot differentiate between those who simply do not consider it as important as other subjects and those whose attitude will be actually translated into a resistance to learning in that area.
2. Design, in 9 year old's eyes, is the least important of the 6 subjects with a weighting of 2.09. As time goes by design improves its standing to fifth, overtaking French but it should also be noticed that design's weighting, nevertheless, deteriorates to 2.37.

3. Maths and English soon took on pre-eminent positions in student perspectives, ending in 15 year olds with near unanimity at 1 each (averaged 1.08). Again it should be noted that English and maths not only consolidate in first and second positions but also improve their standing from 1.7 and 1.36 respectively to 1.08 each.

4. Science stays virtually stable at third with a weighting of 1.58 moving to 1.59, minimal variation.

5. Humanities and French both deteriorate in mark from 1.76 and 2.00 to 2.08 and 2.59 respectively.

What appears to have happened is that once the student had entered the high school, with its fairly traditional "academic" curriculum and that "hidden curriculum" unconsciously put forward by staff, attitudes soon stabilized down to the pattern shown above.

Superimposed on this conventional pattern of subject importance we have the deterioration of attitudes to design, humanities, and French, probably caused by adolescent attitudes developing separately from school experiences.

Maths, English and science improve their rating or, at least, stay steady, probably due to the increasing awareness of the importance of these subjects to employment prospects, and the student's increasing conformity to the norms of the hidden curriculum.

Implications.

1. Learning resistance, as a specific concept, is not as common as first thought, however, the data of the three methods used in this section so far indicates that a poor attitude to design is fairly common and a cause for concern.
2. Attitudes, whilst dynamic, take on a general form at an early age. Whilst there were alterations in subject priority over the age range considered, they were minimal. This has implications for improving attitudes to design, particularly that students need positive experiences at as early an age as possible, certainly by the age of 8.

3. Whilst the previous comment appears to go outside the brief of this work it does, of course, have implications as many learning difficulties are founded on attitudes. If we can give children positive experiences in design from an early age and also work on the hidden curriculum by showing other teachers the relevance of design education, we will undoubtedly improve attitudes to design.

Possible directions for further research in this area could include:

a. Design and the initial training of primary school teachers.
b. Design and inservice education for primary teachers.
c. The preparation of effective resource packages for primary schools which even a teacher without design training can use to gain positive results with children. This would also have the secondary effect of improving teacher attitudes to design.

4. Follow up interviews.

The primary aim of this series of interviews was to attempt to qualify some of the data raised in the "subject importance questionnaires." The sample used 4th and 5th year students at Burleigh who had been selected by teachers on the basis of "students with intelligence but a poor attitude to design." No mention was made of performance or attitude in other areas. The interview techniques used and their limitations, are exactly the same as the previous series and so need not be repeated.

The basic questions were as follows:

a. Why was design ranked so low?
b. To what degree did parental influences play a part?
c. What staff influences were at work?

d. How does the way in which design is taught influence attitudes?

e. What aspects of design do these students see as relevant?

A basic semi-structured schedule was drawn up as follows:

1. What subjects are you doing at Burleigh? How well do you feel you are doing in each?

2. Where do you rate design amongst the others?

3. Do you know what your parents feel about design?

4. Have you any idea what other staff feel about design, your group tutor for instance?

5. Can you tell me something of your feelings about design - importance, enjoyment, relevance, etc.?

6. How would you like to be taught design, i.e. what would you hope to get out of it?

   Keywords used to help out - analysis, sketching, thinking skills, handling tools/materials, evaluation.

7. Why did you choose this particular option within core design?
   a. Own preference.
   b. Doing well in it at high school.
   c. Parents' suggestion.
   d. High school teacher's suggestion.
   e. Did displays from upper school help?
   f. Influence of close friends.
   g. Useful for job prospects.

Results.

The schedule, and approach, of the interviews was primarily open ended. Whilst there were some direct questions the majority of information was factored and analysed down as in the first series of interviews. The results will be dealt with by firstly going through those questions that provided some form of direct answer and then by examining the factors generated by the more open ended questions.
Question 2. Where do you rate design amongst other subjects?

The response to this question was biased by the fact that the sample was chosen as having a poor attitude to design. No student rated design as important. There was a fairly even split between those who thought it of medium importance and those who thought it of lowest importance.

This result was as expected but provided no clear answers as to why these opinions were held, although later questions started to examine this aspect. One interesting point was that many students remarked that whilst they considered it of medium/low priority they did, nevertheless, enjoy it more than other subjects.

Question 3. Parental feelings on design.

Only one student claimed to have parents who pushed design. Three said parents had a low opinion of design, although these were the parents of extremely poorly adjusted students and so the accuracy of this report may be doubted. Two students said their parents did not understand design and the remainder were not aware of any parental feeling in that area.

Question 4. Other teachers' feelings on design.

Only one student reported that his group tutor had suggested he "ease off on design and concentrate on other subjects." Another two students said their group tutors emphasised English and maths and said other subjects were "less important." The remainder of the sample claimed to have experienced no staff bias.

Question 7. Why did you choose this option within core design?

a. Here the vast majority claimed that it was their choice alone. The influence of peers, teachers or parents was denied. However I feel this was probably not the case, adolescent independance would not admit to needing others.

b. About half the students found displays at their high school by the upper school helped them in their choice, however a large minority had not understood the procedure for selecting the subjects at the upper school at all.
c. Very few students had considered future vocational needs in their choice of options. The major reason for a particular choice was success at that subject at the high school. A few admitted that teacher relationships were very important in this respect.

d. A disturbingly large number chose their design core option by the negative criteria of the least unpleasant of the three.

e. Only two students did not get the option they chose.

Factors from open-ended questions.

90+ factors were generated and, in a number of stages, analysed down to the following points:

1. Quick success is important "like the physics trays".

2. Sketching is very important.
   a. Many students found sketching difficult.
   b. Those who found it difficult had a low self concept in that area in the junior school.
   c. Students recognised the importance of sketching in the type of continually assessed design CSE operated at the upper school. A few initially poor results due, primarily, to poor sketching often demoralized. Poor attitudes towards design often developed from this.

3. Course structure.
   a. The style of work, via projects, caused mixed feelings. Many students wanted more freedom, others liked staff control. All said the actual projects chosen needed to have a personal interest.
   b. Many students wanted an increased vocational emphasis. By this they meant basic craft skills orientated to career areas such as mechanic, joiner, hairdresser, etc.
   c. The teacher was seen as most important. Students wanted "firm but fair" teachers. Many CSE students felt they were not being pushed, the staff concentrating on 'O' level students within the mixed ability groups. Some complained that they were prevented from working by other students and that those students needed firmer control. "Skiving" was felt to be easy at Burleigh (not just in design) as teachers "don't check up on you". Many students claimed to be making little effort over a wide range of subjects.

A very common and important complaint was the difficulty of getting teacher help when needed. Many students pointed out that the staff were "pushed off
their feet" in design lessons.

d. Homework was resented in many cases. Students wanted to know why they should do it.

4. Visits were seen as important, very few were organized by design.

5. It was noticeable that all students who took technical drawing enjoyed it. This was not the case for any other subject area. I feel this is primarily due to the fact that it is easy to gain positive feedback by following simple, mechanical rules. The students enjoyed it but this does not necessarily equate to educational value.

6. Design thinking was found in most cases to be a difficult concept to grasp. When, on case studies, designing was thought through verbally with a member of staff, rather than via sketches, it was found that the majority could use an idea generation to evaluation feedback loop. If left without staff support and probing the student did, however, tend to go for the first idea that came into his head rather than using the loop. Most students in the sample resented the "paper design" part of designing, preferring the constructional phase. They tended to see design as two, distinct phases, of designing on paper and then making, even when staff encouraged a more flexible, realistic, approach.

7. Most students were unable to say what they were getting out of any particular subject. Admittedly this is a fairly high concept to grasp but it does reflect the point that teachers do not make a good job of "selling" their curricula areas.

8. Assessment in design was by 100% continual assessment. This caused considerable problems in that many students, unfamiliar with the design approach used in the department on entering the upper school, collected poor marks initially and "gave up". Continual assessment is, in many respects, a far better method of assessing a student's capability in a given area, however it is essential that the student is given the opportunity to make mistakes without it necessarily reducing his chances of a good final grade. More particularly it is not simply a question of how this is done but also that the student perceives this as reasonable.

Discussion.

1. Many student perspectives of design education were based on a craft
model. Emphasis was placed on the practical work and designing was often seen as an imposition. This attitude was very common amongst all students interviewed, whether of a high or low ability, though it should be remembered that all interviewees were selected on the basis of some form of learning difficulty. The higher ability students, from the samples, placed a very low priority on design, often resenting the time spent in the design area rather than following "academic" study.

Similarly lower ability students usually had a craft perspective which prevented them valuing design work, resenting an aspect which they felt prevented them from engaging in more valuable vocational work or simply enjoying basic craftwork. We should not oversimplify the problem, however, most of these students suffered from a wider attitude problem, simply switching to vocational craft courses (an area for considerable research and discussion itself) would not, necessarily solve their attitude problems either in design or elsewhere.

Clearly staff must avoid giving students the impression that there are two aspects to design, the paper design side and the practical making. Design just is not like that and yet whilst staff would certainly deny such a simplistic description this is the model that many of the students interviewed had internalised.

Staff must encourage a breaking down of these perceived barriers. A more active design approach needs to be put forward involving parallel approaches rather than the linear model that many students infer from their experiences at Burleigh. A much more flexible use of drawing, model making and experimentation needs to be put forward.

2. The projects used within 3D design failed to motivate all students. In informal conversation with students in mixed ability groups there were rarely more than 50% of students who felt motivated by the particular project they were working on. In the interviews the majority of students preferred the idea of a free choice in project topic. Staff, however, pointed out that this was not practical due to the problems of resourcing, stocking and teacher guidance. Within the case study group that operated in the 3D area free project choice was operated but it was very clear that a good resource base was necessary to fire ideas.
A freer choice of project material may be possible within the mixed ability groups once the necessary resourcing has been established. This is a long and difficult task which merits further research in its own right. A more immediate solution would be the careful choice and resourcing of specific projects that were flexible and "well sold" to students in order to motivate them. This is not dissimilar to present theoretical practice, however actual practice is poor due to a variety of factors including poor coordination; lack of staff time; limited finance to build resources and the lack of a guiding structure within the 3D course.

3. It was claimed, by the majority of interviewees, that parental influence in the choice of options was minimal. I am not convinced by the truth of this considering that adolescent wish to be seen to be independent, nevertheless several students did remark that parents were unable to offer sound advice due to lack of understanding.

There is clearly a case for a greater effort to inform parents as to the content and practice of the modern curriculum, particularly as there have been many changes since today's parents were at school. The difficulty of communicating with parents was made very clear through meetings of the upper school parent's and staff association. Research carried out within the association clearly demonstrated a lack of interest, on the part of a majority of parents, in general developments. Only very specific problems involving their own children can be guaranteed to engage the attention of many parents.

The active interest of parents in their child's study is acknowledged by many authorities to be important. Possibly the most effective means of selling design as an area of study with value is via the national media. A campaign of awareness and sensitivity needs to be pushed by national bodies involved in design education working with the mass media.

4. The interview techniques, as they were used, were not sensitive enough to reveal any of the subtle influences of the hidden curriculum. Nevertheless, on a subjective level most teachers would admit these influences exist and so it is important that any curriculum innovation is done with full staff awareness. Secondly it is important that all staff should be well enough informed about the wider curriculum that they can see it in a holistic sense. In this way many of the detrimental effects of the hidden curriculum will be minimised, though they could never be removed.
5. Whilst in their final year at the high school students make their choice of options and area of core design. The interviews indicate that amongst the learning resistance follow up sample the majority did not fully understand that choice. Some students said that the exhibition put on by the upper school was helpful but that they did not feel fully informed.

This is another area in which development is needed. Students must make a well informed decision based on a breadth of experience and knowledge of what will come at the upper school. More informed choices will help minimise the number of misplaced students who subsequently become disaffected. Interviews with high school staff indicated a growing awareness of the position within design at Burleigh after the great changes of the previous three years, this, hopefully, will also help develop student awareness.

There is also a case for a very radical look at the curriculum as a whole at the upper school. Is the present system of "academic" boxes relevant to today's students? Would moves towards modular courses help minimise the problems of alienation and under achievement? There are some major questions to be answered in this area, it is clearly an important topic for an action research project in itself.

6. Quick success, it is generally agreed, is important in giving a student feedback and developing a positive attitude and self concept. Design is often a poor medium for such success in that project work may take a great deal of time to complete.

Teachers need to be more aware of the need for quick success. This can be engineered into longer projects by ensuring frequent staff contact and that the student analyses progress after each session and is made aware of his progress. Again the pace of work for teachers within 3D design is so hectic that staff are not finding the time for this essential contact. Improved resourcing and project choice would help liberate staff but there will never be time in, say a double period, to spend time with every student. The staff, therefore, need to organize end of period summaries either in small groups or as a class. End of lesson procedure is, at present, poor, consisting of working until the last moment followed by a hectic clearing up. The students often leave late. Because of this, further ill-feeling can be generated needlessly.
Students need help to be shown their own progress, they are often over self critical. These comments apply at all ability levels, although it is generally agreed that the most able are more capable of self analysis and assessment.

7. The interviews demonstrated the central part sketching plays in design at Burleigh. The continual assessment scheme often led to students becoming depressed with their performance in the first few projects. That depression sometimes led to disaffection and the vicious circle of poor attitude and performance.

Many students who rated their sketching ability as low reported that this self image developed at the junior school. There is a case for improving the standard of non-verbal and graphical communications at junior school level, sketching and drawing are often seen as a secondary decoration around the all important written word. This is a generalisation, it is true, but the work done in this research does indicate the need for greater and more specific research into this aspect of non-verbal communications.

One particularly interesting aspect discovered during the high school visits was that the standard of sketching in the art groups was far higher than had been expected. All students took art as a part of the design roundabouts. The samples of work seen were not selected display work but whole groups work selected at random from stored current work. This work, from mixed ability groups, was of a standard above that being done by students at the upper school in 3D design. It was noticeable that there was very little graphical work in the 3D departments of the two schools feeding Burleigh at the time of writing.

There appear to be three main effects at work here:

a. Some students do develop an "I can't draw" self concept, often due to early experiences at junior school where teachers often expect children to draw without necessarily being shown how. The whole area of junior school graphical communications and model making needs researching.

b. Those who find drawing difficult often opt for 3D design for the negative reason that they wish to avoid further art. Once in 3D design at the upper school they resent the amount of drawing necessary in order to gain a good examination grade, poor attitudes often develop from this.
c. Students were not transferring concepts and skills learnt in the high school art department to the upper school 3D department. This illustrates the dangers of the classical closed cell curriculum. Not all students can make the connections between areas, many find the conceptual leaps difficult. Teachers, because of their personal commitment to their own subject areas, are often poor at helping students establish linkages. The approach operated at Woodbrookevale, the new high school, appears interesting in this respect in that students work around "centres of interest" rather than traditional subjects. Teachers are appointed as teachers rather than historians etc though a few specialists are available in design and sciences. This system should reduce transfer of concept problems but as yet it is too early to tell.

There is a need to look into all three of these areas, though they are peripheral to this work. There is also a case for examining how sketching and model making are being used within the 3D department at Burleigh. The case studies showed that students who were struggling and becoming disaffected with the 3D course responded well on the withdrawal course run by one 3D teacher. The main reasons, other than personality, were that there was reasonable freedom of project choice and no insistence on drawn design sheets. On discussing these aspects with students it was clear that they were not short of design ideas, indeed they were fairly eloquent, verbally, on design points, it was mainly that they could not, and would not, communicate in the method required for the examination.

There needs to be a move to help students realise that designing does not mean hours of sketching before materials can be used. Mock-ups and tape recorded comments are acceptable on the 16+ course. Sketching is an important skill for a designer and will remain a fairly important aspect of 3D design courses but its importance needs to be put into perspective for the particular aims and objectives of each course depending on its level.

6. The majority of responses, on the subject importance follow up interviews, fell into an area that could be termed "course structure".

Points on project work and choice have already been covered and mention was made of suggestions for increased vocational content. It should be remembered that the sample concerned was selected as having difficulties
with design and so, in the context of mixed ability grouping, it would be impossible to comment further or make suggestions for development without further, more specific, research into vocational orientation in design. The staff interviews indicated a strong resistance to this concept and this was reflected in the manner in which the NTVEI initiative was being handled in the school as a whole, that is as pre-vocational education rather than vocational training.

The teacher, and his or her style of working, was clearly a very important factor within the course structure as the student interviews indicated. This area is, however, complex, we could never expect all teachers to work in the same way. Personality plays an important role, ie the personality of the teacher, student and the group personality or identity which in turn colours the teacher's approach. Eysenck has gone as far as to propose setting or streaming by personality rather than ability, an interesting point, but one that would negate many of the social advantages of mixed ability grouping.

The interviews indicated that many students felt they were not being stretched by staff, and that the staff concentrated on the higher ability individuals. This may well be the case, or it could simply be the perspective of the interviewee. The teacher should try to ensure that in the rush of a lesson every student gets attention though, of course, the amount will vary depending on need. One way of helping prevent problems like these is for the teacher to be periodically observed by a colleague who can then debrief the teacher. Such techniques of investigating efficiency and effectiveness are at the same time potentially very rewarding and also threatening. Teachers do establish habits and the observer can be of great help in looking for mannerisms, shortcomings of technique, effectiveness of resources and also indications of aspects such as an unconscious avoidance of certain students. This is threatening for many teachers, especially those who have always worked in a separate classroom, unobserved. Team teaching is a help in this respect in that the teacher learns to operate with others and in a more public manner. The team members can help each other develop an awareness of their own particular style of teaching.

One area that hard pressed staff can often forget to cover is that of explaining the reasons for actions or directions to students. One interviewee complained about staff "treating her like a child," in that she thought it adult to simply go to the toilet when she wanted without having
to ask permission. She resented being stopped and told to ask. Given time and understanding the member of staff could have explained that an adult should have the responsibility to use the toilet at break times. If handled tactfully the student would have learnt something from the exchange but all too often staff are hard pressed and so the student is simply and shortly corrected and so resentment can grow affecting other aspects of that student's education.

This technique, "firm but fair," should also be applied to the other points raised by interviewees, i.e. justifying homework and class control. Again a team teaching situation can help by allowing a member of staff to concentrate on an immediate problem while the other teacher covers.

One area of course structure that was mentioned by several interviewees was their perception of a lack of continuity between schools. Whilst the development of an 11 - 16 curriculum is proceeding through the official channels at both executive and departmental level, I feel that it is important to incorporate a wider brief namely 8 - 18. Many of the difficulties experienced by students on the design course have been shown to originate with problems and self images developed in junior schools. It is here, in these schools, that design must have its roots. At the other extreme we have a situation at Burleigh of core design to 16 and then none at sixth form level. The reasons for having design as core, put forward in the introduction to this work, do not change when a student enters the sixth, there needs to be a commitment to core design at that level and planning for continuity.

9. Visits were mentioned by several students as having motivational value. One must agree, providing the visit is well planned, the students briefed and debriefed together with extension work given. The great problems are finance and timetabling. Finance is a problem outside the scope of this work, however timetabling should be flexible enough to cover such situations.

There are various possibilities but there needs to be a radical look at the way timetables are constructed. Do all subjects need to be taught for five periods, in various breakdowns, for five years? Might there not be mileage in a modular system as used by the Open University and proposed in secondary education by the I.L.E.A.(15). Such an approach would seem threatening to many teachers as it challenges their traditional approach to the curriculum,
but that, in many respects, would be a good thing, the "sabre-tooth curriculum" (16) needs to be re-examined.

10. The sabre-tooth curriculum brings us to the central points of relevance and motivation. Design, like any other subject or commodity, needs to be sold. One of the aims of education generally and design specifically is to help the student think and be critical. Are we to be surprised when this turns against us and students question the teachers' authority to dictate curriculum? The present curriculum followed in the majority of schools is simply a watered down grammar school, academic course which even in grammar schools was very wasteful of talent. Modern society and patterns of employment are changing rapidly and whilst we should avoid the narrow definition of vocational education (that is specific to one trade or career) we cannot deny the motivational advantages of continually showing students the vocational relevance of the curriculum. There is danger, however, in basing a curriculum solely on vocational relevance even today. The key words must be education for flexibility, an ability to cope with changes in working patterns and periods of unemployment. If we move from the general to the specific, interviews with students often indicated an inability to recognise the broad reasons for the work done in design, and yet students could be very particular as to the relevance both of a subject area generally and specific sections within it. One student, for example, stated "Fractions aren't any use, but computing is."

We must, therefore, do two things. Firstly look at what we teach and question its relevance and secondly point out the relevance to students even though it takes time. Better this than hope it will all come together and the student "see the light", the majority will not.

11. Assessment was mentioned frequently by interviewees. 100% continual assessment looks ideal at face value, experience, however, has revealed problems. Many students were depressed by their early efforts and rapidly developed a negative self concept in design. This in turn led to compensatory strategies such as "concentrating" on other subjects, a phrase often found in the student interviews. This situation was illustrated by the 1983 CSE and 'O' level results. The 'O' level, examined by final project and written examination, produced excellent results in 3D design. The CSE, students who "could'nt be bothered" to complete work, claiming to be concentrating on "important" subjects.
The department is now committed to the Leicestershire 16+ dual certified design qualification which involves 100% continual assessment. The exact details have not, at the time of writing, been fully clarified, but it would appear that all work will be marked by an external assessor at the end of the course. This is slightly different to the Burleigh mode 3 CSE where all work from the fifth year was internally marked and moderated followed by an external moderation. The new 16+ would appear to be less flexible in that it gives the student fewer opportunities to make mistakes in the early stages of the course. A better system may be for the student to select work to represent at least one year’s work and demonstrate ability in all of the 16+ examinable objectives so allowing the student some flexibility, but not arriving at the all or nothing situation of assessment by examination paper or final project.

12. The final point from the interviews that deserves mention was that they helped identify "bottlenecks" that were instrumental in limiting the learning of a design approach by students. The particular bottleneck in this case was non-verbal communication. Staff had long realised that students were reluctant to design as opposed to the physical making up of designed objects. This was put down to the fact that the high schools had no real design emphasis, being primarily craft courses. Students were used to simply making what they wanted, either from book drawings or from elementary sketches. Designing, it was deduced by staff, was alien and frustrating. The interviews, however, revealed that the students were capable of a reasonably good standard of design thinking if they were allowed to simply discuss their ideas. The bottleneck was that they found great difficulty transferring those ideas onto paper to prove to the examiner that they were capable of that level of thought.

Non-verbal communications have already been discussed, the point was raised here to show how careful debriefing of students can help identify bottlenecks that have either not been seen by staff or incorrectly identified.
SUMMARY OF POSITION AT END OF LEARNING RESISTANCE SECTION.

1. It was clear that whilst learning resistance, as a concept, did exist, the numbers were fairly small. The measures used, together with interviews showed that those students with a poor attitude in design also tended to have a negative disposition to the curriculum generally. This does not, of course, fit the description of learning resistance proposed earlier.

Students with a poor attitude were under-achieving in design. This was shown by comments made by staff in the initial interviews and by the comments of several students in the learning resistance interviews.

2. The factors generated in the learning resistance interviews tied in well with the "10 areas of concern" from the initial interviews. This added weight to the hypothesis that many of the learning difficulties, primarily attitudes, were amplified, if not caused by aspects of the 3D design course.

3. It was decided to leave the idea of learning resistance at that point and move over to examine the possibilities for improving attitudes and achievement by looking at the course structure for the mixed ability groups. Interviews indicated that the existing structure and practice were not working as well as they might. We had mixed ability grouping but not mixed ability teaching. It was necessary to develop a course structure and teaching techniques to enable mixed ability grouping to proceed more efficiently.

4. At this point a practical problem became evident. The small working party which had begun to examine course structure was proceeding slowly, limited by teachers' ability to give time for meetings. Nevertheless it was intended to develop a course structure and generate resources for one section to be taught on an experimental basis. Evaluation was to be by staff and student interviews.

The difficulty was that the fifth year groups were all involved in final, examination projects and could not be disturbed. The fourth year had had students withdrawn on the basis of learning difficulties from each house group and so the main groups, whilst still mixed ability, did not have the full range of abilities and attitudes, an average of seven students from 160 being withdrawn from each core design house population. In 3D design this represented on average, 2/3 from 40+. 
It would not have been practicable to ask students to rejoin the main groups for the period of the experiment and so it was decided to proceed as the groups stood. It was appreciated that this would limit the effectiveness of the experiment, however there was still a fairly broad spread of ability and certainly many students who staff considered to have learning difficulties of an attitude type.

The situation at that time could be summed up diagramatically as follows:

\[
\begin{align*}
&\text{-------High school visits, ongoing.----------} \\
&\text{initial interviews} \quad \text{-------Learning resistance. -------ended.} \\
&\text{-------Course structure for MAG. Ongoing.------} \\
&\text{Case studies-------------Ongoing.------------------------}
\end{align*}
\]
HIGH SCHOOL VISITS AND INTERVIEWS

Introduction.

The initial student and staff interviews indicated a common area of concern in the high school / upper school link. Students often used words such as "lack of continuity" in 3D design and staff were very concerned with the "poor grounding" of students for examination courses whilst at the high schools.

Certainly there was no direct link between the curricula at the various schools and as the high schools have very different schemes of working within design there is only a very limited degree of common experience at transfer.

It should be noted that within the specific field of 3D design the students present at Burleigh during this study had all come through the period when the high schools were single sex. Only the boys' school had operated a form of 3D department but even there the course was very different in philosophy to Burleigh, consisting of work of a craft orientation with little or no design work.

We had a situation in which female students in 3D design at the upper school had never done any craft work or experienced a problem solving course. The boys, whilst having some basic craft skills were not familiar with problem solving. This point was demonstrated in the interviews when students were probed about remarks such as there being a lack of continuity between design at the schools. In these cases students meant that they were interested in more depth in the form of craft work to which they were accustomed, as one interviewee put it "bigger wood work jobs".

The basis of these problems slowly emerged as being one of the limitations of the traditional autonomy of teachers, especially in split secondary education such as the Leicestershire system.

The problems caused by this autonomy and its ramifications in the different schools were very marked and it was, therefore, decided to follow them up.
Method.

The approach adopted was open ended. There were no specific aims other than:

a. To look for possible directions in this area.

b. To sensitize high school teachers to the problems of the split system.

Data was collected by organizing visits to all three high schools together with interviews with each head of design and all teachers of 3D design. The interviews were informal and open ended. The opening statement was that I needed to be more aware of how the high schools operated in design, the problems they met and questions of liaison both down with the junior schools and up to the upper school.

It should be noted that these interviews had to be handled with sensitivity. Teacher autonomy tends to cause a background of suspicion to form in any split system. It was most important that the high school teachers, who knew me as an upper school teacher, should not feel this research was any form of inspection.

The interviews were conducted on the high school teachers' home ground, after a prolonged settling in period. The interview points were recorded by notes rather than tape recorder as it had previously been noted that teachers were far less happy with the use of a recorder than were students.

Results.

The interview notes were analysed down in an identical manner to the initial interviews. The detailed factors generated are to be found in appendix 9. In this part of the work the factors will be used as follows:

1. Identification of those specific results that related to the immediate problem areas generated from the initial interviews.

2. A more general examination of some of the problems of transition from high school to upper school. Whilst these points may seem peripheral to this work the research clearly showed the great importance of efficient liaison and continuity. Many of the learning difficulties under consideration were amplified, if not caused by limitations in liaison.
Specific results.

The initial student interviews, as indicated previously, showed a common feeling that there was little continuity in 3D courses. It has already been shown that only one high school offered a form of 3D course and that this was, in effect, a craft course which did not fit end on to the work done at the upper school. The result of this situation was that a number of students of 3D design at the upper school developed a resentment which generated a learning difficulty based on a poor attitude. The initial interviews also showed that a large minority were choosing 3D design for the negative reason that they wished to avoid art.

The high school interviews showed that teachers there were only partially aware of these problems. What became clear, however, was that there had been many changes in the high schools over the 2 years previous to the interviews and these had led to two points:

1. The high school staff felt themselves to be under great pressure.

2. Many of the deficiencies of the high school design courses were vanishing as all three now operated 3D design and the new staff had approaches far more in common with that at the upper school.

Concern must be voiced over the problems caused by the work load mentioned above. There had been a number of new staff in 3D design in the high schools but none of them had managed to pay an informal visit to the upper school to discover how design operated there. New courses had developed with no reference to work at the upper school or to work in the other two high schools. The prevailing attitude seems to have been that it was the responsibility of the upper school to liaise. Whilst this would probably be denied by high school teachers, if put directly to them, actual practice indicates this. Of course, liaison, formal or informal, is not demanded of a teacher as we shall discuss in the second part of this section. This lack of definition of role, together with work load meant that the highly important work of liaison was minimal, with termly formal meetings which interviewees at both high and upper schools reported to be of little practical value due to the formality and format.

We must avoid falling into the isolated teacher role, liaison between any
interface of schools whether it be junior to high or high to upper etc is a joint responsibility.

Despite the concern mentioned above the detail from the interviews gave confidence for the future. The courses being developed in the high schools, whilst individual, would generate a far better base for the 3D design course at Burleigh. The personal design philosophy of the staff at the high schools was also seen to be very much in parallel with that at Burleigh. These facts mean that the design staff at Burleigh will have to develop contingency plans for two years hence, when the first students reach the upper school having had a grounding in design education. The present course starts very much from scratch, often causing the comments of "lack of continuity" mentioned before. In the near future a more logical development may be possible. This should minimize resentment and associated learning difficulties.

A second factor raised in the initial student interviews and already mentioned in the learning resistance section, concerned a tendency towards low self esteem in drawing ability in many 3D design students, particularly those who staff defined as having difficulty. Again, many of those students, the interviews showed, had chosen 3D design for the negative reason of avoiding art where they felt particularly disadvantaged. By personal perception, as a teacher of 3D design, backed up by the staff interviews, was that the standard of drawing ability in the high schools was very poor. The initial interviews indicated that often those with low self esteem in drawing formed that image in the junior schools and that it was reinforced in the high schools.

The high school visits and interviews, however, showed a rather different picture. True, there had been little formal teaching of drawing ability at the junior schools, but nevertheless, class groups of work chosen at random rather than by high school staff indicated a reasonably high standard of drawing. These drawings were sampled from art groups, the 3D groups did very little drawing in their design work.

Students appeared to be putting their attitudes and skills into "curricular boxes" and not transferring drawing skills into 3D design at the upper school. This supposition would need a great deal of work before it could confidently put forward as proven, however, at a subjective level it appeared to be largely true.
Conclusions.

The limitations placed on the upper school 3D design course by high school factors were very real. Nevertheless, the experience of the high school interviews indicated that the situation would be improving over the next two years. To attempt to generate any form of intervention programme within the high schools, to remedy drawbacks recognised at the time of this study, would have been counterproductive as it may have alienated new staff who were working hard and in similar directions to those at the upper school.

Another possible direction would have been to develop a programme to help stimulate the concept and practice of design and its associated graphical skills at junior school level. This approach certainly has great potential, however it was felt that it was rather too tangential to the central aim of action research at Burleigh. Time and resources, therefore, dictated that this particular avenue of research should stop at this point though the opportunities for further research are very interesting.

The main conclusion must be that it is necessary for far more efficient liaison procedures to operate than at present. To actually achieve this is difficult in that it involves a great many people in several schools, nevertheless this research has helped sensitize high school staff to the problems and the relevant people in the upper school have been kept fully informed of the findings as the research unfolded.

Because of the importance of this general issue of liaison it was considered valuable to spend a short time discussing some of the general drawbacks of split secondary education as illustrated by the Leicestershire system.

The limitations of transition at 14.

Cooper et al (design advisors) in "A report on the problems of transition between middle and upper schools" 1976 (17), identified two broad areas:

a. Those problems inherent in a middle / upper school situation.

b. Those problems due to local factors.

1. The first point inherent in the educational system of this country is both a great strength and also a limitation. This point is the traditional
autonomy of the teacher. Within the classroom there is very little direct pressure that can be brought to bear on the teacher by his principal, LEA or government. As this autonomy also extends to the principal the pattern is set for the sociological concept of negotiation to establish a very individual pattern within every school. This is a great strength in that it offers scope for innovation and an individuality which can bring out the best in a good teacher. Autonomy also offers the flexibility to react to local situations, to capitalise on opportunities and to motivate via topical and local factors.

We should remember that autonomy can also work against the student. Firstly, whilst autonomy offers the good teacher scope it fails the poorer or recently qualified in that it does not automatically offer support. When support is offered it is via locally engineered systems within the school or LEA, many teachers struggle in uninformed schools where they are expected to get on within the four walls of a classroom with minimal assistance.

Secondly autonomy has generated a bewildering array of CSE's and 'O' level examinations. Transfer from one school to another within the last two years of compulsory education can have grave consequences when curricula do not match.

Employers decry the lack of standardisation of student knowledge and experience due to the vast number of examination courses.

Autonomy means a constant and detailed liaison is necessary at all levels of education. This liaison is yet a further load on hard pressed staff and certainly this investigation indicates that the area of liaison is one of the first to be reduced when the load gets too great.

The high school interviews were constructive and open and every high school teacher recognised liaison as being important, however, subjective experience in schools and the initial staff interviews showed that teachers were all too easily prepared to blame previous schools for difficulties and yet not find time to alleviate problems by liaison.

Teachers in both high and upper schools saw a minimal value in the formal liaison visits organized at an executive level. The most common comments were of over formality and repetition. The usual format was for departmental meetings where one department would show the other what it was doing. This
is a case of statement rather than liaison. Informal contacts were found to be far more beneficial and yet were severely limited by the work load on both sides.

Work load was identified as a frequent and important factor in many aspects of this work. There is a case for the establishment of list and order of priority (if that is possible) for the use of non teaching time. This list needs to be considered by LEA's in the forthcoming re-structuring of teachers contractual duties.

2. The second point, inherent in any split system, is that the upper school teacher is under pressure to gain examination passes. Whilst few teachers would put the passing of examinations as one of their prime aims, we do live in a real world and the importance of qualifications in the eyes of employers, students and parents cannot be denied. The final two years of compulsory education can become a rush to prepare students for the final examinations. The upper school teachers, from the initial sample, frequently commented on the need for more preparation for examination courses whilst students were at the high school. The high school teachers, whilst not questioned directly on this point, may not either see such preparation as an important part of their role, or may have simply overlooked it as a factor. This is a potential source of conflict if liaison is not efficient. Even in the upper school itself there is potential conflict in the way in which the school handles the balance of concentrating on the education of the "whole" child or examination passes. Burleigh states, in the parents handbook, that it is concerned "with the total development of students, i.e. social, moral, emotional and spiritual growth as well as the more familiar academic dimension." This is a very reasonable statement but it disguises the tensions that form in the mind and the work of the individual teacher.

3. A third limitation of any split system is that the upper school fed by several high schools is bound to experience differences in student experience based upon the special factors in each of those feeder schools. Whilst catchment area differences immediately spring to mind we should also remember local factors based on that complex process of sociological negotiation between staff, mentioned earlier. It needs to be noted that this negotiation goes on at every level and so the students themselves have a significant effect on the formation of the overall character of a school together with many other factors.
The practical effects of this point were clearly seen in the high school interviews. The design courses specifically were entirely different in character in each school. These differences are unavoidable if we are to maintain the degree of autonomy we have at present. We must ask ourselves the following questions:

1. Is a "common" experience possible or even desirable?

2. Whilst a common experience would make the job of an examination orientated teacher easier what would be the negative effect in terms of a poorer holistic education and job satisfaction for the high school teacher?

3. What degree of control would be exercised over the upper school curriculum and by whom?

We could never gain an identical common experience, nor would it necessarily be desirable. As a professional teacher I jealously guard my autonomy and feel I use it to the benefit of my students. It should be remembered that the questions above operate in a very grey area of education, there is room for considerable discussion between teachers, employers, parents and students. Such a debate would no doubt be very interesting, however, at this point it would digress too far from the central aims of this work.

Local factors.

As Cooper et al pointed out a great many limitations within the Leicestershire system are caused by local factors.

1. The Loughborough high schools have seen a great deal of change over the last two years. One new school has been established and is now trying to forge its own, independent, identity. The two other high schools have become co-educational, and there have been considerable catchment area changes with more recently announced.

These factors mean that for each of these schools there has been considerable unrest. Changes to buildings and an influx of new staff have generated instability. Each department has moved towards forming a new identity and that takes time, but it is also apparent that the schools have
not recognised the importance of ongoing liaison as a part of that process of forming an identity. Liaison is doubly important at these times and yet pressure usually reduces it. The interviews indicated strong feelings of pressure in high school teachers due to the amount of change.

2. In any group of schools differences in the interpretation of specific subjects are bound to arise. Certainly design is one of the most problematical in this respect. Just what do we mean by design education? Given the Leicestershire concept of an integrated faculty of design consisting of art, fabric, 3D, food and technical drawing, the actual use of these facilities depends on the staff. Many purpose built design faculties in fact work on a separate subjects basis despite county policy. Similarly, whilst many teachers will claim they are unable to teach an integrated design course within older schools due to separate facilities, the truth is that it is the staff who do not want to innovate, the buildings and facilities are secondary to staff commitment.

There is a need for design teachers from all the related Loughborough schools to sit down and discuss common aims and objectives. Whilst I am not naive enough to consider that any form of common agreement will necessarily be reached, clearly discussion will be profoundly valuable on a professional level and could also lead to a degree of consensus upon which to build work schemes that bear a degree of common parentage. Such work schemes should be flexible enough to ensure that a member of staff can exercise that individuality which is so important in developing enthusiasm and commitment. We could offer that flexibility and yet there could be a far greater common experience than at present.

3. The third local factor mentioned by Cooper et al was the degree understanding of the pressures in each school. Liaison, as previously reported, is minimal and whilst all staff claimed a degree of understanding of the role of teachers in the other schools it is very difficult to be sure that this is so. One method of considerably increasing the degree of understanding would be to adopt a more flexible approach to staffing and exchange staff between schools at intervals. Such a scheme has several potential advantages:

1. Staff are sensitised to the need for continuity.

2. Personal relationships are established between staff in the different schools so promoting continued informal liaison.
3. The experience of exchange can be professionally enriching for both the individual and the group he or she joins. It offers new perspectives and widens the experience of the individual.

4. Exchange helps staff, at all levels, understand the problems each school operates under. A greater degree of understanding leads to increased cooperation.

5. In times of reduced staff mobility due to falling rolls exchange offers fresh experiences to staff and increases their chances of future promotion with a broader experience in teaching.

Such a system has been attempted within the Loughborough schools, however it has never succeeded for the following reasons:

1. High school staff were reluctant to move, they saw upper school children as harder to control and the pressures of examination work unpleasant.

2. High school staff often claimed they would be unable to cope with the level of study involved.

3. Staff at both levels fear that students would be disrupted by staff changes. The period of exchange would have to be at least one term in order to get staff fully involved.

The first two reported reasons are clearly not very strong and are based on a lack of confidence on the part of the teacher, who may never have taught older children. This is understandable, but could be overcome. The third point is a very real one. It is simpler for a teacher to change schools for a period of a term or longer rather than try to teach only certain periods or days in the other school. Nevertheless the consequences, for students in their final year, of staff changes and especially staff who may not be fully up to date with the examinations concerned, could be serious.

There is clearly no simple answer, exchanges could have great value but there are problems. We should not, however, forget the long term benefits, which are considerable. The principle of exchange needs to be constantly in mind so that when suitable situations arise they can be seized upon.
Conclusions.

The prime result of the high school visits and interviews has been to bring home the importance of liaison and close working relationships between schools in a system such as used in Leicestershire. Certainly it is clear that liaison is not thorough enough between the Loughborough schools with the results indicated above. One can see how easily it is for upper school teachers to get depressed and advocate an 11-18 system, however, whilst this may solve some problems it would create others.

The Leicestershire system does have its advantages and it is easy to lose sight of them. There are many cases of students succeeding in the upper school, due to the opportunities of new relationships with teachers and students, after conflict and poor performance in the high school. The upper school can also offer a wider curriculum and more facilities than an 11-18 school.

It is unrealistic to expect Leicestershire to abandon its system of high schools and upper schools due to the limitations highlighted in this section. The main lesson is that we should try to alleviate these problems by, amongst other things, efficient liaison, even though it takes time and energy with few, immediately apparent, results. We should also seize opportunities for professional and course development, particularly emphasising the concept of the teacher as a part of a team with all that means, rather than the individual in his unassailable and isolated classroom.
1. **CASE STUDIES.**

   1. Introduction.
   2. Selection criteria.
   4. Results.

1. **INTRODUCTION.**

   The case studies were the second major source of illumination in this research, operating in parallel with the initial interviews.

   The aim was to use case study techniques to gain a second perspective on the general problems of students with learning difficulties, in design, in order to supplement the interviews and their subsequent follow up. The case studies followed two particular groups, of fourth year students, that had been withdrawn from mixed ability groups, by staff, on the basis of having a learning difficulty that was preventing them from progressing effectively in those groups.

   It was the basic intention of the case studies:

   a. To gain insight into the workings and relationships within the withdrawn groups.
   b. To gain an impression of the effectiveness of learning within the withdrawn groups.
   c. To enable recommendations to be made for future practice.

   Withdrawal of students with learning difficulties had not, up to that point, been departmental policy, although it had been discussed as a possibility. The department’s hand was forced to some extent by the provision, by the executive, of an extra teacher in each fourth year house group of approximately 160 students, specifically to help those with learning difficulties. The initial reaction of the curricular area coordinator was to use these staff to withdraw students soon after starting at the upper school, based on high school reports and observation over a period of five to six weeks.
At this point a series of meetings was held between the curricular area coordinator and myself, on other possible ways in which the extra member of staff could be used in each house group. Suggestions were:

a. To provide peripatetic support for students with learning difficulties within the mixed ability groups. This usually meant 160 students in seven groups; two in 3D, two in fabric and three in art.

b. To reduce the overall staffing ratios in design from, typically, 22.8 to 20.

c. To form withdrawal groups on specified criteria.

The eventual plan adopted was to start the year by using the staff peripatetically for eight weeks in order to gain a clearer picture as to the situation and needs of students with learning difficulties. The eight weeks would allow both the extra member of staff and subject teachers to gain a fairly accurate picture and at the same time to enable the change in schools to minimise any learning difficulty that may have been associated, in particular students, with relationships at the high school.

The intention was for a flexible system of support; the teacher would have a base to operate from but the composition of the group was not to be fixed; students were to rejoin mixed ability groups if that was appropriate. If no withdrawals were considered necessary in any house group it was intended that the member of staff would continue to operate peripatetically.

The four teachers timetabled for this purpose were all experienced but with very different backgrounds, personalities and approaches to design. Time limitations meant that it was decided to follow only two of the groups, though two contrasting teachers were chosen in order to gain as wide a perspective as possible.

It was made clear that whilst I was to operate as a participant observer the methodology and work schemes within the group were to be entirely those of the teacher. The overall aim became one of gaining insight into the approaches used in order to be able, in conjunction with that teacher, to make recommendations for future developments.
2. SELECTION CRITERIA.

As indicated previously the selection criteria were left to the teachers concerned. Initially there was considerable discussion between teachers over what criteria were suitable and two main opinions emerged:

a. Those who felt only difficult students, those with behavioural problems, should be withdrawn because of the way in which they tended to monopolise teachers' time. In this way those students with other learning difficulties could be helped more efficiently within the mixed ability groups.

b. Those who felt that only students with a specific learning difficulty such as dyslexia, or the slow learner, should be withdrawn and that "attitude" cases should remain in the mixed ability groups.

In reality it is not a simple matter to establish such clear categories, indeed most specific learning difficulties will tend to lead to poorer attitudes to school in order to protect the self image as failure is experienced. Similarly a case of poor attitude to school, which may be caused initially by outside factors, is a genuine learning difficulty, despite the fact that it has an emotional rather than physical, mental or neurological cause.

In practice, as the house populations were approximately 160, the number of students, who it was felt were not coping in the mixed ability groups without a great deal of extra help, were small. Selection was possible by staff on a far more individual basis, formalised criteria were unnecessary.

The following selection criteria were used for individual cases:

a. The withdrawal teachers observations over 8 weeks peripatetic work, plus a final interview with potential group members.

b. Class teacher's observations.

c. The fourth year, week 6 review.

The first two points are self explanatory. The fourth year review was basically a simple report filled in by subject teachers in respect of each student after 6 weeks at Burleigh. The aim of this review was to identify
those students who were failing, and those who may not be in appropriate sets.

This information was collated and used by group tutors, it was not normally made available to subject teachers. It was felt that these reports would be of value in gaining an overall picture of students whilst considering withdrawal in design. Group tutors were approached for permission to use the forms which were then collated onto a single form for the purposes of aiding selection. The forms consisted of yes/no responses to 5 questions on ability, application and suitability of level of study in each area, together with a small section for any amplifying comments.

After the procedure above had been followed, together with approval from house heads and parents, the withdrawal groups were formed in week 9 of the school year.

3. METHOD.

The techniques used to gain a triangulated perspective over the period of the case studies were as follows:

a. Researcher's observations, using participant observation.
b. Teachers' observations.
c. Staff and student interviews.
d. Alienation, self esteem and self concept questionnaires, pre and post test.
e. Student profiles.

a. Researchers' observations.

Participant observation was used for reasons already covered in the section on research methods. The case studies involved a commitment of 2 by 5 periods per week for two terms in total. Observations were recorded in note form, during and immediately after each lesson. In the case of the art based group all activity took place in the single room used, the 3D based group was much freer to move around the 3D area which consisted of a large open area with several specialist workshops leading off. Observation in this case was far more difficult.

The cover adopted was both open and honest. Students were told that I was a
researcher looking at the ways in which design was taught. The fourth year students did not know me as a teacher, though I did admit that I had taught at the school, this was important in order to prevent confusion if I was discussed amongst students, as the fifth year students knew me. The technique evidently worked, students, on the whole, appeared relaxed in my presence, even feeling bold enough to swear within earshot! An authoritarian role was avoided.

b. Teachers' observations.

Staff were debriefed for their observations at least weekly, more frequently if relevant. This was important, often only part of a social incident had been witnessed by either observer, together a more complete picture of the incident emerged.

c. Interviews.

The staff and student interviews were held, starting one term into the withdrawal and after the post test of the questionnaire. The student interviews were done individually, with certain exceptions, which will be explained later. Similar techniques were applied as used previously, however in this case the structure was far more open, directed simply by asking the student to discuss his or her feelings on the course in comparison with the earlier mixed ability group. By this time students were familiar with me as a researcher and a rapport had been established enabling this technique to work. If students had been approached who had not worked with me it is doubtful that the technique would have succeeded in any significant manner.

The interviews followed the post test of the questionnaire which also enabled the checking of student understanding of that questionnaire.

The staff interviews were held after all the information from the student questionnaires, profile and interviews had been collated for each individual. The staff were asked to discuss both the course itself, individual students and possible ways forward. Techniques used were basically the same as in previous interviews.
d. Questionnaire.

The questionnaire was designed to improve the reliability of the study by broadening the methodological triangulation. On discussing the possible course structures with the withdrawal teachers, before the groups formed, it became clear that the main aim of the groups would not be to develop design skills as such but to lower levels of alienation and improve the student's self image in order to allow learning to proceed more efficiently.

Certainly "self" is an interesting perspective from which to construct a theory and practice of education. Rogers (18) saw self as the motive force behind all behaviour, suggesting that we are constantly attempting to maintain and enhance a positive self image and to protect it by various means. It is possible to make a case that a positive self image is necessary for academic success, however the problems of cause and effect complicate the issue. Does a positive self image of academic ability determine achievement or visa versa? In fact the situation is probably far more complex. Elements of both factors exist in a form of dynamic equilibrium. We can, nevertheless, make a case for accepting that the mechanisms of self image protection, such as lowering the perceived importance of activities in which the student fails, do interfere with learning and that it is necessary to enhance the student's feelings of self in these areas before effective learning can commence. Other limitations of using self as a perspective within the study centre around the fact that it is only possible to deduce aspects of self by either observation or self report. Observation was being used as a part of the triangulation technique and so it was necessary to use self report questionnaires in order to gain the necessary triangulation of method. The specific limitations of self report data have already been discussed, nevertheless, whilst these limitations are accepted, it was decided to adopt such techniques as it was possible to use available instruments which had a history of effective use and were, if used correctly, reasonably reliable.

"Self" is a complex and multidimensional concept, we have to be very clear upon what it is we are trying to measure. Two aspects were chosen:


b. Self concept of academic ability. Brookover '67, (20), modified to self concept of design ability.
Self esteem can be defined as an individual's feelings of worth or value in a general sense. The Coopersmith inventory has had considerable use and the shortened form had been used by Hawkins '72 on a sample of students of a similar age and culture.

It was intended to use this instrument as a measure of general self esteem and its development over the period of the study. Admittedly many other factors would affect the student's self esteem over the period of the study other than experiences in the withdrawal group, nevertheless, it offered a background to more closely focused observations such as the interviews which were to follow.

The Brookover self concept of academic achievement scale was modified in order to gain a more specific self concept in the area of "design ability". This was defined to students simply as "the work you do in the design area". Whilst any modifications to such an instrument could potentially damage its reliability and hence value, the changes made in this case were minimal. Words such as "school ability" were changed to "design ability" and the students told to refer to the design course when asked to comment on grades and potential. Both the original and modified scales may be found in appendix (10).

The third dimension of the questionnaire was that of alienation. It was certainly true that many of the students selected for withdrawal were chosen because anti-social behaviour prevented their remaining in the mixed ability groups. Discussion with these students revealed a measure of alienation from school generally and a more complex pattern of specific areas within. It was decided to adopt the area of alienation as a further measure in the case studies in order to see how student's acceptance of school changed over the period of the case study.

Again, as an instrument the 9 item scale (Cohen '74)(21), was aimed at school as a whole rather than simply Design and so changes in pre/post test would not necessarily be attributable to the design course. This point is accepted, however its use enables a more holistic impression of the student's feelings which could then be probed more carefully at interview. The scale itself had been used with a very similar population of fourth year students in English schools and had been found to be acceptably reliable by
Cohen. One limitation was that the wording used was reasonably complex. Whilst that wording was left exactly as the original, problems were anticipated with the particular sample under study and this proved to be the case, as the student interviews following the post test revealed. This problem was first noticed on the pilot run but felt to be minimal.

Presentation of the questionnaire was in the form of a small booklet which can be found in appendix (10). As a task for the particular students under consideration it was longer than it should have been, however in both pilot and actual use this proved to be no limitation, all groups finished within 15 minutes without demonstrating any restless behaviour. It should be noted that two students, in one group, refused to answer the post test.

The intention was to use the questionnaire, as the groups formed, as a pre test and then, just over one term later, as a post test. The period of one term was long enough to minimise any pre/post test sensitization and yet not so long that natural maturation effects would greatly affect results, though clearly they could be anticipated to some degree.

A further limitation of this method was the fact that at pre test the students had just been formed into withdrawal groups. Clearly this must have had an effect on attitudes and self concepts though not necessarily in any consistent direction. The selection interviews carried out by staff showed that some students positively looked forward to joining the groups, some were more reserved, only one "fought" against it. A great deal has been written on "labelling" effects of withdrawal and streaming and its effects on self concept (Hargraves, Lacey, Barker Lunn), and yet the picture is complicated by the indications that the student's environment is also important. Work in America showed the self concept of ESN boys in special schools to be higher than may be expected (22). Whilst both sample and culture in this example are far removed from this case study it is reasonable to expect that mixed ability groups could have the effect of lowering self concept in some students by constantly confronting them with work of a higher standard than they could attain.

The dual effect of initial withdrawal shock and later self concept effects, due to environment and labelling, considerably complicated the issues involved. This was anticipated and yet it was felt that the use of these techniques had value as a part of the overall triangulation technique.
Questionnaire pilot run.

In order to pilot the questionnaire a similar school was chosen outside Loughborough. Whilst a group identical to the withdrawal groups could not be used, a metalwork option, which consisted mainly of lower ability and disaffected students, was identified as being closest to the sample.

The method used was to explain that I was a researcher looking into the way students felt about schools and aspects of work within them. They were not told they were a pilot group. The estimated time of 20 minutes was more than adequate for use, all students completing by 15 minutes. After the papers were collected the group was asked if it had any problems and a few sample questions tested verbally to ensure they had been understood.

Results.

Pilot group 13, all boys.

1. Alienation.

a. Students frequently used the "safe" middle response of number 3 out of 5 columns.

b. The style of writing was considered by students to be a little "strange"—but understandable on the whole.

c. Question B. "I feel I am really part of this school community". The majority interpreted this as the "school" but a number saw it as their peer group within the school. Students admitted that they would have responded differently and usually more negatively if they had meant the school as an institution.

d. Question F "I seldom feel lost or alone at this school." This question was misinterpreted by several students, due largely to the use of the negative term seldom.

Questions B and F had scores reversed in order to fit in with the positive or negative scale of the other questions. This was an intentional part of the design in order to prevent a student recognising a pattern of answers and using that knowledge to give socially acceptable answers.

This scale gave a maximum score of 45 = highly positive attitude.
minimum score of 9 = highly negative attitude.
mean score possible = 27
As can be seen only one student is below the mean possible score to any significant degree, with two others falling just below. The mean score was 29.07. No statistical tests of significance were used, in the context of the type of study and numbers in the sample it would have been of little or no value.

2. Self esteem.

a. No significant problems, though students reported great concentration needed to prevent accidentally responding in the wrong direction.

b. Scoring

- highest possible self esteem = 25.
- lowest possible self esteem = 0.
- average score from range = 12.5.
- average score attained = 14.61.
3 scores were significantly below the mean possible and 5 below mean score.

3. Self concept in design.

a. A simple scale to operate, however students did tend to go for the safe centre option.

b. The scores from the sheet are reversed, ie:

- highest self concept = 6.
- lowest self concept = 30.
- mean possible mark = 18.
- mean mark attained = 15.76

Only two marks were significantly below mean attained mark.

It was then possible to build a composite grid of the 3 scores for each of the 13 students. Again no statistical test of significance was used, however one can see a rough correlation between the scores.
Pilot summary.

Whilst there were a few questions in respect of the alienation scale the booklet was, on the whole, understood by similar students to the intended samples. It was decided to use the booklet as it stood.

E. STUDENT PROFILE.

The final perspective, within the overall triangulation, was gained by the use of a form of student profile built over the period of the study. It was appreciated that profiling is a very complex area in itself and is severely limited by questions of reliability, external validity and ethics. As a technique, nevertheless, it was felt to have value to this study in three main areas:

a. As a method of assessing how student attitudes, concepts and skills were developing.

b. Acting as a potential motivational factor which could be evaluated by observation and interview.

c. Providing feedback on course effectiveness.

It should be fully understood that the profile design used was not intended to be externally valid, its use was totally limited to the case study assessment. Time eventually allowed only a very simple, unsophisticated design

When considering any form of curriculum development it is important to "design in" systems for assessment and evaluation of both individuals and the course itself. All too often assessment is added on as an appendage.

Assessment is critical in that feedback is necessary at all times so that both the individual student and teacher may benefit. This is not necessarily always the case. If we consider the traditional 'O' level type course the majority of teachers use the syllabus as a work scheme and so there is no form of authoritative feedback except the final grade. These grades come too late for:

a. The student, who must rely on the skill and experience of the teacher for feedback during the course.
b. The teacher who has no way of knowing from the crude grade what aspects of the course require further emphasis for next year.

In many respects the CSE mode 3 offers far more feedback in that the teacher marks the work himself and it is then externally moderated. In this way the teacher has a clearer picture, particularly in design based subjects where the external moderator may actually come to the school and discuss work.

The major point here is that the traditional, examinations based, systems of assessment are summative, that is they paint a picture of one point in time, at the conclusion of the course. These summative assessments are designed for external use by employers and need to be reliable and externally valid.

Efficient assessment and feedback needs to be built into a course, in a formative manner, so that the student may discover what is expected of him, rapid feedback to both student and teacher may help diagnose and correct weaknesses.

Formative assessment is particularly important in a system such as operates in Leicestershire where secondary education is split, (one should also consider colleges of FE etc). Summative tests and references do little to help the teacher in diagnostic and counselling work. This limitation of the Leicestershire system is recognised and moves are being made within the Loughborough group of schools to introduce types of formative assessment.

Profiling, as a term covering a wide range of techniques, would appear to have developed from the limitations of the existing GCE and CSE systems, primarily that they cannot cope with a large section of the population, theoretically 40%. It should also be seen that traditional examinations concentrate on measuring the easily measurable, that is remembered facts and basic skills, manual and cognitive. M. Atkin (23) correctly said "Let us not assume that what we can presently measure necessarily represents our most important activity". This statement sums up the move in education towards developing and attempting to assess, other aspects, no less important for life in society today, such as attitudes (DES, curriculum 11-16) and personal and social skills in relation to working within a team or organisation. It is in areas such as these that conventional examinations simply cannot operate and some of the techniques of profiling offer hope.

We should beware, however, of using profiles to attempt to assess qualities
which students are not given the opportunity to exercise. A fairly common example of this may be "leadership qualities".

Whilst profiling techniques were initially developed for the lower ability range it is clear that a considerable degree of interest is being shown in extending their use to all students in order to gain a clearer picture in both formative and summative senses. As the Further education curriculum review and development unit put it (24) a profile can help differentiate between students who otherwise may "have had the same total but added up differently".

Before going into more detail as to possible approaches to profiling we should also consider some of the drawbacks. To some extent questions of reliability of report, from staff and students, the halo and hawthorne effects have been covered in the section on research methods. If we are to consider profiling on a wider basis we find 3 broad factors:

a. Ethics - assessing personal traits.

b. Reliability and validity.

c. Increased staff workload.

a. The first point was well illustrated in the DES document "Records of achievement at 16" (25) where it was reported that a proportion of staff in schools within the scheme refused to complete records as they felt unwilling to comment on personal qualities.

b. The second point depends on a great deal of time and coordination before any degree of reliability and validity can be assured. Within this work no attempt was made to ensure a valid profile as it was intended for use only within the study itself. To attempt to gain any degree of validity would have used a great deal of the available time, detracting from the central aims of this work.

c. The third point, of staff workload, requires serious consideration by those who intend to introduce profiling as a valid assessment technique. The Further education curriculum review and development unit (24 pp19) reports on using the youth training scheme profile but it should be noticed that they were operating with a staffing ratio of 1:8. The Schools' Council pamphlet 16 (26), reporting on the Swindon RPA scheme, commented on the problems of apathy met where tutorial groups were large. The pamphlet pointed out that good teachers were needed and with small groups, the
present economic climate does not hold hope for developments in this respect.

We might sum up the present feelings of many teachers on the limitations of profiling with a comment from the letters columns of the "Education Guardian" of 17.1.84.(27). T. Polan wrote "Whatever may be wrong with the system (CSE, GCE) it does know where to draw the line. It knows what is measurable. Above all, in assessment of personal and social skills, profiling should confine itself to that which is useful, relevant and legitimate."

Despite the limitations that have only been touched on above, it was felt that a form of profile had value, within the technique of triangulation, for this study. The position adopted was the profile was for internal use and by only the two teachers. Reliability was considered against the time and resources available but no attempt was made at ensuring any degree of external validity.

The technique adopted in compiling the profile was, after background reading, to discuss the situation with the two staff who would have to operate it and to arrive at a consensus for a relevant and workable system for the purposes intended.

Discussion centred around several models of profile, including some in use such as:- The Leicestershire Careers Service Summative SRI and 2s; the Charnwood Colleges T.V.E.I. assessment profile and the City and Guilds 365 attainment profile. After several meetings the following points were agreed:

a. The profile was to be filled in in the presence of, and in conjunction with, the student's own observations.

b. The areas examined were to be of diagnostic value rather than being employer orientated.

c. It should be easy for hard pressed staff to operate.

d. Students should easily be able to understand it.

e. There should be three sections:-

1. A personality grid.

2. A section for written comments on design skills.

4. A work record.
f. The aspects of personality (E1 above) considered should include:
   1. Attitudes to teachers, other students and work.
   2. Thinking skills.
   3. Self control.
   4. Safety.

   g. The section on design skills (E2 above) should include:
   1. Listening and understanding.
   2. Communicating ideas verbally.
   3. Communicating ideas graphically.
   4. Manipulative skills.

A conscious decision was made to put together a trial package on the above points in order to learn by experience. This was better than continuing the research into profiling, as the time needed for such work was detracting from the main aim of the case study.

The profile put forward for trial use can be seen in appendix (7). It was printed on a coloured card to give it a sense of importance and permanence to the student. It was decided by staff that it should be used every half term in a form of tutorial. Privacy was important and so cover was arranged for staff to give the tutorials at the appropriate times. The groups were such that staff felt they could not be left alone for any period of time and the students were unlikely to cooperate if asked to come during lunch times.

A simple grid, grading 12 aspects of the points mentioned in F (above) from "always" through "usually", "sometimes", "seldom" and "never", was used. It was felt that this offered less ambiguity than a 0-5 scale and was both more easy to use and more realistic than complex criterion referenced scales such as the City and Guilds 365.

The 12 aspects chosen were felt to be central to progress in design. A more comprehensive list would have caused an unacceptable work load.

The staff insisted on being able to offer comments on aspects of design skills (G above) despite the fact that this involved further work.

The third aspect, the work record, was intended to be filled in by the student, ideally at weekly intervals, or at least at the completion of each piece of work. The student would be encouraged to comment on how he felt the
work went for him, though he should not be forced to write if he showed resentment.

RESULTS.

The handling and presentation of data from a wide range of perspectives presents problems. The intention here is to give an initial view of each group; to develop this by looking at selected individuals within the groups; and then to use subjective techniques to extract the key factors from each group's log and juxtapose them. From this a list of 6 basic factors were extracted which were subsequently used as a matrix with which to compare and extract information of interest from each group.

Diagramatically this could be summed up as follows:

```
brief group ----> individuals
     ↓
     factors
     ↑
brief group ----> individuals
```

The comparative description will be based on "6 factors" gained by subjectively factoring down observation notes.

**Brief group description - group A.**

These notes are intended to paint a brief, overall view of the groups as they formed. Details will be added later, however it was felt important that the reader gained a quick, overall impression at this stage.

a. The teacher and intentions.

Group A was taken by the head of art, a female teacher, who had worked at Burleigh for a number of years and was known for a firm, no nonsense
approach to teaching. She had experience of various forms of learning difficulty both as a tutor and a subject teacher. Her speciality was art, primarily painting, drawing and printmaking.

Teacher A's intentions were to start with a fairly structured course, common to all the students in the group, from which it would be possible for individuals to experiment as they developed confidence. The initial approach was via specific techniques which it was hoped would give individuals quick and positive feedback, so raising self concept and improving attitude.

The options for a group base were limited to either a bay off an open area or a closed classroom. The closed classroom was the only room in the building which it was possible to isolate simply by closing the door. There were no internal windows. This room was chosen specifically in order to build a group base and identity. It was also more easy to isolate potentially disruptive students within that room, so improving the atmosphere in the open areas. Other groups did use the room, so that it was not possible to make it as personal as it had been hoped, though the intention was to establish a base that offered students a sense of security and belonging. It was very noticeable that only the sixth form at Burleigh have a base as such, even tutor rooms were only available at tutor times and storage was via lockers in the main corridors, on the whole.

b. Selection.

The procedure described earlier was followed. A number of individuals were identified as in need of withdrawal, though for different reasons. The situation was somewhat complicated by the fact that some were being withdrawn for behavioural reasons and it was particularly necessary to prevent certain students meeting in the withdrawal group, or any other. This need to separate caused some logistical problems which were not solved without considerable difficulty, as we shall see.

The group selected consisted of three girls with general behavioural and attitude problems of an anti-social / extrovert type, one of whom was also suffering from serious emotional difficulties; one boy with coordination difficulties and another boy with a neurotic / withdrawing type problem. Each case will be described in detail later.

The composition of the group was, therefore, fairly mixed. It had not been possible to select any one type of difficulty to concentrate on due to the
relatively small numbers. There were others in the mixed ability groups who would have benefitted from withdrawal but could not be due to potential personality clashes or undesirable groupings. This was unfortunate as the only options remaining were to try moving students around the mixed ability groups or hoping that the removal of one element from a group, to the withdrawal group, may minimise the difficulties that interaction had caused.

c. Initial formation.

The group was scheduled to form after the first half term. Complications were caused by the fact that the teacher was ill for the first lesson and so other staff were substituted, using material prepared by teacher A beforehand. I was present, and by then, known to the students.

Only one student arrived on time, this was David who was withdrawn and had fairly severe emotional problems. Other members of the group were not to be found in the building. Eventually, 30 minutes late, 5 girls arrived of whom only 3 should have been present. They explained, in an aggressive manner, that they had been to see the school counsellor as they had no intention of being "split up". It should be noted that these students had not come from the same group, they were an outside friendship group which was trying to force entry into the withdrawal group as a whole. Of course the two extra girls were ones that it had been decided must be kept apart from the other three.

The group of five was quite defiant that they were not to be split up and so they were allowed to stay together for the remainder of the lesson and the problem was passed onto the vice principal level. It was felt better to keep them together for that time rather than have them rushing off as they had promised to do.

Tim, the other boy who should have been present, was absent that day.

The set exercise proceeded reasonably well, the girls worked satisfactorily, probably as they had got their way that lesson!

Towards the end of the lesson, the questionnaire booklet was issued and explained, All filled it in except Ellen who refused, claiming that she was concentrating on her drawing. Attempts at persuasion only met with an
increasingly curt rejection. As I did not want to spoil my relationship as a non authoritarian observer Ellen was left to continue.

Clearly this initial meeting had been something of a problem. The main factor was the willingness of individual students to challenge the authority of the school. Tim, it transpired, had simply got up and left the school. The embarrassment of the withdrawal had been too much for him. With the girls, peer group dynamics and pressure far outweighed anything the school could threaten them with.

d. Subsequent development.

Over the next three to four weeks a stable group was built up. This was a slow process, only David would turn up on time. Even when there David would sit in total silence and do nothing if he received less than 100% teacher attention. On several occasions other individuals simply turned up with a group member "to join the group", without any recourse to staff at all. All these intrusions were handled diplomatically by teacher A. The other boy, Tim, eventually arrived in week two, physically escorted by a member of staff as he had refused to come willingly. It is interesting to note that this particular student achieved great success within the group over the next term.

By week 5 a small group of 5 students had settled down and was making progress with the exception of David. Lateness amongst the 3 girls was a problem, due primarily to the fact that each lesson was preceded by either lunch or a break during which they met up with friends and chatted long after the bell. The usual pastoral channels were employed to try to reduce this problem, with conspicuous lack of success. The two boys, being very introverted, seemed to lack close friends and usually turned up on time. It is interesting to note that whilst the student's respect for teacher A undoubtedly grew over the period of the study their distain for authority remained as high as ever. This fact was demonstrated by frequent suspensions for behavioural problems, though these were never in design.Whilst behaviour in design was, on the whole good, members of the group were well known for disruptive behaviour outside and even demonstrated their distain to the school governors!

This brief summary of the conditions at initial formation will be developed next for individuals, however, at this time a few points should be made.
1. In establishing the group more time was needed in discussion and tutoring to help the students accept membership and on specific terms. This was particularly important when dealing with students who have considerable emotional and attitude problems.

2. It may have helped to introduce the group more gently, perhaps by taking them out of their original groups during lessons for short periods for, perhaps two weeks before, to enable acceptance to be reached. It is clearly unrealistic to expect many of these students to simply accept instructions from staff if these clash with their own wishes, they do not accept the traditional subservient role of the student.

3. One should not underestimate the difficulties here. These students have to be handled very much on an individual basis. The emotional difficulties present may be severe, and so skillful and patient tutoring is necessary. There is no room here for direct confrontation.

Brief description - Group B.

a. The teacher and intentions.

Group B was taken by the head of technical drawing, who also taught 3D design. A man in his mid 30's, he was an experienced teacher who had worked at Burleigh for many years and was regarded as "approachable and friendly, but firm when necessary" (from one student on interview).

Again teacher B had experience of students with learning difficulties via teaching, tutoring, and involvement in a scheme for disaffected students on the school's "alternative curriculum".

The intention was similar to group A, to start with a common, structured element and slowly to introduce degrees of freedom. The opening work was based around a photography project, though it was intended that individuals should eventually follow a craft orientated course within the 3D area.

The group base was a workshop off the main 3D open area. It was possible to close a door to achieve a degree of isolation, however:

a. There were internal windows into the open area.
b. There were facilities within the room that were needed by people in the open area, so traffic was always present.

c. The facilities in the room were limited, so the students needed to move into the open area frequently.

It was recognised by teacher B that a home base with a sense of identity and security was important for the group. In this case it was far more difficult to achieve than with group A. Plans are being made, on the basis of this year's experience, to achieve a greater degree of independence for the group without actually making students feel segregated.

It is true to say that group B, with its more open working area suffered a greater degree of behavioural difficulty than group A, within the design lessons. Whilst one could not say with certainty that this was due to the openness rather than to individual personalities, certainly opportunities were there for students to "disappear" or relate to students in the open areas. Within this house group it was necessary for a far greater degree of mutual support between the withdrawal teacher and the two 3D teachers in the open area.

b. Selection.

An identical procedure was adopted to group A. Within this house group it was felt, by all staff, that there was a far larger proportion of students with attitude based learning difficulties, though detailed investigation would be needed to establish the underlying causes. There were no students, it was felt, who needed withdrawal on specific learning difficulty grounds such as slow learners, those present appeared to be managing reasonably well within their own particular mixed ability groups and it was felt that they would gain more by remaining than they could in the withdrawal groups.

Initially a group, of 6 were identified, all of whom were disaffected and had been disruptive in various ways. It was felt that withdrawal in their cases was necessary both:

a. To give these students a more suitable environment in which to develop as individuals.
b. To relieve the pressure on the mixed ability groups and enable more effective teaching there.

It was noticeable that all of these 6 were boys. It is difficult to say to what degree this was due to the withdrawal teacher's criteria on selection; the sample of students suggested by specialist teachers; or the fact that teacher B intended to work in the 3D area following a basic craft course. It should be remembered that these students came from high schools which had been single sex initially. Facilities and opportunities for work in 3D had been minimal in the girls school and it is reasonable to assume that girls at the upper school tended to have a lower degree of identification with 3D areas than art or fabric.

It was intended that the small initial group may well expand over the following term. There were a number of students who remained in the mixed ability groups that had been considered for withdrawal primarily due to anti-social behaviour and general attitude, but who, it was felt, should be given a further opportunity to develop within their original groups.

It was interesting to note that teacher B's course would be non-exam only. Teacher A was able to enter her students for an art CSE (not the Burleigh mode 3 or 16+), because the type of work being undertaken could be entered for this very flexible examination.

Two weeks into the new course 2 girls joined from a fabrics design group after a considerable degree of pressure from them upon the head of design. They were very determined to leave fabric as they resented the design approach and wanted to join a ceramics group. This was impossible due to numbers and so eventually they joined the withdrawal group after prolonged discussion with staff.

Again this illustrates the intensity of feeling and determination many students have when faced by situations with which they disagree. The emphasis placed on negotiation with students in tutoring at Burleigh gives the student a degree of independence and yet there needs to be debate on the issue of a students level of maturity in making these decisions against staff advice. The two girls involved in this particular case were intelligent, and perfectly capable of 'O' level passes at 16+ in fabric design, if they had applied themselves. Were the teachers involved correct
in accepting the students wishes in this case? One should beware associating educational worth simply with examination passes, however, some interesting questions have been raised by this which will be covered in greater detail in the summary.

c. Initial formation.

The group formed on the first lesson after half term. It was necessary to actually go and get 3 students from their old groups despite their having been briefed as to arrangements. The students claimed to have forgotten and this may well be true, but one cannot be sure that they were trying to avoid joining the group or simply being awkward. Certainly in the individual interviews between teacher B and the students, prior to formation, all prospective members of the group had actively expressed a wish to join the group.

5 students were present at the first lesson, Spencer being absent, (he had a very poor attendance record). This lesson began by teacher B introducing the SLR camera to the group for 10 minutes, by a talk illustrated by a single camera for demonstration. The group were then taken outside for 20 minutes, where each student had the opportunity to take several frames. The group then returned to process the film.

Behaviour in this first lesson was poor. The group was slow in being brought together and the students were not "captured" by the project or its presentation. As a project it did not fully involve all the students, all of the time, there were many "dead moments" while waiting for the camera or for the chemical processes of development. These moments represented opportunities for behaviour such as pushing, interfering with others and "loud" comments. In short, behaviour intended to be disruptive and establish the boundaries of behaviour that were to be allowed in the group.

Towards the end of the first lesson, after numerous attempts by teacher B to demand better behaviour, a group "pep talk" was given. This was clearly not a satisfactory start. Several factors could be identified:

a. The difficulty in getting students together initially, generated unrest, this needs to be far smoother, opening with a crisp, business like atmosphere.

b. The project choice and the dead time within it.
c. Unlike group A the individuals in group B had already formed relationships in their original groups. Spencer, Phedell and Dean had come from the ceramics group; Kevin and Leigh from the textiles group. This was not the case in group A. Kevin and Leigh particularly interacted in a manner which was disruptive. As we shall see later the absence of Kevin brought much improved behaviour in Leigh, enabling him to progress.

d. Subsequent development.

At the second lesson all students were present, though there was no urgency to get to the lesson. The sixth member, Spencer, arrived. Teacher B was absent but had left some sketching exercises for the group to work at with a relief teacher. Again the lesson did not go well. The group did not relate to the task and frequently made excuses to move about, causing as much disruption as possible as they did so. Several warnings were necessary from the relief teacher, particularly for Kevin who constantly interfered with machinery in a dangerous manner. It was necessary to call the duty vice principal to remove Grant whose uncooperative and awkward attitude became far too disruptive.

This second lesson again illustrated the problems of project work to which students fail to relate. The absence of the group teacher lost opportunities to capture interest and build the vital student/teacher relationship.

The third lesson was introduced by teacher B with a specific project idea, a turned wooden box involving the use of lathes. The short talk was illustrated with practical examples and talk of the possibilities for variety in the technique, relating to student interests and needs. This did generate some interest, though Phedell proclaimed loudly that he was not interested. Grant pointed out that he could not afford the cost of materials. Some scrap wood, suitable for the technique, was found for Grant's use later.

This project offered some success. The students worked in pairs, due to the limitations of machinery, and some positive progress was made. Constant staff attention was necessary, particularly for Kevin and Leigh who frequently became bored and would turn to dangerous behaviour with machines, if left for any length of time.
As a project, using the specific techniques it did, it was successful in that positive results were obtained easily so enhancing student self-image and identification with the topic. It was possible to use scrap materials, such as damaged school desks, to minimise problems of cost, though one has to be careful here as some students appreciate and value an item more if they have to pay! This is evidenced by comments from some students as they discussed finished projects with the teacher after completion.

By week 4 the initial settling in period appeared to be over, a relatively stable group of 8, including the girls from the fabric group, though Spencer and Grant were frequently absent. Whilst the group was getting more involved in a number of projects it was noticeable that Phedell, Kevin and Leigh would only work under the most direct supervision, otherwise there was a danger of them wandering off into the open areas where staff complained of interference with other students. These three students appeared to be immune to staff admonishments.

Factors from the two brief descriptions.

The notes above were intended to briefly summarise the picture after initial formation. A clearer picture will emerge as the more specific aspects of the study progress, however at this point it would be advantageous to pull together a number of observations.

1. The selection criteria adopted by the two teachers were different, though to some degree these criteria were modified by the situation within each house group, each of which had established a different character.

Group A contained a wider range of learning difficulty types than group B which had concentrated on the problems of disaffected students. Group A prevented friendship groups moving into the withdrawal group. Group B allowed three friendship groups to enter.

Whilst it is difficult to generalise, it would appear that care needs to be taken in examining the nature of friendship groups in situations such as this.

2. The importance of a long period of tutoring students into acceptance of group change was seen. Resentment can easily be caused and its effects
prevent progress for individuals, or the group, until it had been slowly removed.

3. The initial structured courses did not work for either teacher, both abandoned their plans after one week and hurried into getting students onto individual projects. In future this needs to be recognised and selection of project directions could become a part of the initial tutoring before the student actually joins the group. In this way students could start with a more positive aim.

4. If structured work is done it needs to have a crisper start in the way the group is formed and the project itself needs to be worked through and its limitations spotted. The prime example from the studies being dead time.

5. It needs to be appreciated how difficult some of these students can be. Small group sizes and experienced teachers must be used, with a clear understanding of departmental backing available. It also needs to be emphasised how individual the case study students were, staff simply cannot make the mistake of responding to a hypothetical "average" student, a thorough knowledge of each individual is essential.

6. The degree of openness in the working environment would appear to be an important factor. Behaviour and learning were better in group A than group B with its more open style. It is also interesting to note that whilst the behaviour of students in group A was, on the whole, good, it was not carried over to other lessons or break times. There was as much potential disruption in group A, the situation was different.

Group B had opportunities for moving beyond staff control and these opportunities usually led to some form of incident. It would be far better if staff had more control of when an individual had need to move outside the group base. In that way opportunities are created for managing a programme to increase maturity as the event is specifically task orientated as opposed to student initiated work avoidance, or seeking social activity.

7. The importance of staff contact for students, not simply as a supplier of knowledge, but as a social model for attitudes, etc, needs to be appreciated. In many cases when a student asked advice or drew attention by poor behaviour, it was, in fact, a need for contact and reassurance.
8. The possibility of examination qualifications is desirable as an additional motivational factor in the teacher's armoury. The majority of these students claimed not to be interested in qualifications in design and one may accept this, however in some students the possibility may help.

9. A particularly complex topic is the degree to which teachers should go in accepting student wishes if these wishes conflict with the teacher's perceived long term interests for the student. The answer can only be given on an individual basis after thorough tutoring with all interested parties; the student; the teacher; the group tutor / house head and the parents. At present decisions are being made without necessarily using such thorough tutoring due largely to student pressure and staff workload.

**INDIVIDUALS.**

This section will be dealt with by choosing a number of students from each group as representative in terms of ability and attitude. Each student will be examined in terms of a standard matrix as follows:

1. Pen picture.
2. Questionnaire. Pre/post test on alienation, self esteem and self concept in design.
3. Fourth year review as at week 6 of term one.
4. Profile.
5. Interview.
6. Any relevant specific observations covering development.

**Group A.**

**Vicki.**

a. **Pen picture.**

Vicki presented two images to the world. To those who knew her and she accepted, she was a cheerful and highly communicative person, however she could suddenly become most obstructive and then no amount of reasoning would change her feelings when in such a mood. Those who did not know her often
reacted against her obstructive side and found she would not concede an inch, as witnessed by two performances in front of the school governor's disciplinary committee. She had, therefore, a reputation as a disaffected and potentially disruptive student.

Frequent absences, often for long periods and supported by her father, made Vicki's progress at school very poor, which was unfortunate as the case study observations indicated she had potential and had produced some interesting work.

b. Questionnaire.

Note. Vicki refused to complete the post test. Several attempts, over a period of weeks were made but her attitude only hardened. This, in itself, tells us a great deal about Vicki, as indicated above. There was no evidence of this side of her character improving over the period of the study.

1. Alienation.

Pre test 19, mid range score 27. A significantly negative attitude to school. Although there was no post test, observation and discussion revealed no improvement in attitude to school. Frequent absences demonstrated her alienation together with her reaction against authority such as the governors.

2. Self esteem.

Pre test 13, mid range score 12.5. An average self esteem, no evidence of any significant development.

3. Self concept in design.

Pre test 19, mid range score 18. Note that the reversal of the score value means a slightly negative self concept but not significantly so.

c. Fourth year review.

English - Poor attendance makes comment difficult. No contributions in class, doesn't want to know. Very withdrawn.
Maths - Frequent absences, large amount of work outstanding.

Design - Attendance 4/12, difficult to comment.

Social studies - Aggressive if any aspect of her behaviour is challenged. Several referrals to duty vice principal.

Food - When she comes she works quite well and shows enthusiasm.

Geography and Biology - no comment due to absence.

d. Profile.

Never used with Vicki due to absence.

e. Interview and development notes.

Vicki refused a formal interview away from her peer group. These notes are based on a series of informal contacts with her in class over the period of the study. Absences were frequent and often continued for long periods and so it was difficult to make any clear conclusions on development.

Vicki found the work in group A "alright", which could be interpreted as more enjoyable than elsewhere, but not so interesting that she was "captured". Vicki tended to go absent for whole days and so it was difficult to use this as evidence of what areas of the curriculum she was avoiding, unlike Spencer in group B, who would miss most lessons except design once he had become interested.

During the case study several long conversations were held around the group table when Vicki would be most forthcoming on a number of aspects and it was noticeable how her relationship with teacher A allowed this. These conversations also made it clear that Vicki usually met with a large degree of negative feedback from other teachers, those with normal sized classes, who did not have the time to develop a relationship. Vicki did gain some positive feedback in group A, however it was insufficient to encourage a more regular attendance which in turn may have developed a more positive feedback in other areas. The result was the continuation of her absences.
Whilst the above notes indicate absence may be due to a failure of the school to interest Vicki we should not forget the pressures at home that were pulling her away from school, certainly her father was more than willing to support her absence and may well have suggested it. Vicki did a great deal of house work at home.

Ellen.

a. Pen picture.

Ellen was a disturbed student who had been rejected by her parents. She was in care and hated it, running away from the home on a number of occasions. Her general front to the world was aggressive and she was involved in a number of unpleasant situations, often terrifying other students.

Despite this side of her character Ellen had potential and did some very good work for teacher A, although for a long time she could not bring herself to admit it let alone look pleased.

It took a long time to be accepted by Ellen and even then she would be abrupt; the questionnaire, profile and interview were very positively refused. The reasons given were that they were not interesting but it was probably that she associated this type of work with the social workers and the unhappy side of her life.

b. Questionnaire.

Refused pre and post test.

c. Fourth year review.

English - No real problems, reads well, holds her own in discussion, written work has faults but not too bad. Never seems very happy, but usually gets on with her work.

Maths - No report available.
Design - Work OK but she finds it boring.

Social studies - Ellen could follow a CSE course but her behaviour is such that this could not be considered, a constant source of disruption.

Pottery - Behaviour improved considerably. Ellen's efforts have been worthwhile, some constructional difficulties but she has started again at her own request.

Dance - Disturbing, disruptive behaviour and manner, removal imperative. Threats and bullying other students cannot be tolerated.

Note that the reports indicate ability in several areas but that this ability is usually overshadowed by behavioural problems.

d. Profile.

Not done.

e. Development notes.

Ellen was very slow to accept people, her initial sullen reaction must have been an important factor in teacher expectations of her. Ellen could not express any feeling for people by conventional means, she could only do it by aggressive, physical means, even if the feeling was one of affection. Ellen needed to be understood and loved but the only modes of communication she was capable of were aggressive. Despite the "physical assaults" we could see that Ellen was at least making progress with some members of staff in that she had come out of her sullen phase and was trying to communicate.

Ellen produced some good pieces of work in the group. At first she could not accept any praise at all, even in fairly private situations, however over the period of the study she definitely improved in this respect. In fact towards the end she was even seen to smile on receiving praise and was able to admit that she enjoyed some pieces of work.

Ellen became very angry with herself whenever she made a mistake and yet because she demanded a great degree of independence this would happen fairly
frequently. Her anger, unfortunately, whilst directed at herself, could have effects on others and be disruptive.

One particularly worrying aspect of Ellen's personality was her fantasising. Her stories at times were frankly hair-raising, however on two occasions she told stories that teacher A and myself knew to be untrue and yet could have caused trouble to others. It is a recommendation of this study, that staff log incidences such as this so that this aspect of a student's character is recorded in case it causes a difficult situation in the future.

Despite the above point Ellen made considerable progress within the group, eventually even receiving a commission for art work for the cover of a pamphlet for the school "Tutor Mother Scheme". Her self confidence was undoubtedly improving.

Whilst Ellen's development within the group was positive there were frequent incidences of disruptive behaviour, threats and violence outside the group. There was no indication of any improvement in this respect over the period of the study.

Tim.

a. Pen picture.

Tim was an interesting member of the group. Within most of his other lessons he was constantly in trouble for silly pranks, though it was fairly clear that he was being led by others who remained in the background. Once he was removed from these influences, into the withdrawal group, Tim became an introverted, quiet individual who worked very slowly without saying much at all. Over the period of the study he made great progress within the group in terms of personal confidence and design skills, however elsewhere in the curriculum the situation was much the same as before.

b. Questionnaire.

Note no pre-test done due to absence.

1. Alienation.

Post test 27, mid range score 27. There was no evidence at any point in the
study to indicate any degree of alienation. His deliberate absence in the first two weeks of withdrawal was due to an emotional reaction to that specific situation rather than school in general.

2. Self esteem.

Post test 12, mid range score 12.5. An average score. Whilst no pretest was done it is probable that his self esteem at that time was lower. Certainly within the specific environment of the group there was ample evidence for an improvement in self esteem, particularly his increasing confidence in entering discussion with others. It is arguable as to the degree that this was transferred to his dealings with everyday life.

3. Self concept in design.

Post test 18, mid range score 18. An average score, Tim answered all questions with the middle option, playing safe.

c. Fourth year review summary.

English - Easily distracted and finds it difficult to work with others around. Reasonable behaviour but needs to become determined to take responsibility for his own progress. Supplimentary education being organized.

Maths - Fights with particular students. Problems with legibility of work, writing seems uncoordinated. Very low score on tests but not incapable.

Design - Experiencing problems with the practical work.

Woodwork - Nice lad but works painfully slowly, can't keep up with the majority but will get some valuable experience from the course.

Home science - Talks too much at the expense of his work.

History - One piece of work badly done, others very late.

d. Profile.

On the scaled items Tim felt there had been little or no development over
the period of the study, he made no comment in the section on skills and teacher A did not fill it in. He did enter his own comments on the work record card, in this case his sense of achievement probably overcame his lack of confidence. It was noticeable that the personal attention and individual work rate that the withdrawal group was able to offer enabled Tim to achieve his first successes in an artistic sense. This positive feedback was probably primarily responsible for Tim's development within the group.

e. Interview.

Tim admitted to finding the transition from the high to upper school very difficult, self confidence came only very slowly. He confirmed the observation conclusions that he resented being moved into the withdrawal group and yet that he was very much happier after one term. Particular aspects of group A's work mentioned included freedom of choice and the fact that he was not rushed to keep up with others. It should be noted, however, that whilst he considered freedom of choice important he very rarely used it, preferring to seek staff suggestions which demonstrated his lack of confidence. Tim pointed out that he considered it very important to finish projects carefully and in his own time rather than being rushed.

Tim was not as open in the interview as he had been within the group, whilst his self confidence had undoubtedly improved he still remained a withdrawn student.

f. Development points.

The observations and interview notes indicate that Tim had had great difficulty settling into the upper school and found the pace of work demanded by staff, in the mixed ability groups, far too fast. As has been noted previously, staff at the school were not necessarily matching mixed ability grouping with mixed ability teaching. Once Tim had accepted withdrawal the more individual environment was far more suited to him and progress was made. Certainly, in the case of a sensitive person such as Tim, the handling of withdrawal needs review, but he appeared to recover within a term and make more progress than it would be reasonable to assume he would have done in a mixed ability group.

The arrangement of tables in the withdrawal room, a central group of four together with several singles around the walls, encouraged a situation where
staff and students could talk freely whilst continuing to work, or individual students could find a degree of privacy by working at a side table. Initially Tim always sat at one of the outer tables and worked in silence. Over a period of time he joined the main group at the centre table and started to join the conversations. As his confidence grew it was noticeable that he would start to discuss his work with staff, looking forward and actively seeking opinions rather than passively accepting comment. His bringing in a tee shirt to do some screen printing demonstrated his growing interest and responsibility as he had had to do some active searching in order to find the correct type.

Despite the undoubted improvement in design the picture outside failed to develop to the same degree. Tim continued to be in trouble for disrupting other lessons and was suspended on one occasion, about one term into the withdrawal. The degree to which success, in one area of the curriculum, can help develop an individual's work elsewhere, would appear to be limited. Tim was being failed by a curriculum and staff who were too stretched or lacked the sensitivity to be able to cope with his highly individual needs.

Group B.

1. Phedell.

a. Pen picture.

An extrovert with a very low attention span. He needs a constantly high level of social interaction, particularly with girls. This is done in a very loud and sometimes physical manner which is not always appreciated by the recipient. A large individual and strongly built he frequently uses physical contact in his dealings with other students, usually by play fighting. Of West Indian descent, in a school with very few West Indians, Phedell stands out both physically and by virtue of his actions. He complains of being frequently blamed for incidents which he did not cause, which in some ways is probably true due to his high profile. He has a jovial manner with all. It is very difficult to make him be serious or accept constructive criticism. Likeable but can irritate both staff and students.

b. Questionnaire.

1. Alienation.

Pretest 32, post test 29, mid range 27. Indicates a slight deterioration
though the interview revealed confusion on question B, the real score on post test may be closer to 30. The degree of movement was not significant and the score shows a reasonable degree of identification with school.

2. Self esteem.

Pre test 13, post test 13, mid range 12.5. No change and score very close to mid range.

3. Self concept in design.

Pre test 18, post test 12, mid range 18. Note reversed score indicates a large swing upwards in self concept, however Phedell was in a very “high” mood when post tested. This result cannot be considered reliable. Observation indicates a self concept of design ability in excess of true ability.

4. Fourth year review summary.

English - Weak, only just to CSE standard, pleasant but can get noisy and argumentative.

Maths - Supplimentary maths for two periods per week, can work well if he tries, but does not settle down.

Design - (ceramics) Standard of work low, drawings not being done. Has lost interest and lacks effort, not disruptive.

PE - Blows hot and cold, frequently fails to bring kit, can be rude.

Geography - Pleasant but difficulty in settling down or staying quiet. Constant demands for attention.

Physics - Generally poor application.

d. Profile.

It is very difficult to have a serious discussion with Phedell. He is honest in his self image most of the time. There was little movement in his scaled items over the period of the study, though discussion did make him think a little about his projected image.
Phedell admits to having a small attention span when listening to instructions so he often misses aspects rather than not understanding them. He can communicate his own ideas reasonably well, though no significant development was noticed. He admits to poor graphical skills and a resistance to developing them, no progress made at all here. In manipulative skills Phedell did learn several new techniques and started to demand higher standards of himself, though his low attention span limited progress.

Phedell was very resistant to filling in the self report section on work done. When he was persuaded he reacted by being silly, probably to mask his own inadequacy in this respect. This area was not pushed as to do so may have been counterproductive.

e. Interview.

Phedell saw the profile as a "waste of time" but admitted that it was interesting to see how aspects were developing. He admitted disliking talking to staff in a one to one manner. His original course, ceramics, was not a success, largely due to negative feedback, though he got on with the teacher.

He claimed he had difficulty relating to many teachers saying that they tended to be "two faced" in that while they accepted him most of the time, they sometimes reacted strongly. This is to be expected with Phedell's personality, most staff can accept his extrovert, cheerful manner up to a point and when under pressure may react suddenly. Phedell could not recognise this point or his part in it.

Phedell was enjoying the withdrawal group, pointing out the practical orientation and the lack of pressure to draw. He saw teacher B as easy to get on with but a person who knew where to draw the line, though Phedell was constantly engaged in trying to move that line.

Phedell saw the small group and his belonging as important, he felt accepted by the members of the group and he appreciated the increased staff attention.
Examinations did not interest Phedell at all, and yet he wanted to work as an electrician or mechanic and knew that these needed qualifications. He appeared to be unable to make a connection between lack of qualifications and future employment.

f. Observations and development.

There was little positive evidence for any development in terms of the questionnaire, especially when one considers Phedell's mood that day. In terms of observed behaviour it was clear that once he had become interested in a project he would make progress in a series of short bursts interspersed by long periods of intense social interaction that would only be ended by staff assistance with the project. Phedell rarely remembered techniques taught. This may have been simply the need to have staff contact or his poor attention span preventing meaningful learning of anything but the simplest techniques. Once a project was finished, even if successful Phedell resisted starting new work for as long as possible, consuming a great deal of staff time in the process.

Whilst it could be safely hypothesised that Phedell would have done even less work in the mixed ability groups primarily due to restricted staff time, it is also true that he achieved relatively little from the opportunities offered during the period of the case studies.

2. Spencer.

a. Pen picture.

A reasonably intelligent student who uses an aggressive "skinhead" style of dress and manner to establish a respected position within the local teenage sub culture. Once it was possible to get to know him he was revealed as a sensitive and intelligent person who had some very astute observations on school life. He preferred direct action rather than preliminary thought.

b. Questionnaire.

1. Alienation.

Pre test 25, post test 30, mid range 27. This demonstrates that from an
initially slightly negative attitude to school there was a small but positive improvement. Certainly his attitude within design, by observation, developed considerably during the period of the study.

2. Self esteem.

Pre test 20, post test 20, mid range 12.5. The highest self esteem in the group, it reflects his position within the student sub culture.

3. Self concept in design.

Pre test 16, post test 15, mid range 18 - note reversed values. Little movement, though that in a positive direction. A fairly accurate self picture.

c. Fourth year review.

English - Good orally, intelligent but his attitude is holding him back. Very slow to produce written work.

Maths - Only one homework done, behaviour satisfactory but tends to be lazy.

Design - (ceramics) Slow progress, he has lost interest, behaviour good.

Social studies - Capable of much more application. Work does not reflect his abilities. Cooperative in class.

Technical drawing - He has worked with enthusiasm, gets down quietly and effectively. No kit in school and homework a problem.

Metalwork - Hits walls! - egged on by others into unruly behaviour.

The reader should note the changed attitude to work in technical drawing. This effect is interesting, the initial interviews indicated a positive attitude to technical drawing amongst all students who took it, including those with various learning difficulties. The reasons given, or inferred, on interview fell into two areas.

a. The vocational appeal.

b. The fact that a few simple, mechanical rules, put together give easy positive feedback.
The technical drawing staff were mentioned as being "good teachers", however this was outweighed by the above factors.

These points have relevance for project choice within the case study groups and the core design course as a whole, though one should beware of assuming that because certain work is enjoyed it has educational value above other topics.

d. **Profile.**

Only used once with Spencer due to absences at appropriate times. A fairly realistic view of himself and his abilities. Admits to easily being confused by technical terms.

e. **Interview.**

Spencer felt profiles were useful but said he would not be prepared to talk to teachers about the aspects listed. An outsider or counsellor was possible.

Spencer does not like coming to school and has frequent absences from most subject areas except design. He did abscond from the initial M.A.G. design groups and for the first few weeks of the withdrawal group on occasions, however, he soon realised he enjoyed the craft orientation and now attends regularly.

It was pointed out that textile work was interesting - especially when screen printing onto tee shirts. The aspect here is of direct relevance to Spencer's teenage culture and is, therefore, of great motivational value. He claimed to like all aspects of the withdrawal group, the work, the staff, group size and composition. He claimed that the fact that the course is non-exam did not concern him, he had no future plans at all.

f. **Observation and development.**

The most interesting aspect in Spencer's case is that he is reasonably intelligent and highly selective in what he is prepared to do. For him work has to be a case of direct action rather than design and of personal
interest rather than simply craft work. Spencer's degree of identification
with school, on the alienation scale, rose five points from below the mean
score possible to a positive value. It is difficult to say to what degree he,
interpreted "school" as design, as he took the test in a design lesson, and
the interview indicated his attitude in other subject areas had changed
little ( technical drawing stable ). Spencer's self esteem stayed a high
positive value of 20 and there was a very small increase in self concept in
design.

During the period of the study Spencer's attitude and work in design rose
steadily from a low level on joining the group to a higher level and then
stayed consistently high. His appearance grew even more anti establishement,
though in conversation he was most polite. It could be concluded that whilst
Spencer enjoyed the work in group B and his
attitude within it was good, there seems to have been little benefit back to
the wider curriculum.


a. Pen picture - Kevin posed a problem in his continual insistance on
interferring with machinery, even when being operated by others. Frequent
warnings, even on a formal level, had no affect whatsoever, he appeared to be
unable to control himself. Kevin tended to form a friendship group with
Leigh, Kevin being the leader. He was slightly extroverted and very
restless, unable to be still or silent for more than, literally, seconds.
His behaviour sometimes annoyed other students.

b. Questionnaire.

1. Alienation.

Pre test 29, post test 27, mid range 27. A reasonable attitude to school,
there was a small but not significant downwards move over the period of the
study.

2. Self esteem.

Pre test 19, post test 19, mid range 12.5. Well above the mid range, he had
a positive self esteem, though it did not improve over the period of the
study. A leader within his own small peer group.
3. **Self concept in design.**

Pretest 17, post test 17, mid range 18. Note the scores indicate a self concept slightly above mid range, which is a little unrealistic as Kevin's design ability is certainly low. No movement over the period of the study.

c. **Fourth year review.**

Maths - Behaviour very variable; language bad; doesn't seem to know any better; very easily bored or frustrated.

English - unsettled at first; lacks confidence; very demanding; settling down and starting to concentrate.

Design - Behaviour very poor; needs an impossible amount of attention.

Science - Behavioural problems, disruptive at times; has to be carefully supervised in practical situations.

Modular Course - needs a lot of support.

The point on safety in science should be noted.

d. **Profile.**

First assessment not done due to absences. Had a rather more positive view of himself on all scaled points than staff felt.

e. **Interview.**

Kevin surprised me at the final interview because of the level of intelligence his answers displayed - far higher than anticipated or indicated by other observations. This may be a case of teacher expectations based on, in this case, behaviour or similarly a halo affect. Kevin found any design work boring but claimed to like craftwork as it was more active. He liked working with teacher B and the group because of the greater degree of freedom of project work and increased staff attention when necessary.

f. **Observation and development.**

It should be noted that whilst he claimed he preferred extra staff attention
he would frequently disappear into various parts of the building in order to gain the level of excitement he obviously needed continuously. Little indication of any improvement in attitudes or behaviour in either observations or questionnaires. His hyperactive manner hardened staff attitudes to him, which in many respects may have become self fulfilling due to their strength. His performance on the final interview was certainly a surprise.

**Leigh.**

a. **Pen Picture.**

A quiet but very open and cheerful student very much in the shadow of Kevin. Frequently involved in silly or dangerous behaviour, though when Kevin was absent there was a very clear improvement. Leigh likes to get on and is frustrated by any delay such as "designing."

b. **Questionnaire.**

1. **Alienation** - Pretest 28, post test 31, mid range 27. This shows a reasonable increase in identification with school, although even initially it was good. Examination of the score showed that Leigh scores lowest in the "inability to influence" section.

2. **Self esteem** - Pre test 17, post test 17, mid range 12.5. No development.

3. **Selfconcept in design** - Pre test 17, post test 16, mid range 18. Reverse score values, so he sees himself as slightly above average - a little unrealistic. There is a slight, though not very significant improvement over the period of study.

c. **4th year review.**

English - needs to stop being cheeky; amiable and pleasant but runs the risk of going too far.

Maths - "Bubbly", but basically a nice lad.

Design - needs more help and attention than possible.
Woodwork - very interested, does the homework.

Drama - good, works really hard.

History - homework difficulties.

d. Profile.

Leigh was unhappy about doing this with a teacher, though happier with a non authoritarian researcher, "You need to be able to say what you think." Leigh felt that he had improved over a number of the scaled items, primarily: showing interest, presenting work tidily; originality of ideas; evaluation; thoughtful for others; safety; care of equipment.

This would appear to be the case on observation evidence, though he can regress when he fails to distance himself from Kevin.

e. Interview.

Leigh had originally opted for fabric design where he was the only boy and felt very alone. He moved to art where he came under Kevin's influence. Leigh finds the withdrawal group "much, much better" due to the freedom of choice and the increase staff attention he needs. Again it was the design part of fabric and textiles that Leigh resented and found hard. In group B he can concentrate on making, gaining positive feedback. During the interview Leigh made several intelligent observations on the design course and other students.

f. Observations and development.

There has been a general positive improvement in Leigh over the study, this can be seen in alienation and self concept scales together with observation. It is difficult to say how specific to design this improvement is, the questionnaire was sat in the design block and so some association will have affected its reliability as a measure of school alienation. There was no change in self esteem, which the pilot studies indicated may be the more reliable instrument. The other complicating factor is Kevin. When he is absent Leigh is far better, though tending to regress when he returns. On the whole Leigh has become more aware of his limitations and also aware of how to use staff as a resource though he still insists on using human resources rather than books, worksheets etc. He has developed the areas he identifies with; he has avoided the areas he feels weak in; the course has not reasonably stretched him in this respect.
COMPARATIVE DESCRIPTION.

In order to reduce repetition it was decided to discuss the observations of the two groups together, using a matrix based on the essential factors rather than separately and chronologically.

The technique used was as follows:

1. To extract the key points from each observation log.
2. To juxtapose these points.
3. To subjectively extract the major areas.
4. To use these areas as a matrix with which to discuss the case study observational results.

The six areas factored were:

2. Teaching methods, resources and motivation.
3. Feedback.
4. Handling problem students.
5. Outside effects.
6. Attitudes and acceptance.

1. Group Composition.

It was originally intended that the withdrawal groups be a flexible system of support for those students within the mixed ability groups who needed it. The experience of the case study indicated that in fact there was much less movement than had been intended, in each case a core of students who were to remain in the group evolved and around them there was only a slight degree of flexibility of membership.

What flexibility there was was most evident in group A. Here there were three cases of students who joined the withdrawal group for varying short periods of time and subsequently returned. The reasons for these cases were primarily to defuse potentially explosive social situations. In this respect the more stable, enclosed atmosphere of group A was ideal for such situations and these temporary withdrawals appeared to have had value.

With group B there was much less flexibility. The group stabilized at
after two weeks and only gained two further members after the case study had officially ended. There were no cases of students returning to the mixed ability groups from group B.

The situation described above does not tally with the initial intentions. The reasons for this may be listed as follows:

a. The stable core consisted of students who could not handle relationships or learning within the mixed ability groups. They were, however, coping within the withdrawal groups.

Examples of this in group A would be Ellen and Tim. Tim, especially, made excellent progress within the group but at the same time his behaviour in other lessons and at breaktimes was little better. To return Tim would have destroyed his slowly improving self confidence, he would have succeeded neither academically nor personally.

Within group B Kevin, Spencer and Phedell would probably never return to mixed ability groups. Whilst Spencer was responding very well he was doing so to the specific and special conditions of that group. Had he been returned to the other groups and been expected to follow the 16+ course he would have rebelled again. Phedell and Kevin, whilst making progress in some respects, were simply too disruptive and potentially dangerous to be allowed back into the mixed ability groups. Their behaviour would have considerably lowered the quality of the learning environment, whereas in group B the favourable staffing ratio gave them the attention they desperately needed.

b. Group B was following a course that was very different to the 16+ course in 3D design. As the 16+ was continually assessed a stay of more than a month in the withdrawal group made it very difficult to return due to work that had been missed. It may, in future, be possible to withdraw a student and yet continue on the same course work as the mixed ability groups, in order to enable a return when deemed appropriate.

A similar situation existed in group A, however, there it was possible to follow either an art CSE totally within the group, or work on 16+ elements and then rejoin the mixed ability groups, as was done with three temporary members. The smaller size of this group, its physical compactness and adequate facilities for an art course, made this much more practical than in group B.
Having established the groups both teachers had seen it as important to form a base area, a feeling of security and the development of a group identity. It is true, however, that in many respects this could be seen to clash with the concept of flexibility mentioned earlier.

Without doubt the establishment of an identity succeeded to a greater degree in group A. This was due to its physical isolation; smaller group size; and working practices such as the large centre table and coffee breaks, where students were given the opportunity and responsibilities to set up and run a coffee fund. The break was welcome during a long treble period, providing a focus for discussion and was also an example of giving students opportunities to experience responsibility. The use of this technique in group B would have been more difficult due to the openness of the working situation and the proximity of a number of other disaffected students who remained in the mixed ability groups. These students would, no doubt, have reacted, demanding coffee breaks for themselves.

The situation for group B will be improved by the establishment of a more independent workshop and the removal of facilities needed by students outside. In this way a closer, more educationally viable unit may be built up.

Whilst considering group composition we should also remind ourselves of the need to improve joining procedures from the mixed ability groups. The actual selection procedure should be similar to that used in the case study but followed by a longer and more careful tutoring of students before acceptance. A "contract" of sorts may be advantageous, it is necessary to overcome the problems of forced entry such as was witnessed in group A.

2. Teaching methods and resources.

a. It was noticeable that at withdrawal the degree of motivation amongst those students was very low. There were two broad reasons that became apparent at interview. Firstly the majority of these students had been selected primarily due to serious disaffection. The act of withdrawal could not immediately solve these problems, as evidenced by the poor attendance suffered by both groups initially. To motivate students with such attitudes is very difficult and made all the more so by absence.

The second factor was the shock of actually being withdrawn. All of the
students will have experienced this to a certain degree, though it was only possible to discriminate the extreme cases. Tim reacted very strongly to withdrawal, finding it impossible to attend at first due to the stigma he attached to withdrawal. Again a student suffering from this type of shock will be very difficult to motivate initially. As previously indicated this element of shock may be reduced by more careful counselling before transfer, though it could never be eliminated.

b. Once the groups were formed, the staff saw the favourable staffing ratio as a powerful factor in aiding the motivation of students.

1. It was clear from the mixed ability teaching before withdrawal, that the majority of students with learning difficulties required a large amount of direct teacher contact in order to motivate, select directions and then maintain the momentum. Written resources and instructions were disliked, primarily because many of these students had had little success with the written word. The importance of this personal contact and particularly that it should be immediately available, cannot be underestimated. Within a mixed ability group of 22 the time available per student is very limited. The degree to which staff were stretched when working with the design mixed ability groups was illustrated by one student commenting "I wouldn't do his job" on seeing a member of staff rushing about simply to try to give advice to all who needed it.

2. The favourable staffing ratio within the withdrawal groups enabled staff and students to relate on a far more personal level and with this came understanding and respect (both ways). The post test interviews showed that all the withdrawal students felt the teacher was "good", using words such as "approachable", "friendly", "knows where to draw the line" and "consistent". Teachers in normal groups across the curriculum were not so favourably reported, even teachers who had been felt by staff to be "good" teachers had failings as far as the withdrawn students were concerned. Phedell stated that many teachers were "two faced", that is inconsistent in their dealings with students. It could be hypothesised that in many cases this was due to the pressure those teachers were under, resulting in them occasionally reacting harshly to a student who was being difficult.

It should be noticed that these observations on teachers were not directly sought from students, they came openly, as a part of responses to open ended questions on working in the new groups. There are ethical questions here,
however, it was felt that these observations illustrated a point. That point was that whilst a number of recent publications (28) have suggested that staffing ratios were not as important as hitherto felt, this study, with both the mixed ability and withdrawal groups, indicates that with the style of learning adopted within core design at Burleigh a good staffing ratio is essential. Many authorities have endorsed the aims of design teaching and its methods, including the Secretary of State for Education on a visit to Leicestershire in May 1984; what is important is for these authorities to grant the means to resource such courses.

3. The improved staffing ratio within the withdrawal groups also enabled teachers to develop a positive group identity and to more easily orientate it towards a greater acceptance of staff aims. As has been indicated previously, in the case of group A, the use of a central table, coffee breaks and group discussion, worked very well in this respect. Whilst such activities may seem to be taking time away from design activities, staff felt that the final output of work was similar to that which one would expect in more conventional teaching. Whilst the activities were not directly relevant to design education at all times, a great many valuable opportunities were created for learning generally. As Eisner (29) put it "The dynamic and complex process of instruction yields outcomes far too numerous to be specified in behavioural and content terms in advance."

4. Whilst discussing the factor of staffing ratios it would be interesting to enter into a little speculation. At Burleigh there are a number of staff who are either not on timetable or with a reduced commitment specifically to be able to offer support to students with learning difficulties, disaffection and their associated problems. The effect of this policy is to raise the number of students in each teaching group. It would be interesting to observe the effect of a policy of placing these teachers back on timetable in order to gain the most favourable staffing ratio possible. Whilst it is admitted that this would only lower the ratio in the order of 1.5 to 2 students per group, all of the staff interviewed felt, on a subjective level that difficulties arose in an exponential manner against student numbers rather than linearly.

c. We can recognize from the point above, on gaining student acceptance of staff aims, that many opportunities arise during teaching which may be seized and put to good use in a general educational sense. An example of such opportunist teaching occurred when Ellen put a piece of paper over a
heavy, embossed, book cover and then rubbed with a piece of chalk. A type of brass rubbing resulted which clearly surprised Ellen. Teacher A, who had observed this, seized the opportunity to praise Ellen (who, by then, was able to accept a certain degree of praise in front of her peers). There followed a rapid and very satisfactory investigation as to the possibilities of this technique on both the book cover and other textured surfaces. Other students in the group joined in with a measure of excitement and the remainder of the lesson was very purposefully spent. A number of techniques were learnt in the best manner, by personal discovery, and there was much discussion as to possibilities. It was all unplanned.

d. Both teachers had chosen to use structured courses to generate an initial momentum with the groups. Observation indicated, however, that neither of these approaches was successful, both failing to motivate any great degree of interest in students. The photography course with group B was certainly worse in this respect due largely to attitudes at transfer; a poorly resourced introduction and a large amount of dead time for students during the project.

Whilst we cannot generalise as far as to say that no structured course could work under identical conditions, it was decided by staff to wind up these approaches as soon as possible and move towards individual projects with which it was hoped to introduce a more personal element of motivation.

On face value this would appear to be a logical development, indeed the initial interviews for this work showed that many students, particularly those with learning difficulties, felt that a freedom of project choice would be a key factor in generating enthusiasm.

Both staff attempted a very open choice of individual projects initially. The aim was to give students immediate “hands on” experience with a minimal design input (probably simply by discussion) and rapid success leading to positive feedback.

In fact, the vast majority of students simply could not handle this sudden freedom and needed a considerable degree of teacher input before work could commence. As the projects were intended to be individual this meant a great deal of dead time whilst students waited their turn, during this period frustration or boredom built up, as it tended to when immediate help was not available.
Whilst the projects were individual and freedom of choice technically operated, clearly there needed to be some form of alternative structure to attempt to build a meaningful experience. The teachers were poorly resourced for the sudden change in direction, a greater degree of freedom had been intended at a later date, they were not yet ready. The individual projects, eventually selected, did not necessarily make the best educational sense. Phedell, for example, could not handle the time scale of his chess board, he did not get the rapid positive feedback that he needed.

It was recognised, in discussion with staff, that a system of resources was necessary to meet the particular needs of this type of group. It had been observed that staff suggestions for projects tended to be turned down by students, what was needed was a collection of materials that would "sell" ideas to the students, generating enthusiasm through direct experience of the possibilities at a concrete level. Within group A, with its arts bias, the teacher considered the resources should consist of a wide range of stimuli from natural and mechanical forms to completed works demonstrating various techniques. With group B it was intended to build a selection of starter projects which would excite students; give them an immediate start to work with little design necessary and have a high chance of success within a short period of time, ideally no more than a double or treble lesson. The projects should then be capable of development on a more individual basis. That is, for the student to take the initial experience and develop it along his own, personal lines. The turned wooden box was a good example, in that, a very reasonable piece of work could easily be produced in a double lesson, and then, using exactly the same techniques, the student could introduce an infinite variety of; dimensions, form, lids, etc. The initial design work for such a project needs only to be brief, verbal if necessary.

The aim now is for staff to build up a selection of such resources so that a choice is possible at the first meeting, although, hopefully, students will fall into natural groups of perhaps three with each individual in these sub groups intending to attempt the same project. Observation indicated that this tended to be a natural process and staff "persuasion" would probably not be needed. If this was the case the amount of staff input and demonstration time could be radically reduced and, similarly, "dead time" for students. This would be especially true if materials were prepared beforehand, something which is difficult to do on an open ended design course such as operated in the design core.
Whilst the process of resourcing has already begun it is acknowledged that it will take time to build, refine and present it to the required standard.

e. Observation revealed how important it is to have informal discussion at the end of each lesson on what has been achieved by individual students during that session. It was noticeable how positive results for individual students began to generate motivation not simply for that student but also for others. An example of this spin off process was Spencer finally becoming interested in working after seeing Grant's success with a turned wooden box. Several members of group A were similarly motivated after seeing Ellen's success with the rubbings of the embossed book cover. The teacher needs to be aware of such developments and move quickly to maximise the possibilities, this being more possible in a small withdrawal group than one of the large mixed ability groups.

f. The loss of an ongoing project occurred on a number of occasions in group B. The depression and loss of motivation this can cause in a student is difficult for a member of staff to appreciate. There is a need for a more secure system of work storage for all groups in design. Whilst individual cupboards are out of the question, due to cost, group cupboards would sometimes not be locked or, if a student was absent, his work may be removed by others to get out their own, it could then be forgotten to be replaced. Staff need to be very aware of these problems and personally supervise the storage of work.

g. A great source of disappointment during the study was the apparent lack of transfer of any positive developments in attitude within design to other areas of the curriculum. Whilst individuals, such as Kevin, made little progress within the group, in others there was moderate to high success in terms of attitude to work. Ellen, Spencer, Leigh and Dean made substantial progress but their behaviour outside the groups improved little.

It would appear that students have established very rigid boundaries between areas, undoubtedly encouraged by the way teachers operate.

It would be interesting to develop this study further by investigating the degree to which behaviour and attitude to work outside the design group may be improved if a greater effort was made to show other teachers and house staff how well individual students had progressed in design. It is possible to hypothesise that if this were done effectively teacher expectations may
rise and a more general improvement in attitude to the curriculum on the part of that student may result.

Photographs were taken, and displays put up, of student's work from both groups and these did raise the self esteem of these students to some degree, but these displays were only in the design department and were, therefore, not necessarily seen by other staff.

3. Feedback.

A major failing of many organizations is that they do not recognize the importance of feedback to members, whether they be office workers, executives, teachers or students. Feedback is an essential human need which can be associated with the model of "self" as a dynamic, motivational force. We are constantly seeking information on how others see us both directly, and indirectly via our work. The way in which such feedback is internalised depends largely on how close it is to our existing self image.

Within education generally, feedback can be seen in terms of personality factors or those relating to work performance. This feedback may be formal or informal. Within the groups of this case study the continual probing by students for informal feedback was very evident in their constant need to relate to staff, asking what to do next even though the techniques they were using had been explained before. This was not simply a matter of forgetfulness, though obviously it played a part, it was also a process of seeking support and feedback from every comment or gesture. It is important for staff to understand this, even the most casual remark, without malice, can have very negative effects for a student's self esteem.

Formal systems of feedback, such as a school report, tend to be disregarded by disaffected students for the reasons that they probably contain negative feedback and secondly that they represent the word of a system they reject. If, however, the student has achieved a rapport with a member of staff and that teacher is very careful, opportunities may arise, or be created, to help develop the student's attitudes and self esteem in an informal manner far more powerfully than any formal technique, providing that the feedback is not excessively dissonant with the student's existing image.

An example of such a process was the development of Ellen's self esteem within group A. At first Ellen was so negative in her approach to her work that any praise she was given was impossible for her to handle, particularly
in public, and this would lead to immediate disruptive behaviour. Whilst we must recognise that this was also an attempt to maintain her image in front of peers, discussion over the period of the study indicated that she simply could not handle praise, being far more familiar with rejection and chastisement. Over a period of time teacher A gently helped Ellen begin to accept that she was capable of goodwork and that praise was something one could expect to follow. Eventually Ellen could accept a degree of praise in public and was even seen to smile, something she rarely did.

Within the case study the formal systems of feedback and assessment by profiling and student work record cards were not a success. Students did not, on the whole, enjoy the process of discussing a profile with the teacher. Several students mentioned this point specifically during the post test interviews. To some extent this could be due to the novelty of this type of work with the student.

In operation, completion of the profile at half termly intervals was too infrequent, students had forgotten the previous discussion and so the motivational effect was minimal. Whilst completion at half termly intervals was too infrequent in this respect, in others it was too frequent, great difficulty was experienced generating the time necessary to enable staff to have enough privacy to discuss the profile with the individual student. Staff were also under far too much pressure, relief staff were necessary to enable the exercise to continue. This was possible for this small scale experiment, however on a larger scale the school may have found this impossible.

The student work record cards, which were designed for self completion, were again not welcomed by students, who were very reluctant to use them. In practice the pressure of work often meant that they were forgotten by staff and so only a patchy record exists. To some extent student resentment can be understood in terms that they represented formal records and the written word, both of which had negative associations for many of the students under study.

Whilst the potential advantages of profiling and student record cards still remain, there needs to be a very careful re-think of their actual application. This should centre upon creating a more relaxed, constructive atmosphere. If this approach is developed we may be confident that student attitudes will slowly change and these systems of assessment and feedback will play a positive role.
We should also consider the point of feedback to staff. This again, can be considered on both a formal and informal basis. Formally feedback is in terms of the results of examinations, tests, homework and coursework marks. With the withdrawal groups in this study these possibilities simply did not exist, however the profile and work record would have been of equal value to the other techniques, if not more so, had they been more successful.

The teacher can use attendance as a crude measure of student motivation, it is true to say that both group's attendance levels did improve, bearing in mind that many of the absences there were, were due to suspensions following activities outside the groups.

The major technique of gaining feedback available to the teacher, in any situation, but more particularly in the case study groups, was to be able to listen, informally but effectively. In this respect the teacher must firstly have the time to listen, which means a reasonable staffing ratio and a scheme of work which frees him to listen. Secondly he must be approachable to students, they must feel confident they can confide in him.

4. Handling Problem Students.

The case studies highlighted many factors in the handling of students with learning difficulties, particularly the disaffected. To a large extent these factors have been mentioned elsewhere in this work, however it would be appropriate to summarise them at this point. Before we do this, it would be as well to realise the problems that mishandling such students can cause. Reports from other curricular areas demonstrated serious disruption, including violence, caused by certain students who were also members of the case study groups. Another aspect was demonstrated by the difficulties an individual such as Phedell could cause when wandering off into open plan areas, making it difficult for the staff there to motivate their own students. The point of safety in a design workshop area should not be underestimated, students such as Kevin could cause very serious injury by interfering with equipment.

a. In dealing with problem students one general strategy, already discussed, is the need to help students gain a positive feedback. A successful technique in the case studies was the sharing of success, that is discussing progress at the end of the session. In that way it is possible to fire off interest, in others. A good example was Spencer and his being motivated by
Grants success with the turned wooden box.

b. We can also recognise the advantages of engineering positive feedback for students who are aggressively disaffected. All too often staff may find themselves in direct confrontation with such students which will invariably be counterproductive. The aggression in these cases is often a defensive mechanism for the student who simply cannot handle the school system. By engineering positive feedback using techniques already described it will often be found that as the student's confidence rises there is less need for protective mechanisms such as aggression. This would appear to be the case within the groups under study, however it is unfortunate that the rise in self esteem and lowering of aggression is very situational and is not necessarily carried over into other areas.

One should also beware the fact that public praise for a student identified with the more extremely disaffected elements in a school could be counterproductive, in that it threatens the student's place in the sub culture; is too dissonant with his self image and is, therefore, rejected. In these cases praise must be given, but in a private and sensitive manner.

c. We have already covered the problem of giving the student, with a learning difficulty, help immediately it is required. The case studies furnished numerous examples of the difficulties staff face in this respect and the possible consequences, from a much reduced motivation to disruptive and dangerous behaviour.

There are no clear answers here, all we can do is ask for:

1. Smaller, more easily managed classes and work schemes designed to maximise the amount of time the teacher has available to teach rather than issue equipment, saw up materials, etc.

2. Awareness by staff of the special needs of these students, particularly the need for sensitive handling even when under pressure.

d. Whilst it has already been pointed out that students need positive feedback we also need to be clear that this means very detailed preparation by staff to ensure that this is so, particularly with difficult students in the early stages of a course.

Ellen was an example of a student who would work well if she gained the
positive feedback of success, but if she met with only slight difficulties her reaction was very strong and would take a great deal of counselling to remove. Projects need to be carefully thought out to increase chances of success and so that any mistakes made are minimal and easily rectified. It is true to say that students need to experience difficulty in order to be able to deal with the emotions caused and be able to rectify these problems, however this needs careful management.

e. The establishment of a group identity, with the teacher a part of that identity in students' eyes, has been recognised as a positive development. Discussion and working together both develop that identity and at the same time provide opportunities for development if well handled by the teacher.

The use of coffee breaks was frowned on by the majority of design staff, however we should remember firstly that group A was able to isolate itself simply by closing a door and secondly that it is simply unrealistic to expect any student to be able to give 100% concentration over 2 or 3 periods. This was particularly true of the students in the withdrawal groups who tended to have lower attention spans than the norm. Students take unofficial breaks, it is far better to have the teacher as the controlling element.

f. A further factor, already covered, was the problem of handling student fantasy. This should not be considered a trivial matter and whilst no open confrontation should be allowed to develop all such incidents should be noted immediately and discussed with the head of department and pastoral staff.

5. Outside Effects.

The external influences appear to be two fold, those due to direct peer group influences and those due to situational effects, although they cannot always be easily separated.

Group A demonstrated the greatest improvement in behaviour and attitude to work within design, mainly due to the fact that they were far more isolated from other students, particularly those with whom they were known to form peer groups with anti social tendencies. The change in attitude outside the group was also more marked in group A with suspensions for nearly all students in the group over the period of the study.
Situational effects, for example particular lessons preceding the design lesson or incidents at break times could also cause students to arrive at the design lesson with a negative attitude. No recognisable pattern was built up, although observation did reveal particular lessons when staff considered the students a little "high". The summer '84 teacher's action with the suspension of lunch supervision was undoubtedly a factor in that many students were arriving back in school in the afternoon late or in an excited or uncooperative mood due to events outside the school premises.

Having recognised the importance of outside effects on events within the classroom there is little the individual teacher can do other than not allow confrontation to arise, and rely on a developed relationship with the group to diffuse any situation. The teacher should also be able to rely on a developed and efficient system of support from other staff if an incident becomes too much to handle within the classroom.

6. The Development of Attitudes and Acceptance.

This final section is based around the premise that progress is difficult, if not impossible, unless a positive attitude and a degree of acceptance of the course aims is generated quickly. To some extent this is a chicken and egg situation in that it is difficult to raise attitudes unless some successful work is done. This is accepted, however, if techniques described earlier are applied, it is possible, as the case studies demonstrated. The case study groups took about eight weeks before the growing group identity and success of individual students reached a point where motivation took a noticeable upturn. This is a very crucial period for the teacher and a great deal depends on his or her personal sensitivity and ability to relate to students with learning difficulties.

A description, at this point, of the techniques which may be applied in order to maximise self concept, attitudes and acceptance would be unnecessarily repetative.
COURSE STRUCTURE.

This particular line of investigation developed one of the four directions which evolved from initial interviews.

1. Course structure.

2. High school visits.

3. The teaching environment.

4. Learning resistance.

The initial interviews concentrated on the general topic of students with learning difficulties in design. The experience of those interviews and of the initial work in the case study groups suggested the need for a change of emphasis away from learning difficulties specifically towards underachievement generally. The factors behind this decision are listed below:

1. The initial interviews gave insight into the problem of students with learning difficulties within the context of the mixed ability groups of core design. The initial case study work also looked at students within the mixed ability groups before withdrawal. There were indications that the core design course and the way in which it was taught may have been amplifying, if not actually causing some learning difficulties and underachievement.

2. The initial teacher interviews supported this hypothesis, in that teachers admitted difficulties in teaching mixed ability groups and that they tended to aim for the mean ability in the presentation of work and subsequent expectations.

There were two main reasons for this situation:

a. The group sizes were large, this prevented the degree of individual attention that students needed.

b. Teachers lacked both training and confidence in handling mixed ability groups. The majority of teachers in the department trained before such techniques were introduced, with the age range under consideration, and
their personal experience up to recently was with set or streamed groups within closed classroom situations.

The broad result of these points was that teachers felt they were neither stretching the higher ability students nor developing the lower ability to the degree they considered otherwise possible.

3. Staff recognised difficulties in the way in which core design was taught, though there was confidence in its conception. The resulting situation could be described as mixed ability grouping without mixed ability teaching.

4. There was evidence, within the initial interviews with both students and staff, for considering that underachievement was at a disturbing level. This was later backed up by interviews in the learning resistance section. Many students admitted making little effort in school generally though it was difficult to gain any clear insight from individual students as to why.

   a. Certainly there was a general feeling of apathy within many of the student body, due, in some respects, to the economic climate or more particularly to the individuals reaction to it. This was characterised by a number of interviewees who were drifting and claimed, on interview, that there was little point in trying as it would not help them gain a job.

   b. On a more specific level the large numbers in teaching groups prevented the direct tutoring necessary. Teaching techniques employed in core design, at that time, whilst claiming to be student centred were very dependent on the teacher as the central resource. If he or she was busy, as was usually the case, it was difficult for students to get help when it was needed. A feeling of frustration slowly gave way to boredom in many students. The net result was underachievement.

The above points begin to illustrate that underachievement was present for various reasons. To quantify it is very difficult and can only be done by closely focused diagnostic lesson techniques using several experienced observers. This was not possible and so it was decided to go forward based on the, albeit, subjective opinions of the members of staff.

A further factor which influenced the direction of this section was the introduction of the Leicestershire 16+ experimental scheme to design at Burleigh. It was clear on studying the syllabus (appendix13) that it had
been written in such a manner as to be as flexible as possible. This had the advantage of allowing a great deal of personal interpretation for staff and yet it was also clear that many staff were concerned at this lack of guidance.

When considered together the point on underachievement and the new 16+ suggested that the central thrust of this part of the research should be focused upon the development of a course structure and associated teaching techniques for mixed ability grouping when using the 16+ syllabus. In this way it was hypothesised that underachievement may be reduced together with other more specific learning difficulties.

The decision was also made to concentrate the work within the 3D department rather than dealing with the broader design department. The reasoning for this was as follows:

a. I had little experience outside 3D design.

b. It was more possible to achieve positive results with a smaller unit.

c. It was felt that 3D was likely to, and probably should, remain a discrete unit within the design course. The staff were not yet ready to have a totally integrated design course, though this may well be a future development.

At this stage it was decided that the work would have far more value if the staff were directly involved in its development. It was felt that staff would accept developments with far more conviction if they were involved.

Based upon this thinking the general aim of this section became:

Working in conjunction with staff, to develop a course structure, teaching techniques and resources that would enable a far broader spectrum of students to achieve a measure of success in respect of the 16+ aims and objectives whilst operating in mixed ability groups.

Method.

The approach adopted was essentially orientated towards the specific situation at Burleigh, within the limitations of time and resources.
1. Clarification of direction with the Head of Design, based on initial interviews.

2. "Feedback 1" document written and issued to staff. This was a summary of points from initial interviews as they related to 3D course planning.

3. Course structure working party formed.

4. Course structure guide produced.

5. Technology project devised and run as a section of the course structure in order to evaluate some aspect of the thinking.

6. Section summary.

1. Clarification of direction.

This has largely been covered within the introduction to this section. During this clarification the staff were involved with myself in a constant dialogue.

2. Feedback 1 document.

This document (appendix 3) was intended to both inform and act as a stimulus for debate within the 3D department. The document consisted of those points from the initial interviews that were relevant to 3D course planning. Suggestions were made for further work and comment was invited from staff. It was given to staff three days before a departmental meeting where it formed a major item of discussion.

The result of this discussion was positive, in that there was broad agreement, however many members of staff accepted it passively as they had done with many previous innovations. This was unfortunate, it is important that staff, who must work any new scheme, must accept such developments in an active manner.

There were three fairly minor areas of dissension on the document:
a. That the idea of a guided evaluation sheet was unnecessary. A well constructed analysis, it was proposed, would offer the necessary structure. It was also pointed out that a guided evaluation structure may well blinker the student response from innovative directions.

These comments were generally accepted by staff present and it was decided not to use any form of guided evaluation sheet in 3D design, although the fabric department has adopted the idea on a trial basis.

b. Comment was made on the difficulty of finding more time for individual feedback (point 7 in feedback 1, appendix 3). Several models were suggested which are covered in the appropriate section below.

c. It was felt that students were finding design concepts easier to grasp when less technical terms were used. Examples were using "considerations" rather than "analysis" and "initial ideas" rather than "synthesis", etc. Again the point was accepted.

3. Working party considerations.

A course structure working party, consisting of myself and two other teachers from 3D, was formed. Meetings were held both as a group and, when necessary, between myself and individuals. Feedback to the design staff as a whole was both informal and formal, for example the feedback 2 document (appendix 4) and the course structure itself. It was most important that the staff be involved in the initial development as they would accept it with more conviction. The process of generating a new course structure took most of one term, the factors considered were as follows:

a. The new Leicestershire 16+ design syllabus presented the department with an opportunity to examine its approach. The flexibility of the syllabus gave great scope for individual interpretations, nevertheless it was felt that within the department itself some form of guiding structure was necessary to help staff present work in the most interesting manner and subsequently to be able to assess work. These points will be examined in more depth in parts h and m, below.

b. It was important to try to clarify where the developments of the previous three years had led, what form of identity did the department feel it now had? Discussion at the departmental meetings and within the working
party established that this identity was one of a "product design" course. This could be defined as an approach in which the identification of needs and the clarification of problems leading to a designed solution and evaluation are the central aspects. This may be seen as distinct from a CDT approach where the major aspects are materials, processes and the technology necessary to manipulate them. The difference in the final end product may not be immediately apparent, however, it may be said that product design concentrates on the cognitive processes rather than practical skills.

c. The staff felt that design should be taught at upper school level in an holistic sense, that is by looking at complete design situations from start to finish rather than concentrating on any one aspect until mastered. Using this approach it was felt, on balance, better to teach technique as necessary and to individuals rather than on a class basis when only a small minority may actually need that process at that time. This meant that CDT type "theory lessons" or craft foundation courses were not used, students started with design situations and learnt new techniques as necessary, as they worked on individual solutions.

Whilst it could not be said that there was complete agreement amongst staff on this point it was generally agreed that an holistic design approach must come first as it was essential that students appreciated that the main aims of the course were design and its associated cognitive skills rather than vocational craft skills.

d. The concept of an holistic approach was, however, complicated by the limitations imposed upon the upper school by the widely differing experiences at a high school level. It should be remembered that, certainly for the next two years, students arriving at the upper school will tend to have narrow experiences in design, many girls not having any skills in the manipulation of "hard" materials. Some form of basic skills input was going to be needed for the next two years while the new design courses at the high schools got underway, it was, however, important to present this in a manner which did not overshadow the basic cognitive design skills.

There were four basic models which could be adopted:

1. The use of short "inputs", during each lesson, of perhaps no more than five to ten minutes covering a range of understanding. A prepared programme over the first two terms could cover a wide range of techniques and processes. With this we have the problem of what to teach first, many
processes would be needed early on.

2. The use of a resource base so that students could refer to various teaching aids on their own initiative or under staff direction. This technique can help, but cannot eliminate the personal confirmation needed by the teacher that a technique has been mastered safely.

3. The use of a highly structured introductory project whereby it could be guaranteed that a basic range of tools and techniques would be used during the completion of that project. An interesting technique, however, it was felt to run counter to the departments philosophy of freedom within a design situation. The structured project was felt to be a valuable introduction to design at a high school level, where elements of design may be exercised around the structured core of a project, but at the upper school, with only five terms to assessment and examination, this was felt to be a retrograde step.

4. The final option, put forward by some members of staff, was to run a "roundabout" of skills as an introduction to the course. For example, 3 weeks of basic metalworking skills, followed by wood, plastics and graphics. This more traditional CDT approach is admittedly reliable in getting over basic facts and skills, however, it was dismissed for the following reasons:

a. It denies any high school experience.

b. Rather than development based on an individual students past experience it returns to a beginning, bad psychology as a student rises into his final school.

c. It perpetuates a primacy of materials and skills over concepts and more widely applicable cognitive skills.

d. It would take too much time away from the central aims of the design course.

After much discussion it was decided that staff must start to build a resource base that would cover all aspects from stimulus material to instructional material. This would be a major task, and would take several years. In the immediate future it was necessary to back this up by using the "input" technique. A programme was worked out to start with the Autumn term of 1984 intake and this envisaged ten minute demonstrations on topics such as "cutting materials", "costing", "making holes", etc. The emphasis would be essentially "how to do it", without any requirement for traditional craft knowledge of facts such as remembering the grinding angle of a scriber or concentrating on any one material.
In developing a course structure it was important to keep to the fore the reasons why design was a core subject, as covered in the introduction. Design was not a vocational vehicle concerned with a specific body of facts but a broad experience that could enable students to have opportunities to develop concepts, skills (cognitive and practical) and attitudes as put forward by the HMI in their 11-16 1983 document.

It was important to engineer opportunities for development in these areas into the course structure even though many do not fall within the assessment objectives of the 16+ syllabus. One should avoid the trap of interpreting syllabi in a rigid manner, valuing only those aspects which are easily assessable and ignoring the wealth of potential, peripheral, but not directly connected to the assessment objectives of any course.

The working party found it a valuable exercise, as teachers, to focus on these areas and attempt to explore the potential contributions of design. In this way the degree of awareness increases in the teachers mind and this, in turn, can help him develop the maximum potential from the material he is using.

If we briefly look at the three areas:

1. **Concepts.** "Concepts enable one to classify, organize and understand knowledge and experience. Often it is the abstraction and generalisation from a number of discrete instances". (HMI 11-16 pp32)(30).

In this respect a design course is demanding. Working individually or in small groups on unique solutions demands an ability to be able to organise and apply experience and knowledge in new ways to suit the particular problems under study. Opportunities are constantly presented to develop concepts and apply them. These concepts cover a wide range from the analysis of situations to technological concepts such as power, friction and structure.

2. **Skills.** Defined as "A capacity or competence, the ability to successfully perform a task whether intellectual or manual." (HMI 11-16 pp29)(31).

This is the traditional area for educational assessment in that skills, both
cognitive and practical, are easier to assess than attitudes or conceptual understanding.

Skills are not an absolute quality but exist in a spectrum of ability. Assessment on the 16+ design course will contain a high degree of assessment of demonstrated cognitive and practical skills. The limitation here, however, is that the assessment of cognitive skills is to be done via manual media, usually sketching, model making and practical work. This places limitations of reliability on such assessment techniques. Are we really assessing what we intended to? The student's confidence and ability to express himself and his chain of thought clearly and efficiently are all important. It is true that the 16+ is to allow tape recorded comments by students, nevertheless, the medium of drawing will remain important, which is unfortunate when the reader considers two points which arose in the initial interviews:

a. That many students have a poor self concept in drawing ability, the "I can't draw" Syndrome.

b. Many students had chosen 3D design for negative reasons, i.e. rather than wanting to experience the 3D course it was a case of wishing to avoid art because of a low self concept at drawing and associated skills.

There are clearly problems here, but if the teacher is aware a great many skills can be developed in design, for example:

a. Communications - graphical, oral and written.

b. Numeric - calculations in a concrete rather than hypothetical setting.

c. Observational - focusing techniques.

d. Imagination - creative skills, for example brainstorming and many other techniques as typified by "De Bono's thinking course."

e. Organisational - individually and as a member of a group.

f. Practical - manipulation of materials.
g. Social - working as a member of a team.

3. Attitudes. Defined as "A disposition to think or act in a particular way in relation to oneself and to other individuals or groups in society". (HMI 11-16 pp32)(32).

This is a particularly important area, in which design education can offer many opportunities. It does, however, require great sensitivity and awareness on the part of the teacher in creating and developing those opportunities in a system such as a Leicestershire upper school where there is great pressure on students and teachers who have to reach rather narrow assessment objectives in only five terms.

Examples of attitudes which may be fostered during a design course are:

- adaptability
- commitment
- cooperation
- self confidence
- perseverance
- tolerance
- curiosity
- etc.

f. It is most important that any course structure, for mixed ability groups, helps maximise the potential in all students rather than aiming for mediocrity. Many strategies were discussed by the working party, some of which are listed below, but it is necessary to realise that whilst concern may be apparent in stretching both the high and low ability student the emphasis must be firmly on the individual and his special needs rather than lumping students into three crude categories of high, low and medium abilities.

1. A level of success was seen as important. We may refer to Weber and "Yes, they can!" in that it is necessary to engineer success in order to decondition defensive behaviour in lower ability students. This could be taken further than Weber's particular interest into the area of disaffected students where Ellen, within the case study, makes an interesting example.

The ways in which success can be achieved vary enormously, but one example
may be to structure a starting point using techniques such as jigs and pre-prepared materials in order to give rapid, positive feedback as a starting point for development. An example of this from the Stanley "Link" magazine (33) was J. Flood's work based on simple rubber powered chassis made from pre-cut wood and drinks cans which could eventually be developed by the student as far as computer controlled, electrically driven vehicles.

2. At the higher ability range it is important to design project work in such a way that it can offer challenge. This is best done through the flexibility of design projects. This point is far more complex than it might, at first, appear. If a group of students are given the same brief, a student who produces a complex, technological solution has not necessarily done better than a student who produces an uncomplicated answer. It would be bad design practice to encourage complexity for no good reason, simplicity in design is often best.

Despite this point it is possible to use the flexibility inherent in a design brief to investigate more deeply and report in such a way as to maximise the learning potential of an, albeit, simple project.

3. It was seen as important to use group work alongside individual work to give opportunity to develop skills and attitudes such as communications and cooperation. Again the limited time available in the upper school and the restrictions of examination work tend to encourage teachers to use individual work as it is far easier to assess. This is wrong, firstly it is an over-rigid interpretation of aims and secondly it is ignoring the real needs of students as they become adults.

4. Project work, it was recognised, needed to be better planned, resourced and then "sold" to students. The initial interviews indicated a degree of dissatisfaction with projects set by staff. Whilst the working party felt a total freedom of project choice, as requested by students, was unrealistic, it saw it as important that far more work go into the development of project ideas and also the presentation of these ideas to students. It was necessary to develop a greater degree of acceptance of these projects by students.
The initial interviews had indicated that the teaching techniques being employed in 3D design were somewhat repetative. What had evolved was a tendency to use an identical design approach to projects over a regular eight week cycle. The freedom the design brief allowed also meant that many students were not experimenting to a sufficient degree, they were developing only a limited range of skills and concepts.

The working party felt it important to break this inwardly looking cycle by introducing variety in teaching technique around the centrally agreed concept of holistic design.

Points discussed included:

1. It should be possible to vary project length. There was considerable discussion over the need for a deadline at all, thereby allowing individuals to proceed at their own pace. The possibilities this offered were interesting, opening up a very different approach to design. Despite this potential the staff felt that disadvantages in terms of control and guidance, on an individual level, exceeded the advantages and also that the use of deadlines was realistic in terms of education for life.

Variety could be introduced in the complexity of the design briefs. Some could be taken only as far as a mock up stage, the limitations being the difficulty of evaluation. Whilst it would be possible to evaluate for aesthetic and ergonomic considerations this would not be possible for the efficiency of construction or durability in use.

A further approach would be the use of simulation exercises. These are short, intensive, simulations of industrial design and production situations. They are a very valuable exercise in their own right in terms of insight into working practices, however they also offer the teacher a further tool in the generation of motivation.

2. A further point centred around the practice, in 3D design, of team teaching two groups. This had several advantages. It offered a greater range of staff experience to the students; gave staff a degree of in service training in that they could share experiences; students had a choice of staff to relate to and there was also the factor of being better able to cover a variety of working areas.
It had been noted, however, that in certain respects this team teaching was not working well. Typically when all students needed to be gathered together, such as at initial registration, and when pulling the end of the lesson together with 40+ students the group was slow to gather, quieten down and react to staff instructions. Discussion of work was also less intimate, students were not as directly involved and individuals could "hide" from staff and so avoid attempts to draw them out into discussion.

Some members of staff had experimented with separate group bases for these times, the students being able to work as one group in the central open area as appropriate. This system was found to work better and was recommended to all staff.

3. The need for group work to compliment individual work has been mentioned above in f.3. Educationally there are many points in favour of using group work in design, some of which have been covered previously, however, at this point we can also look upon it as another method of adding interest and variety into working practices and so improving motivation.

Groups can be engineered in several ways. Random criteria such as names grouped together in the register are crude in that they miss opportunities. Friendship groups are simple to organise, though they can generate a certain amount of squabbling! They usually meet with the approval of students but clearly have disadvantages when cliques of students, with poor attitudes to work, form.

An alternative approach is to use the teacher's knowledge of individuals to engineer groups on a number of criteria, such as mixed ability and sex groups. This technique was used in the technology project discussed later in this section. Whilst the findings will be discussed in more detail at that point it can be said that there were many problems due to the students unfamiliarity with this type of grouping. At the age of 14 they found it difficult to work in a team chosen on the basis of mixed ability, sex and the deliberate breaking of friendship groups. Despite early problems, however, by the end of the project all students questioned recognised the logic in such grouping as an experience relevant to working life.

4. A further factor that emerged from the initial student interviews was the way in which students soon came to see design as a rigid
method. Typically they would refer to "the design method" when in fact many approaches are possible. Staff agreed that this was unfortunate as they did not intend to give this impression. What appeared to have happened was that the guiding structure, suggested to students in their early design work, was interpreted by them as a rigid method. This adoption of a rigid approach to design would tend to destroy innovation and so the working party saw it as important that any course structure attempted to open student eyes to alternatives. One way in which this may be done is to reduce the predominance of sketching within design work. Many students find their designing severely restricted by a lack of confidence in sketching ability and many others develop a concept of design which involves a great deal of paperwork before the idea can be translated or experimented into three dimensions.

Designing must come to be seen as an unconfined process in which the student feels free to experiment in whatever media appropriate. An example of such an approach was mentioned in f.1 in the form of the roller chassis project by J. Flood (33). This project's design approach is very much more experimental than the type of design work practiced by students at Eurleigh up to that point. In this case drawing was limited to recording experiments and illustrating points of discussion between group members. The majority of the thinking was via practical manipulation of the device. This approach tends to free students from self imposed restrictions based on a poor sketching ability.

5. Homework was considered by staff, to be an essential part of the course. There were four main areas in which it contributed to development:

a. Drawing ability as a communication skill.

b. Observational skills via directed investigation.

c. Research skills.

d. Evaluation skills and design appreciation.

An earlier working party had set up a homework structure based on the above points. Typically the technique part would lead with the drawing of a match box, as an exercise in perspective; lettering in perspective and shade. All homework was preceded by a five minute talk on any relevant points. The observational homework was placed at regular intervals between other exercises. A typical observational exercise may be to draw the inside of a 13 Amp plug, labelling the wires and parts. This may be expanded, the following week, by completing a table of fuses and their applications, a form of research exercise. It is, however, important to note the emphasis observational homework tended to place on drawing ability.
The evaluation exercises were aimed at encouraging the student to look critically at the man-made world, to evaluate chosen aspects and to be able to make logical decisions based on considerations such as cost, quality of construction, safety aesthetics and ergonomics.

Building a student's confidence in drawing ability is a slow process in which homework can play a part, however it is important that a teacher be available whilst the basic skills are learnt in order to attempt to prevent any negative feedback developing. Homework had limited value in this respect. After completion each exercise was analysed openly by putting all the sketch pads on a large table for group discussion before individual marking. This practice, whilst appearing to be valuable, had a drawback in that an individual student with a poor self concept in this area, may be embarrassed by "failure" in such a public manner.

This fear of embarrassment in front of peers may have been one of the reasons for the failure to submit homework in many cases. Typically as many as one quarter of the students in any one group would either hand work in late or not at all, either way avoided public analysis. It should also be remembered that the initial student interviews indicated that many students had chosen 3D design for the negative reason that they were seeking to avoid art in which they had a low self concept. Drawing in 3D was associated with artistic activity.

Despite the fact that a proportion of students in 3D design did not associate themselves with drawing as a part of design. Staff nevertheless recognised this as a central skill. What is needed is a careful examination of the role of drawing and ways in which a positive self concept in drawing may be developed in students.

a. Homework needs to follow on from more detailed instruction in class, perhaps exercises may be begun and students problems identified before completion at home.

b. It may be possible to offer times when "homework" may be done at school under staff supervision, eg certain lunch times, providing staff are available and willing to give this time. Whilst this suggestion may have some merit it is anticipated that many students, particularly those having a poor identification with school aims, would not take up the offer.
c. To do all marking and feedback on an individual level would prevent the poorer achiever being embarrassed. If this is to be done thoroughly, however, it will involve a great deal of repetition for the teacher as it would demand far more detailed feedback on each pad in terms of general points and developments that would normally be made to the group as a whole. Secondly it would deny that opportunity to praise, publically, those who have done well, a powerful reinforcer if handled well.

There are no clear cut answers in this area, nevertheless, staff need to be aware of these factors and be reminded of them in order to maximise potential.

d. After spending time discussing some of the possible teaching strategies that could be employed in teaching 3D design to mixed ability groups, the working party moved its attention to the development of a working structure for the course.

It has already been pointed out that the Leicestershire 16+ aims and objectives are both very flexible and yet offer no definitive structure for a work scheme. After discussion it was recognised that a hierarchy of objectives existed.

1. 16+ examined objectives.
2. Structural factors based on product design.
3. Design skills

The foundation level design skills caused concern amongst the upper school teachers, as has already been discussed in the section on high school factors and 3.d above. Nevertheless a broad but undefined range of skills were learnt by the students at the high schools and it had been decided to supplement these by the use of short "inputs" during the first two terms of the upper school course and the establishment of an efficient resource base.
The second level of the hierarchy was based upon what staff saw as the central course identity, that of a "product design" course. Considerable discussion was given to this aspect and eventually three broad areas emerged within the concept.

1. Functional areas, - ie those areas orientated to purposeful design, design centred around a recognised problem, need or opportunity. Considered within this area were also such factors as ergonomics, production and economics.

2. Technical areas, - ie an area more specific to the application of scientific principles to everyday life. An appreciation of the potential of mechanisms, energy, structure etc.

3. Aesthetics, - ie looking at the use of graphical skills and their application to designed objects, aesthetic considerations and environmental factors.

These three areas should only be seen as a convenient split to enable staff to focus on a structure, they are not exclusive and do, in fact, interrelate considerably. One would expect, for example, to see environmental considerations in all project work but it was felt necessary to focus on it at one particular time.

It was considered important to help students experience these areas in an holistic sense. For example, within the area of technology it was the case within both high and upper school technology courses that the student identifies with one specific area at a time, ie it may be a project specifically on gearing. It was felt that as technology was developing rapidly as a separate subject at these schools, to cover the technical area of the Burleigh 3D design course in a similar manner would be short sighted. It would deny high school experience and alienate students due to its repetition. The favoured method for the 3D course structure technology section was to use the "egg race" principle. That is to set up problems to be overcome in a competitive manner either as individuals or teams. The problems would be engineered in such a manner as to encompass a broad range of technical concepts. By then discussing the solutions at the end of the exercise, experiences could be shared amongst all students, so gaining a far broader understanding.
The next stage in translating these three broad aspects into a course structure was to consider what order of priority they may receive. Eventually the following weighting was agreed:

Functional 2  Technical 1  Aesthetic 1

It was considered that the last two terms of the course should enable a major project of a student’s own choice to be undertaken. This effectively left 55 weeks of the course split on a 2:1:1 basis, i.e.

Functional 26 weeks.
Of which ergonomics = 2, production/economic simulations = 2, and functional projects = 18.

Technical 13 weeks,
Of which there would be 3 by 4 week duration egg races. One as an individual, two as team races.

Aesthetic 13 weeks,
Of which graphic design = 5 week exercise, environmental design = 4 weeks and aesthetic design = 6 weeks.

It was then possible to start considering the various possibilities this structure offered. It was felt important that the structure did not become rigid, evaluation procedures for both students and course had to be built in, as we shall see later. It was also envisaged that the actual project work done, within each of the areas, would vary from year to year, both as a result of evaluation and also to maintain a degree of freshness and momentum amongst staff.

The structure evolved from these points to give a two year course which was felt to provide a good motivational base in that it provided interest and variety. The establishment of the structure and intended project topics for the next two years also enabled far more efficient planning of resources for each project than had hitherto been the case. The responsibility for project presentation was delegated to staff who then had the necessary time to prepare a professional presentation that was more likely to capture the imagination of students and fulfill the potential of all students in a mixed ability situation.
Course structure.

Please refer to chart on the next page.

Notes.

**Project 1.** Functional, duration 6 weeks. Based on simple, clear considerations and hence evaluation. A generous deadline for a simple project, though staff will have to emphasise the desirability of simplicity in design.

The project will be an individual effort, though small groups, for example four around a table, may work together discussing considerations and evaluation.

A suggested topic for this first project may be a device to hold and dispense £1 coins suitable for carrying in a pocket or handbag.

Staff would need to suggest investigation directions, eg dimensions, ways of stacking, dispensing, etc.

**Project 2.** Technical, duration 4 weeks. A team project based on, for example, a simple chassis driven by a rubber band, designed to cover a set course at the steepest angle. The basic chassis design would be given plus pre-cut wheels to enable a very rapid start to ongoing developmental type design. Little emphasis on paper design other than recording.

**Project 3.** Aesthetic, duration 5 weeks. An individual project, an example being packaging for a particular commodity, eg a powder such as talcum. Orientated to graphical and aesthetic design but will include such areas as a package which is functional and capable of withstanding stated conditions.

**Project 4.** Production simulation, duration 2 weeks. Small groups in competition to design a simple chair from one sheet of plywood, simulated by card to scale. Basic rules explained including cost of materials, cutting, folding and joining operations etc. The basic aim is simply to produce a low cost chair design, however the project opens considerable opportunities for discussion on topics such as aesthetic evaluation, production / management systems and marketing. The evaluation of an individual's contribution to
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such a short, intensive exercise is very difficult and it is, at present, not intended to attempt to give individual marks to carry forward to the 16+ grade from these simulation exercises. They are, nevertheless, very valuable exercises in the field of design and education generally.

**Project 5.** Functional, duration 6 weeks. An individual project emphasising ergonomic considerations. An example may be a device to enable one to safely carry a sheet of glass. Basic considerations and evaluation would be done in conjunction with other students in small groups but the development of the project would remain an individual responsibility.

Starting points given by staff would include a discussion on what the term ergonomics means and suggestions as to relevant measurements, weights and suitable evaluation tests.

**Project 6.** Technical, duration 4 weeks. A similar egg race type project to project 2. A suggested topic may be a vertical take off flying machine, powered by a rubber band that would remain in the air for the longest time.

The team compositions would be different for this second technology project, either socially engineered or chosen from the register on a random basis.

**Project 7.** Aesthetic, duration 4 weeks. An environmental brief, for example a study of litter bin design eventually leading to a scale mock up for a situation chosen specifically to ensure a range of considerations. An individual project.

**Project 8.** Functional, duration 8 weeks. An individual project to greater depth. By now students should be well acquainted with design approaches and the use of small group "brainstorming" techniques when necessary.

Typical project areas may include a device to help open difficult jar and bottle tops; a device to prevent the theft of bicycles, which is capable of being simply and permanently fastened to the frame, etc.

This project should make full use of graphical and model making design techniques leading to a testable prototype.

**Project 9.** Production simulation, two weeks. The final project of the first year. It offers some flexibility to the timescale of the projects preceding it as it can easily be shortened and still have value.
Teams, chosen on a basis other than friendship groups, compete with the "paper aeroplane production line" simulation which is less orientated to design than production techniques and management of production in industry. Staff must be prepared to stop students working, at intervals, to explain concepts such as buffer stocks, etc. as they arise.

Project 10. The start of year two, a 5 week aesthetic project based on a modular jewellery system such as a bracelet or belt. An individual project but allowing small group discussion.

Input would be needed on aesthetic criteria such as the golden mean. Considerable experimentation would be expected using a modular principle. To be evaluated on both aesthetic and functional criteria.

Many students report difficulty in handling aesthetic design. By orientating it towards a modular design and suggesting experimentation with card followed by some basic colour work all students should be able to produce a satisfying design, providing it is kept simple.

Project 11. Functional, 6 weeks duration. Final egg race, based on group work. Again the composition of the groups will be different to continue to develop the students ability to work with others. A typical task may be to design a vehicle which will drop a coin on a given line a certain distance from the start.

Major project. The final two terms would be spent with the student working individually on a major project of his own choosing, in consultation with staff. An individual project, students would be expected to demonstrate and develop skills, both cognitive and practical, developed over the course.

The structure presented above is based on deadlines with little flexibility, it was felt that this had to be the case when handling 160+ students in each year. The initial interviews, however, had shown that rigidity of project deadlines caused problems. Some students had difficulty in meeting deadlines, either due to slow work, problems, or a complex solution, and so they had to go forward to the next project with unfinished work, hardly satisfactory in terms of gaining positive feedback. On the other hand some students would finish early and were left trying to fill time, this
encouraged complexity rather than simplicity in design.

The idea of a flexible finishing time was rejected by staff as unworkable with the numbers involved, though several models were considered and aroused interest. The solution eventually accepted was the concept of "mini-skills". This meant a collection of resource packs would be designed and produced by staff based upon simple skills needing the minimum of teacher involvement. Examples would be cutting screwthreads, selection of adhesives for specific situations, use of particular tools etc. In many respects these are similar to the basic skills inputs it was intended to give to students arriving from the high schools over the next two years while the foundation courses at these schools begin to work efficiently. The mini skills, however were intended to go further and be used in two ways:

1. As a resource, ie a student needing to know the correct adhesive for acrylics could look this up. This would enable the student to be more independent and free staff from some of the more basic instructional roles.

2. To generate flexibility at the end of a project if it were finished before the deadline. In this case the student could complete one or more mini skills which could be credited to him on a record card (see assessment). A typical example may be a simple exercise in the use of the strip bender for acrylics.

A great deal of teacher time will be needed in this area over the next few years, they will be gradually introduced as the need for the basic skills inputs diminshes.

a. Assessment.

Assessment procedures have two main purposes at an individual level. Firstly to act in a formative sense, giving feedback to staff and students on progress, highlighting weaknesses and so by careful teaching maximise potential. Secondly we have the summative form in which a picture is painted at a point in time, usually on leaving.

On a wider level we must also consider the role assessment has to play in terms of giving the teacher feedback on course effectiveness.
The Leicestershire 16+ course is based on 100% continual assessment, split between 70% for coursework and 30% for a special study. This study is a piece of individual work, tackled over a period of about one year. It will be started off by a number of starter lessons, which are not shown on the course structure sheet but the majority of work will be done in the students own time, using homework and vacations.

The marking of coursework will be based upon the examinable objectives of 16+ (see appendix 13) which break down into five parts:

1. Analysis.
2. Communications.
3. Development.
4. Realisation.
5. Evaluation.

In terms of both formative and summative assessments including references, staff identified four areas of the course structure that needed recording for individual students.

1. Project work - marks and comments.
2. Homework marks.
3. Mini skills - which done, to give overall impression.
4. Attendance.

The homework marks play a part in the overall 16+ via the examinable objectives of communications skills and secondly via the special study.

There was discussion amongst staff on the relevance of marking mini briefs, the final decision, however, was to simply record when each had been done and in that way build up a picture of a student's breadth of experience.

Initially, it had been intended to follow the area of assessment through to the logical conclusion of producing a working system. This idea was eventually dropped for two reasons:

1. The fact that the department was itself working at evolving a standard record card that would be common to all areas of the department. This involved a large number of meetings and necessarily took time. The task was not expected to be complete until after this study would have to close.
2. Any record card developed would take more than two years to evaluate effectively through use. Whilst this is an interesting and important area the time scale ruled out its inclusion in this work.

In terms of ongoing feedback to staff on course performance the main instrument will be meetings of staff after each project was completed. At these meetings marks would be discussed. Typical sources may be informal discussion with students and general observational information such as perceived enthusiasm, work rate and understanding.

Such a method would ensure a formative assessment of the course so allowing ongoing modification, rather than a summative one after two years.

The desirability of individual feedback to students on completing each project was both recognised by staff and also seen as extremely difficult. The mathematics of the situation simply would not allow it and although several models were discussed the basic factor persisted, that the number of students, multiplied by a certain amount of feedback, equals a great deal of time when staff are not available to support others.

There were no simple answers to this problem, the suggestions made by the working party centred around three points:

1. Working practices needed to be revised to liberate the teacher to teach. Techniques such as structuring projects around standard sections of material or the use of a technician as a "duty machinist" during lessons may help in this respect.

2. Work would be marked and commented on in teachers own time, followed by a group de-brief on the major points. We should remember the point on homework debriefs mentioned earlier, that lower achieving students were often embarrassed by failure in a public place, it would be better if only certain, positive, examples were selected to illustrate good points. Negative points may be illustrated by examples produced by staff so avoiding alienating students.

3. Team teaching offers the opportunity for the staff to agree to one teacher concentrating on individual or small group feedback for a period whilst the other teacher covered the classes. The roles could then be reversed.
b. One important factor which emerged from staff interviews, was concern over the degree of underachievement within core design. As this research was not directly involved with students outside design it was impossible to say to what degree this underachievement was general to the course or specific to design.

Several teachers pointed out that they felt mixed ability grouping contributed to underachievement in that it was difficult to teach these groups in a manner in which one could be sure of maximising potential for each student. To some extent these comments reflect a lack of acceptance of mixed ability grouping as one could make similar comments on streamed or set groups. Despite this point it was recognised by all staff that procedures needed to be developed within the course structure to help focus staff attention on diagnosing underachievement and subsequent corrective action.

It was recognised that underachievers are hard to identify within a mixed ability group. The underachiever is adept at avoiding attention, in turn the teacher has too little time with a large design group to concentrate on looking for such students. We must also remember that we tend to expect all students to use their intelligence in a certain way, the student who chooses not to identify with our aims and may become bored with lessons is not seen as intelligent and yet he may be. The normal pattern of student assessment in schools is upwards from the class teacher, via group tutor to house heads and principal. It is vitally important that the group tutor also disseminates information downwards to class teachers in order to give them a fuller picture of each student's performance across the curriculum. The experience of many teachers demonstrate cases of students who, whilst performing poorly in one particular area and considered to be of low ability by that class teacher, was in fact intelligent and capable of far higher standards if the reasons for this specific performance problem were identified and corrected. If time is allowed to pass therapeutic action is far more difficult. The system, it should be remembered tends to rather myopic, capable of recognising a disruptive underachiever but not the quiet, withdrawn student who will be seen as of low ability rather than an underachiever with a learning difficulty.

Experience within the department and the case studies have shown the effectiveness of a peripatetic teacher in helping with both initial diagnosis and also subsequent corrective action. It was decided that whilst the department could not rely on having that extra member of staff, as used
in the case studies, each year, there should be a deliberate attempt at about weeks 4-6 of the first term to diagnose cases of underachievement in design. This could be done by pulling in extra staff from preparation periods to increase the staffing ratio in a group for short periods of time to enable concentrated attention on individual students. Once staff were able to compare notes a clearer picture would emerge. Whilst this extra staffing could not be continued for any length of time the key initial stages of diagnosis would have been started and with awareness, the teacher is more likely to achieve some success.

c. An important aspect of any course structure is that it enables a professional standard of resourcing and presentation of project work to be prepared. Past experience within the department was not good in this respect, the course structure was too loose, with the result that new projects were introduced in a hurry, without the backup and presentation necessary to seize student imaginations.

Any course structure needs to be flexible enough to meet unexpected eventualities, and yet it needs to be enough of a skeleton to enable staff to plan well ahead. In this way tasks may be sensibly deligated and any teamwork liaison organised.
COURSE STRUCTURE CASE STUDY.

Introduction.

This section developed from the deliberations of the course structure working party in that it was felt to be important to attempt to assess the work of that group by resourcing, running and evaluating a section of the proposed course structure as a form of case study in order to enable both myself and the department to gain some experience of the difficulties that may present themselves.

One particular area of interest was that of the degree of staff identification with mixed ability teaching within core design. If we refer to the initial interviews it will be seen that many staff had difficulty coming to terms with this form of teaching, despite its advantages, and there were reasons to suppose that this lack of identification may be limiting the efficiency of the learning process. By adopting a case study approach rather than a strictly experimental approach of manipulating only one variable, it was possible to include all the 3D staff in the running of a particular project and so also use it as a form of inservice training. If carefully structured it should be possible to give all staff a positive experience and so generate a greater degree of identification.

It was felt important to include, in any case study project, as many of the methods suggested in the course structure that were unfamiliar to 3D design staff at Burleigh. In this way, by using observational and interview data, it would be possible to maximise the potential benefit to the 3D design course. Particular areas of interest evident in the course structure were group work, particularly when socially engineered, competition and developmental design (see point \( g \) pp.).

The course structure itself, for that time of the fourth year course, proposed an eight week functional design project, followed by a simulation project. By the time the working party had finalised the course structure it was not possible to generate the necessary resources by the time they would be needed and so it was decided to take one of the technology briefs out of sequence and use that. It should be noted that it was appreciated that there would be considerable disruption over the period of that last half term due, not only to the 1984 teachers' action but also to the usual end of year programme of events and NTVEI students' residential experience. Because of
this it was decided to expand the proposed four week technology course to eight weeks, although the actual contact time was expected to be about the same. Whilst the hours spent on the project may have been correct, one should not forget that continuity and familiarity with the work would have been reduced so effecting working efficiency.

**Project evolution.**

As indicated above a technology brief was chosen for study for the following reasons:

1. The students had not covered any technology by that time.

2. The brief offered opportunities to experience aspects of design different to that normally done at Burleigh. Examples include team design work, design in a competitive situation and a developmental approach to design.

Within the area of technology staff had recognised that there would be little point in duplicating work being done on the control technology course or that done at high school level. The preferred approach was an holistic one, adopting "egg race" type projects, which approached technology in a practical manner. The motivational potential of these projects was considered to be high for the following reasons:

1. Quick results were possible with constant feedback as ongoing testing led to development.

2. Team work in a competitive situation.

3. Specific objectives made the task clearer to students.

4. Project assessment was easier for students due to the more limited and specific objectives.

Assessment from a staff point of view, however, was considerably complicated by the use of group work. It was difficult to devise a system which could objectively measure a students input to a project, the only work specific to individuals being the log sheets of ideas and record of development.

The 16+ scheme of assessment, however, does not demand that all work be
marked, only that all work be available for display. It was suggested by staff that it would be better to assess individual contributions to the project on a more subjective basis and in discussion, as the project neared completion. No marks would go forward to the 16+ grade, the project would stand solely on its intrinsic value as a relevant part of the course structure.

The specific egg race chosen for the technology brief was selected from the "Ideas for egg races" (34). The hill climb vehicle offered all the opportunities listed earlier and also a compact and readily available system of ongoing testing and development.

The course structure intended to lead into group work gradually and over a series of group projects. Initially students would be allowed to select groups based on friendship patterns, then groups would be selected on a random basis from the register and only after this was it intended to select on socially engineered criteria. In this way students may gain valuable experience of the positive potential of group work in terms of encouraging communications, idea generation, teamwork and social skills and yet would be led gently into a situation which is potentially very threatening.

For this particular case study, however, it was decided to go immediately for the socially engineered group in order to learn from the type of group work which, it was anticipated, would cause the greatest number of problems and yet offer the greatest educational advantage. More lessons could be learnt despite the fact that students would be going into group work without the lead up intended in the course structure.

The criteria chosen for group selection were dependent upon staff knowing students well by that stage of the course. They were:

1. No close friends.
2. A spread of ability.
3. No more than one "poor attitude" case.
4. If possible a mix of sexes.

No absolute model of how to operate in groups was presented to students,
though a brief discussion was held at the start of the project on possibilities. Aspects discussed included how the work could be directed – via a leader or in a cooperative manner, delegation of work and the recording of results.

Difficulties were anticipated in the form of students resenting the breaking of friendship groups, and poor initial communications within the groups. It was stressed as important for staff to emphasise to students why this had been done and also remind them of the reasons as the project progressed.

The element of competition was introduced as a potential motivational factor. We should, however, be aware that as a whole the policy of the school was to minimise competition in order to reduce failure in individual students and subsequent lowering of motivation and self esteem. No orders of merit were produced and the house system made little attempt at encouraging competition. Despite this policy it was felt that if correctly handled competition could have a positive educational value in this situation.

A further factor in the approach of this project was the opportunity to show students that alternative approaches to design did exist. It should be remembered that many students were beginning to gain the impression that design was a rigid method. Such an approach would tend to minimise creativity and opportunity. The use of a developmental approach, incorporating quick modelling techniques with frequent testing and development gave students a further insight into the potential of design.

Resourcing.

A very direct approach was adopted in order to maximise motivation by involving students as quickly as possible. There was no lead in lesson as such, staff were told to introduce the project as briefly as possible and have the groups working within 10 minutes.

The resources prepared were essentially very simple:

1. Teachers notes, see appendix (5).

2. Student booklet, see appendix (6).

3. The test course itself, prepared by the school technician.
4. A teacher's resource box, containing small tools likely to be needed, such as a glue gun, wheel turning jigs and mandrels, rubber bands, pre-cut wood, wax etc.

The student booklet was put together using computer generated graphics in order to encourage a technological association. The colour and design of the cover were bold in order to catch the eye and, hopefully, interest. Students were asked to record ideas and experiments on the yellow follow up sheets. All paper work was on A4 format, used horizontally, whereas students were used to working on A3 paper in the department. A4 was satisfactory for the simpler role drawing was to play in this project and had advantages in terms of cost and storage.

In order to gather data two general sources were used. Firstly observational data and secondly interviews with members of staff after the project was completed. During the period of observation a similar role was adopted as used in the case studies with withdrawal groups, that is as a non-authoritarian observer who talked to students, asked questions and was prepared to give advice.

Observation.

As anticipated there was considerable discontent, at the start of the project, on announcement of the composition of the groups. On the whole this consisted of quiet grumbling aimed at the social engineering aspect, though some students were surprisingly very upset about it. One example of an extreme reaction was the loud comment "I'm not coming to this lesson again!" and indeed one teacher reported a student who did not attend any of the design lessons during the period of the project. This was, admittedly, an extreme reaction, the student had attended normally beforehand but resisted all pressure from the pastoral system during the project. For many students resentment was demonstrated by an unwillingness to cooperate within groups, being slow to form into groups at the start of each lesson and a tendency to talk to friends in other groups. Staff commented upon the amount of work necessary to overcome the inertia of resentment caused by this form of grouping.

The above notes, specifically on the point of grouping, point a fairly black picture on student reactions to socially engineered groups. We should remember that this concept was alien to these students, those talked to
claimed never to have come across this form of grouping anywhere in the curriculum. As indicated above the intention of the course structure was to lead into this gradually, this more direct approach was being used in this case study simply to gather the maximum information. The effects of this sudden move were anticipated, however the following points could be made:

1. Staff identified the most resentful students as those who had a poor identification with design anyway. It may well be the case that these students resented the grouping technique, but it may also be a part of a reaction caused by a general disaffection.

2. In all cases two teaching groups, totalling an average of 45, worked together in the open area. This led to crowding and an ease of communications between individuals of different groups. A better group identity, and eventually, sense of purpose, would have been established if groups had more space to work.

3. The standard of group cooperation did improve over the period of the project. This makes it reasonable to assume that had a more logical pattern of group work experience, as proposed in the course structure, been used there would have been a far greater acceptance of the socially engineered pattern.

4. All students talked to at the end of the project recognised the reasons why the grouping was done in this way, and agreed with its value for them in the future. Several, however, made the point that this did not necessarily make them enjoy it.

5. The groups were too big at four, one student made the observation "There was not enough work to spread around". This is a reasonable comment, next time such group work is used three ought to be the optimum number.

Another factor which came to light during the observation was the reaction of girls to the project. It must be made clear that the following points are generalisations, not all girls reacted identically and indeed many boys could be said to have reacted similarly. We should also remember that girls were in the minority in the 3D groups, typically 3/4 in each group of 20+. The girls in that fourth year had only experienced a very small amount of technology at their high schools and only in their final year there.

The first impression given was that the majority of girls reacted most
strongly against the topic of technology rather than the grouping. Words such as "I can't" and "It won't be any use to me" were used. The strength of reaction, along traditional sexist lines, was a cause of great concern, especially as these girls were virtually at the end of their compulsory education. There are no easy answers here, however it is reasonable to suppose that a gentler lead in, in a more relaxed atmosphere than the socially engineered groups, whilst working from a good foundation in technology at the high schools, should lead to a greater degree of identification with technology.

It will also be necessary to consider the findings of the "Girls and Technology Education Project", reported in the TES of 29 June 1984. This suggested that girls have a far more suspicious attitude towards technology and that it will be necessary to change the emphasis of design and technology courses to place some emphasis on the broader aspects of technology, beyond "traditionally male areas of diluted civil, electrical and mechanical engineering to include new technologies in the fields of medicine, agriculture, food and pollution control". The report also emphasised the need to consider social and moral aspects of technology and to place emphasis on the personal as well as abstract aspects of technology.

The social engineering of the groups also caused a degree of alienation for girls, particularly as they tended to be allocated as the only girls with three boys in a group. The reaction was usually one of quiet rejection, whereas the boys had been vocal. Typically the girls did not get involved in the work of the group, although we should also recognise the chauvanistic attitude of some of the boys in ignoring any contribution made by a girl or simply allocating them a role as a record keeper. It would have been interesting to repeat the case study using an aesthetically based topic to see if once the traditional male role of dominance in matters technical was removed the degree of chauvanistic behaviour diminished.

The way in which groups organised themselves and the work rate produced was disappointing and failed to improve to any great degree over the period of the project. There were, admittedly, many disturbances to group composition and routine due to student absences for visits etc. A short discussion had taken place at the start of the project on possible uses of members within the group, but no firm model had been presented. This was reflected in the way in which the groups worked, primarily using an inefficient decision making process, a poor division of labour and a tendency for one student to work with the others watching and making suggestions.
In terms of the generation of ideas, whilst there was considerable discussion evident in some groups the quality of recording of ideas and decisions in student booklets was poor. The range of concepts put forward by the groups as a whole were very limited and the technology reflected work of a far lower age range which leads one to question the decision to lead directly into the project without any form of technology input.

It was clear that the majority of groups arrived at a working principle and model very soon, as was intended, however, there was little evidence of serious development from that time onwards. Development was a key concept for this type of design work and the failure to grasp this concept and exploit it appears to reflect on work done in the 3D design course previously. Students appeared to be content to have arrived at a solution which worked and were not too concerned with developing it despite staff pressure.

It was evident that the testing of devices did lead to the generation of enthusiasm, often large groups gathered around the test ramp which provided an ideal focus for teaching, offering many opportunities to discuss points with students on an informal basis. The level of commitment to the project appeared to take an upturn after the first two weeks when the testing of the first devices generated a positive feedback. Despite this improved commitment, however, it was clear that as a reasonable solution evolved the work rate lowered as indicated above, development was not as strong an element as had been hoped.

Observation indicated that the end of lesson debriefs did not go as well has had been planned, for two basic reasons:

1. Firstly staff began to allow students to carry on working for too long. This meant that little or no time was available after putting tools away to discuss work. This was to some extent understandable, when an air of purpose had been developed staff were reluctant to lose it, or simply became carried away, not noticing the time. The aim of clearing away early was twofold: firstly to generate time for a debrief and secondly to enable students to leave on time with the workshop tidy and all tools accounted for, rather than experiencing the rush and bad feeling that was fairly typical of 3D lessons previously. By clearing away late the staff had lost the opportunity to hold a debrief and secondly may have caused an antagonism in students who were losing some of their free time.
2. The second limitation was the way in which the debrief themselves developed. They tended to become shorter, as indicated above. Staff tended to drop the insistence of a rota of spokesperson for each group. The reason was understandable, many students found such a formal situation very difficult and tended to give a very disjointed report. The teacher often reacted by leaving this part out and opening a discussion generally. This minimised the anxiety on particular students but also enabled them to "hide". This situation meant that unless the teacher's questioning technique was perfect many students may have managed to avoid being drawn into active discussion and, therefore, would not have gained from that discussion in terms of self confidence or understanding.

Staff debrief and discussion.

The following notes were based upon interviews with four teachers who were involved with the project, one of whom took three separate groups through the project. The sample, therefore, represents the observations by staff of 120+ students experiencing the project.

To avoid repetition of points covered in the previous section only the key points are discussed below. The notes cover two broad areas, those concerning group work and those concerning the project itself:

1. All staff reported that the disruption typical of that time of year was amplified by the fact that students were working in groups, continuity was badly affected in many cases. The course structure specifies individual project work up to the last week of the fourth year when a short, team, simulation project would take place. Absences would cause less disruption to individual project work and would also be less likely to influence a group project lasting only one week.

2. Staff remarked upon the difficulty students experienced in coming to terms with group work, primarily in respect of a willingness to form new relationships and an ability to divide labour in order to work efficiently as a group. The socially engineered groups used in this case study did, as previously indicated, put students in the most difficult position in terms of relationships. When following the proposed course structure this would be led up to gradually. Staff made the suggestion that there should be initial experiences of various forms of group work over a far shorter time period. In this way students would be able to recognise the fact that the situation
was for only two periods and so be able to cope with the stress involved more easily. To some extent, this point is answered by the suggestion made earlier that students "brainstorm" out points of analysis etc at stages of what are otherwise individual projects. Other than this the only similar experiences planned are the two simulation exercises. Staff will have to consider either the development of the course structure to include such short experiences or the introduction of formalised elements within the individual projects. The course structure was intended to be dynamic rather than rigid.

3. A number of lower ability and disaffected students were observed by staff to lose interest during the project, though staff pointed out that the students involved tended to react in a similar manner to other design work. It is, on the basis of data available, impossible to be sure why these students became alienated by the project, whether it be the groupwork, the project topic itself or any other factor. Certainly staff felt the brief to be simple enough for lower ability students to understand and achieve a measure of success and yet also offer opportunities for considerable depth for higher ability students. One is led to presume that isolation from peers was in many respects the most alienating factor.

4. One member of staff took a group with a large proportion of high ability students following a three sciences course which required their absence for two of the five periods per week during the project. A clear fall in the sense of direction and work rate was reported when the high ability students were no longer present. This was a strong indication of the directive force such students could carry and links well with previous observations on a poor sense of direction amongst lower ability students.

The key element here is the establishment and maintenance of a sense of direction. In some respects the use of socially engineered groups may well be a good way of exposing the average and below average student to such models in a more effective manner than a single teacher would be able.

5. The factor of the amount of space available to groups has already been mentioned but it is necessary to include further comment at this point on the basis of staff comments. 45+ students in the limited space of the open area made concentration difficult and appeared to encourage excessive social interaction, which could hardly be avoided, particularly when members of any team were moving about to use the equipment. The effect of this frequent social contact was that students lost touch with the project, feedback was
slow to be obtained, and so the beginnings of a spiral of underachievement was reached.

In future the additional adjoining space available in the graphics base should be used, together with staff allocation of work tables which would enable available space to be utilised to its best potential, rather than allowing students to congregate in clusters of groups.

6. The relationship of girls to the groups has been covered in the section on observation. One member of staff gave the following additional information, based on a house group that had not been directly observed by myself. In this case girls had been allowed to join groups in pairs, whereas in other groups there had been only one girl to each group due to their small numbers. In those groups with two girls the member of staff observed that the mutual support was beneficial and the girls were much more involved with the project or, indeed, separated from the boys and produced a solution of their own. This is an interesting point and again illustrates the strength of feeling most students attach to personal relationships in their work.

7. Whilst staff clearly recognised many problems in the use of socially engineered groups all reported a breaking down of barriers to some extent over the period of the project. This observation ties in with my own discussions with students covered earlier, a typical comment being "I didn't like it at first, but it's alright now". The steadier introduction to group work intended by the course structure will, on the evidence of this case study, lead to a positive result in respect of the general aims of groupwork: the ability to cooperate; to generate ideas in a cooperative manner; to work efficiently as a team.

8. In terms of the project itself staff had several observations. Whilst it was recognised that the project was capable of stretching students across the full ability range there was disappointment with the degree to which this was achieved. As previously indicated lower ability students and those with poor attitudes to work gave up just as readily as they had done with other projects despite the fact that staff felt reasonable solutions to be within their grasp. It is possible that the higher ability students within the group pushed on too fast and the lower ability felt isolated from the work, though no specific observations were available to confirm this.

Within the higher ability range there was staff disappointment at the level
of solution offered. These student appeared to have developed a workable solution quickly but then failed to capitalise on the opportunities for development. In the project planning both extremes of ability were considered and strategies suggested to staff (see teachers notes appendix 5). These strategies were not followed up actively by staff, rather than the strategies themselves being failures. The staff recognised this fact and put it down to the pressure of large groups. Observation backed this up in so far as staff were continually involved, unfortunately a great deal of time was spent on encouraging less motivated students to become involved, this detracted from the more central task of counselling students on aspects such as developing technological concepts and applying them.

The lack of development of the project, in design terms, was evidenced by the limited range of types of mechanism considered by students. Those mechanisms actually chosen offered opportunities for development but even these remained at fairly basic levels. Staff questioned the decision not to use a lead lesson or system of resources to give students a wider vocabulary of technological understanding. The reasons why this decision had been taken centred around a wish to encourage motivation by immediate involvement and a reliance on a degree of previous experience from the high school and elsewhere. On balance, it would appear to have been necessary to include some form of input for this particular year due to the fact that technology had only been introduced into high schools in their final year and in a limited manner. It would be interesting to repeat this case study in two years time when we may be confident that all students will have received a technological background at high school level.

A further way of encouraging a variety of approaches and, therefore, enriching the overall class experience, would be to write in a greater degree of freedom at the planning stage. One may also consider encouraging diversity by including a requirement for this in the brief issued to students. The writing of such briefs, however, is not to be considered an easy matter, in this particular project the wording was intended to prevent simple catapult devices which would climb even a vertical course and at great speed. Nevertheless, two students considered that they had found a way around the wording to produce such a device. In the end all staff could do was accept their reasoning and use the situation in a positive manner to illustrate to students the need for lateral thinking in design work.

9. In working the project several members of staff remarked on the
difficulty students appeared to have in using the booklet. Rather than actively using the booklets in discussion as a notepad to communicate visual ideas, the booklets were really only used as a means of recording the final design and even here students tended to leave this for a week or so before they entered any information. The methodology of actually using the booklet needed far more organisational ability than students appeared to be capable of. More efficient end of lesson debriefs may have picked this point up and enabled staff to give advice.

10. Some teachers remarked upon the lack of any mechanism in the project structure to enable staff to ensure just what students had learnt and how well they had understood the concepts they had applied. This is a fair criticism, the answer being that there had been no intention to evaluate the students' specific technical understanding. The primary aim had been for students to experience some technical concepts in an holistic manner, whilst working as a member of a group. The 16+ syllabus does not call for a specific body of knowledge as CSE's and 'O' levels in technology do. The main point has been the experience of a method of thinking and working rather than the learning of any specific body of knowledge.

CASE STUDY SUMMARY.

The aim of this final section is to pull together some of the overall points raised by this project. Detailed points have already been covered in previous sections and will not be repeated here.

The main aim of the project was certainly fulfilled in that the experience highlighted many of the difficulties of this form of work and yet it led staff forward with an increased confidence in groupwork and the possibilities for alternative approaches to design.

The adoption of a systematic introduction to both of these aspects, as proposed by the course structure should ease many of the limitations which arose during the artificial and rather forced experience presented by this case study.

Staff began to recognise the benefits of explaining to students the reasoning behind approaches adopted in far more detail than had hitherto been the case and subsequently the use of frequent reminders in order to build student acceptance and confidence in the approaches being used.
We cannot, of course, claim total success in this respect, but when we consider the shock the new approach offered and the strength of student reaction to it, the degree of acceptance by the end of the project was reasonable. The adoption of the structured introduction proposed should raise this degree of acceptance higher.

The act of explaining to students the reasoning behind the project also had the benefit of encouraging staff to think more carefully about the work they were generating. The pressures of work for staff were such that staff were not necessarily assessing the value and effectiveness of their programmes of work as well as they might. Team teaching and the explaining of work to students all encourage a more detailed self appraisal of work.

The case study again highlighted the importance of continuity and a logical development of curricula between the high and upper schools. Earlier sections of this work had given rise to confidence in future developments but on the other hand the case study illustrated the limitations of the present situation in respect of student understanding of design and particularly the technical element within 3D design.

For example.

1. All students had a fairly poor background to technology and furthermore there was no evidence that students were able to translate those concepts they did hold into a developed reality. This is to be able to develop a basic concept, refine it and apply it in a real sense.

2. The majority of girls were seen to hold fixed and sexist views on the relevance of technology to themselves.

As indicated previously, it is expected that these limitations will ease as the high school curricula develop. As girls become sensitised to the possibilities of design and particularly technology their numbers in such subjects will rise and, in turn, increased numbers will give a greater confidence to tackle problems in group situations rather than falling back on a sexist role.

One of the aims of the case study technology project was to open up minds to creative thought by showing students alternative approaches to design. In this respect the ability to use resources and a variety of approaches to
design are important, though it will not be possible to evaluate these aspects of the course structure for some time.

The case study illustrated the problem of the use of resources in particular. It has been agreed that a greater resource base needs to be made available for design work, however it was also seen that no student made use of those books available in the department or in the school library during the project. The course structure needs to take into consideration the need to encourage a student's autonomy in seeking information from appropriate sources. This could be done by various elements, written into projects, which exercise the students in using various sources in order to familiarise them with the possibilities.

The dangers of a student being seen to fail publicly have been covered already. In this respect the experience of the case study offered no clear solution, indeed the closeness of the group situation and the reliance of team members upon each other tended to emphasise failure. Whilst there would appear to be no way around this problem we may consider that by careful placing of those students who may be at risk in this respect, amongst a group of students who the member of staff can expect to be more supportive than most it may be possible to give them positive feedback and raise their self esteem by being a part of a successful team. The group dynamics of such situations are complex and one could never be fully confident of a positive result, however we must again take the pragmatic view that the potential benefit of groupwork far outweigh potential difficulties for individuals and that a member of staff who is fully aware of these factors may reduce the possibilities of failure by sensitive handling of group composition.

The value of group work was recognised by all staff and students by the end of the project, despite the fact that some students admitted to not enjoying working in socially engineered groups.

The decision had been made by staff not to attempt to assess such work, as has been explained earlier, however this raises an important point. If we recognise the ability to work as a member of a group as important we should also recognise that the students ability to work in this manner and the development of this ability should be assessed in some way, even if the actual product of that group work is not, though it must surely reflect the efficiency of that group work. Assessing a student's ability to work as a member of a group is a difficult and largely subjective task. For any degree
of reliability some form of triangulated observation technique would be required. To some extent the team teaching used in the department could offer some advantages in this direction.

A further limitation that may be recognised in the use of group work is due to the impossibility of ensuring that the aims of the activity are necessarily met. A situation could arise where a dominant student may take the lead and prevent participation by others either directly or indirectly. Certainly there was evidence of this to varying degrees in the case study project. Such a situation would provide a poor experience for the majority of members of the group.

One of the advantages of group work envisaged in the considerations of the course structure working party was that it would enable a more efficient use of teacher time, in that, in this case there would be four times fewer "units" needing teacher support. This, it was expected, would improve the quality of teacher intervention with each unit, in this case a group of four students. The case study observations, however, indicated that this expectation was not fulfilled, staff were still very stretched throughout the lessons and again spent a disproportionate amount of time simply encouraging certain individual students to become involved in the work of the groups and "selling" the concept and validity of groupwork. Whilst one must agree that these are relevant matters to staff it was disappointing that the use of groups did not engender a closer working relationship between students so freeing staff to concentrate upon helping students develop understanding of the concepts involved in the project itself.

It is hoped that the smooth development of group experiences and skills, as proposed in the course structure, will answer many of these points. However, on the question of assessing a students abilities to work within a group it will be necessary to look to a profiling technique which, as indicated in an earlier section, is a major area for research in itself and will not be examined any further in this work.
CONCLUSION.

The aim of this final section is to look at those general areas of concern which have emerged during this study but which have not been dealt with in the more specific summaries of individual sections.

There is, of course, great danger in over simplifying factors and their context. Those discussed below exist in a very complex and dynamic interrelationship and yet we are forced to artificially separate them in order to gain some perception of the intricacy involved.

We may approach this task by identifying three broad areas: the student; the teacher and the curriculum.

The evidence of this, albeit, limited study, indicates that a large minority of students hold strong feelings against either the curriculum in general, or aspects within it. Students demonstrated a capability for fine discrimination. The strength of feeling in many cases was, frankly, disturbing and made all the more so by the inability of staff to handle this resentment, where apparent, in a constructive manner. In many cases students were allowed to avoid work in certain areas of the curriculum in which they were capable of achieving a degree of success in terms of personal advancement and qualifications. A number of students exhibited disaffection which was actually upsetting the development of a working ethos in the group.

Teachers recognised the need to encourage students to become active and willing participants in the educational process, however. It was apparent that staff rarely made an effective job of justifying directions to students. Students lacked the faith that such an approach demands.

The reasons for this situation were complex, though in terms of staff, two main areas were apparent:

1. Teachers felt themselves to be under an excessive work load in terms of many factors, for example, staffing ratios, mixed ability teaching and general administration. It was, however, apparent that staff were not using available time as effectively as they might, due to both stress induced tiredness and the lack of an effective model or structure to work within.
2. Teachers were using teaching techniques which were alien to them up to fairly recently. We should remember that concepts such as design education, mixed ability and team teaching were recent developments imposed by staff in authority. Not all teachers necessarily agreed with these principles or had received any form of initial or in service training to illustrate possibilities. We must ask ourselves whether, even if staff agree with such techniques, (which was certainly not the case here), can we be sure they really understand the principles and opportunities they offer? If the answer is in the negative we can expect the work done to be ineffective.

The directional factor of the curriculum was seen to be severely limited due to the drawbacks of the Leicestershire system. In order to reap the benefits of this system time and resources will have to be made available to ensure effective liaison. Alternative and more efficient forms of liaison need to be explored. Examples may be various forms of staff exchanges and the opportunity for staff to be able to explore alternative approaches to teaching design in other, similar schools, outside the immediate area.

Curriculum needs to be an active concept, with inbuilt systems of feedback and growth. It must never be allowed to degenerate into a simple "body of knowledge" requiring consumption and regurgitation. Teachers, in turn, need to see themselves firstly as teachers who teach via a curriculum rather than imparting that curriculum to students. In this respect staff need to be encouraged and enabled to look at the wider questions of curriculum relevance for students who will become the citizens of the future.

A technique which would be of positive value in terms of curriculum and staff professional development would be the use of periodic inspection procedures using colleagues from other schools. If approached in a constructive manner all participants would learn a great deal, including the assessors. An outside observer may reveal many aspects hidden from participants by close proximity.

The key to the overall situation is the teacher, his standards of professionalism and effectiveness. This study has, in a limited manner, gone some way to unravelling some of the complex interrelationships of the many factors in the environment of a particular course, in one school and some of the ramifications and possibilities in terms of alleviating certain forms of learning difficulty.
APPENDIX 1.

BURLEIGH COLLEGE. A description.

Burleigh college is a comprehensive upper school and community college within the Leicestershire system of 11-13 high schools and 14-18 upper schools. Students transfer to Burleigh from three feeder high schools although the reader should be aware of the following points.

a. Woodbrookvale.

A new high school, no students will enter Burleigh from Woodbrookvale until 1985.

b. Limehurst.

Previously a single sex girls school which went co-ed in 1981/82. All girls at Burleigh at present (ignoring transfers) came through a single sex system with no 3D design experience.

c. Garendon.

Adjacent to Burleigh. Previously a single sex boys school, therefore similar points apply as above but at Garendon a fuller range of design activities was available, including fabric and fashion. It should be noted that a "roundabout" operated within the design department at Garendon but the experience within the 3D area is very much one of crafts rather than design.

Lismon.

Whilst there is strong agreement with the principle of an 11-16 curriculum to take students smoothly across the high school/upper school divide, progress in achieving this aim is slow within design due, primarily, to the pressure of work. It is hoped that an 11-16 curriculum of some form will be in operation in the next few years, however, at present, all boys and girls at Burleigh came via rather different systems.
Community.

The school is also a community college. Adults may form part of normal day classes; day and evening classes for the community are active; and the community may use the resources of the college for example reprographics, workshops and staff expertise. It would not be appropriate to discuss the merits of the community college concept here, however, it should be pointed out that there are few adults, other than teachers actually working within the design department and therefore those beneficial aspects of a community college do not apply directly to this work.

Organization.

Burleigh operates parallel systems of academic and pastoral control.

Pastoral.

The college is divided into 4 houses each of which is made up of mixed ability tutor groups of about 20 students, each coordinated by a group tutor. Groups meet twice daily, at the start of the day and after lunch for registration, notices and tutor based activities.

Academic.

a. Core curriculum. All students take 5, 35 minute periods per week in English, maths, design and X block (an amalgamation of RE, games, PE and careers, on a roundabout).

b. Options. Each student then has a choice of 4 other subjects of which one must be a science and one a humanity. There are a wide range of options but the following points apply:

1. Most options are on a set basis, ie CSE, GCE, or non-exam. There are, however, many subject areas which do not offer non-exam courses and so the lower ability student is very limited in his choice of options.

2. Within design it is agreed that a student specialising in, say, art, within core design, cannot also take art as an option subject. Similarly a student taking 3D design in core would not be allowed to opt for metal or woodwork. The principle is to prevent a student choosing a narrow curriculum.
3. Technical drawing and food are not a part of core design at Burleigh, unlike at many other Leicestershire upper schools. They operate within the option system only.

**Timetable.**

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<th>Monday, Tuesday, Thursday, Friday.</th>
<th>8.45</th>
<th>9.10</th>
<th>10.55</th>
<th>11.15</th>
<th>12.25</th>
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<tbody>
<tr>
<td>Tutor P1</td>
<td>P2</td>
<td>P3</td>
<td>Break</td>
<td>P4</td>
<td>P5</td>
<td>Lunch</td>
<td>Tutor P6</td>
<td>P7</td>
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<table>
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<th>Wednesday only.</th>
<th>8.45</th>
<th>9.10</th>
<th>10.20</th>
<th>10.40</th>
<th>11.50</th>
<th>12.45</th>
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<tr>
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<td>P4</td>
<td>Lunch</td>
<td>Tutor P5</td>
<td>P6</td>
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<td>P8</td>
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1. The day is split into 35 minute periods arranged either as singles, doubles or trebles. The timetable on Wednesday is different to accommodate the limitations of this system.

2. Core design operates on one treble plus one double period, whereas options operate on two doubles and a single.

3. There is a twenty minute break in the morning but none in the afternoon. School finishes at 3.15. A large number of students live in outlying villages and use contract buses. These buses leave immediately and consequently out of hours activities are few.

4. From the interviews it was found that most students find a Wednesday afternoon, of 4 periods, without a break hard. When asked for suggestions, other than switching to a 3 period afternoon, it was clear that an afternoon break was needed. Students did not want to extend the day to cover it and it would be impossible to further shorten the lunch time to cover it.
5. Students gave very mixed reactions to lesson length. No firm conclusions can be drawn.

6. Staff perspectives on lesson length vary. Linguists tend to prefer at least 3 contacts per week whereas design and sciences prefer the 3 + 2 system to allow time for practical work. Many design staff feel that the 2 + 2 + 1 system in options is useful for "theory" but I feel this tends to preserve inappropriate teaching styles based around the timetable - eg "filling" a single period with theory when a number of short theory inputs within longer lessons may be more appropriate.

7. Many staff pointed out that low ability and disaffected students had difficulty concentrating in long lessons.

8. Lunch, at 55 minutes is short. This was done so that a 3.15 finish was possible in order that staff may use the time for administration and curriculum development. This has had two broad effects:

a. Lunch is too short for activities after students have waited in long lunch queues.

b. After school few staff are free of meetings to supervise out of hours activities for the remaining students who are not tied to contract buses.

This is unfortunate as I feel a thriving extra curricula programme (both at lunch and after school) has a broadly beneficial effect within a school.
APPENDIX 2.

DESIGN AT BURLEIGH.


"We, at Burleigh Community College, see design education as the application of understanding using imagination, originality and creativity to obtain a desired result, using materials, processes, and scientific principles with an appreciation of aesthetics.

We feel self expression and personal reaction to design problems are important facets of a student's total education. We hope all students will become enquiring and imaginative people. Few will become designers by profession, but all will benefit from an education which enables them to meet life's everyday problems and make decisions. They will be able to evaluate and maximise the quality of their lives."

2. The development of design at Burleigh.

The design centre was purpose built following the Leicestershire plan type of design faculty and opened in 1973. Home economics remained in a separate block. Subjects within the area were taught independently and on an option basis.

In 1979 a Burleigh mode 3 design course was started which introduced an element of design into what were basically craft courses. Students followed a "roundabout" of separate material areas in both art and 3D areas.

In 1980 design became a "core" subject in the curriculum in that all students followed a course in design, though they opted for either art, fabric or 3D design within that core. In that year a new curriculum area coordinator and 3 other staff were appointed to the department (including myself). All those new teachers were committed design teachers, whereas the other staff had a craft or art background.

By 1981 the department had jointly devised a new mode 3 design studies syllabus which was initially adopted by the 3D and fabric areas. Although the art department retained its mode 1 CSE courses the exercise started the process of integrating the department. Whilst students continued to opt for
either art, fabric or 3D design within core certain common elements were
team taught across areas and there was a vast increase in cross
fertilization of ideas between departments.

In 1983 the department as a whole adopted the new Leicestershire 16+ design
syllabus. This is a pilot scheme which is jointly certificated in that marks
are awarded at either CSE grades 5,4,3,2 or GCE C,E,A.

Departmental organization.

1. Coordinator. (scale 4)

2. 3 departmental heads within core design.
   a. Art.
   b. Fabric.
   c. 3D (functional design).

3. Departments in options only.
   a. Food and living studies.
   b. Graphical communications.
   These departments come under the control of design but do not operate in
   core, only as options.

4. Core design. When a student enters the design department for core design
   on a 3 + 2 period basis he or she chooses to follow design via one of the
   three media of: art, fabric or 3D design. The student works primarily in
   that area though he may use facilities anywhere in the department as a whole
   if necessary.

   There is an element of interlocking through:
   a. project work when necessary.
   b. a linking element within the course which examines those areas and
   concepts common to design in all three areas. This is done by a series of
   exercises spread throughout the two years of the course. These exercises are
   planned by groups of teachers from all areas.

5. Examinations. Those students in the fifth form are completing the
   separate CSE and GCE courses as appropriate, though in mixed ability groups,
   it should be remembered. The fourth year are all following the pilot 16+
   scheme on a jointly certificated course. In many respects the 16+ is very
   little different to the Burleigh mode 3 which preceded it. Changes in
   working practice have been minimal, although the art department has had to
   increase its weighting on experimental work.
APPENDIX 3 FEEDBACK 1 DOCUMENT

A series of notes intended for internal staff use only.

FROM: DEN
TO: DESIGN STAFF

SUMMARY OF MAIN POINTS FROM STUDENT AND STAFF INTERVIEWS THAT RELATE TO 3D COURSE PLANNING.

1. I want to use some of my time this term to help develop the 3D course, including the generation of resources for and the presentation of, at least one project over a 6 to 8 week period. This project, or package could then be evaluated by the staff and a series of interviews with students. Information gained can then be fed back into course development.

2. It was very evident that we need a greater degree of structure at both:
   a. A 2yr course level - ie mapped out but flexible depending on feedback.
   b. Within projects - this will help to give students confidence in approaching design, especially those of a lower ability. My research in the high schools backs up this conclusion, however changes in the high schools approach to design, happening at the moment, will mean developing our approach in 2-3 years time.

3. a. Designing is difficult. "We" have been overconfident in thinking students can grasp the concepts with minimal staff input.
   b. Designing is closely dependent on a students communication skills. Many students have poor self concepts from the high schools in drawing, often seeing it as "art", in fact many chose 3D because they did not want to do art or fabric. They often find that this poor self concept causes them difficulty when trying to express an idea they hold in their head, they can talk about it, but they cannot sketch it.
   c. We give very little feedback, either during, or at the end of a project. We are not helping students learn all they can from their design work.
   d. There were many examples of a low regard for design in the interviews. I am working on how we might "sell" design on a broad front, however I feel there is a great deal we could do during our teaching to improve the
standing of design in the students' eyes.

SUGGESTIONS

4. We should put more structure into projects. Eg rather than starting with a statement of a problem area we might try a development type of project such as Jim Flood's roller project - I'll say more about this at the next staff meeting. We might also try using standard sheets for analysis and evaluation, ie a banda sheet with guide lines on them and spaces for response. Low ability students can answer successfully, higher ability students can use the sheet as a basis for expansion. There are other possibilities here, perhaps an aide-memoire that enables a more individual student answer whilst still giving guidance where needed.

5. We need an agreed course structure underneath the examined objectives of the 16+. We might start by trying to decide what the essential aspects of a product design course are, break them down and teach them via projects based on these aspects. Eg. form; colour; ergonomics; structures; mechanisms, etc.

6. Many students get negative feedback in 3D due to the central role drawing plays. Drawing is essential but we need to help students realise that what we are after is an ability to communicate ideas.

   eg.
   a. To the examiner - a record of the student's thought processes.
   b. To the individual himself - a sort of memory bank to help in the generation of ideas.
   c. To the staff so that we may guide them.
   d. To other designers, eg during group work.

The 16+ assessment scheme is very flexible, it doesn't specify means of communication, therefore we need to broaden the minds of the students as to possibilities including tapes, wider use of models and photography other than drawings of various types. We need to get away from the situation where design students feel they have to sit down and design on paper to perfection before they get up and construct the design. We need design to be more active, developmental and relevant.
7. We need to create time during each project to give feedback to all students. To generate that time we need to minimise our "technician" role and maximise our teaching role. We could:

a. Use technician help for machining and issuing materials etc.
b. Structure projects so that less machining by staff is necessary, e.g. use standard sections laid down in the brief.
c. More guided analysis and evaluation sheets would allow staff freedom to give feedback at the essential moments at the beginning and end of each project.

At the end of each project it is essential that all students get a more individual and thorough feedback than at present. The "all gather round" for 10 minutes technique has its uses. It is immediate and good for helping students see other approaches, but I feel we need to give more than that. We could, for example, give core or homework exercises to give that time for more individual debriefing.

8. To "sell" design we need to take time to:

a. Explain why design is a core subject.
b. Explain the relevance of design to a wide variety of jobs.
c. Explain the structure of the course clearly.
d. Emphasise the academic quality of design to those who look down on it, without alienating those of lower ability.

All of these things need constant reminders, it is not sufficient to explain them at the start of the course and then presume the student remembers these "facts". They are not "facts" but attitudes to a large degree and need constant reinforcement.

Perhaps we can use these few notes to start some debate within 3D design on course structure over the next few years. My talks with the high schools indicate that there will be a marked improvement in design ability and basic craft skills by the time the present first years get to Burleigh, we might even notice some changes as the present second years rise. These changes will mean that we will have to look again at the way we introduce design at that time.

So, for the remainder of the time available, I would like to help develop:
a. A course structure to use with the present and next few intakes, together with some of the projects and resources necessary.

b. To look forward to the new, enlightened, intakes and be ready to make the most of that, potentially exiting, situation.

DEN 15.1.84.

APPENDIX B FEEDBACK 2 DOCUMENT

A series of notes for internal staff use, reporting on developments within the course structure working party.

FROM. DEN 17.2.84
TO. 3D staff
REF. Course structure feedback

Paul, Steph and myself have had a number of meetings in the last few weeks addressing ourselves to the points in the first feedback notes. So far we have concentrated on course structure. If you wish to make any points on these notes please see me, either informally, or I can arrange a time for a meeting.

1. We were clear that the basic direction of the 3D course was good, what was needed was a clearer structure for staff and students. Radical surgery was not necessary.

2. We are moving towards a curriculum similar to that proposed by the DES in their 1983 11-16 statement, that is, a curriculum based not simply on facts learned but also the development of skills, attitudes and concepts.

We need to be sure that all students have the opportunities to develop these areas and so we must consider them in our planning.

The DES consider skills as "a capacity or competence - the ability to
successfully perform a task, whether intellectual or manual." In design we can list our required skills from communications, observational, and social skills to practical tool manipulation skills. We have decided to adopt the list of skills we worked on last year for resource preparation as a basis for this aspect of course planning. A suggestion for incorporating these into the course structure follows later.

The DES define attitudes as "a disposition to think or act in a particular way." They list a variety that are applicable to design eg. adaptability; commitment; cooperation; reliability; self confidence; self discipline, etc.

Again, we need to build in opportunities for students to exercise such attitudes.

3. On the conceptual level we decided firstly to clarify what "we" are. We decided on a "product design" identity and started to list some possible conceptual areas within such an area. The list is not closed, please see me if you wish to make alterations, however small.

These are in no particular order:

- graphical
- ergonomic
- economic/production
- environmental
- functional design
- modular design
- aesthetic design
- technological
- evaluation
- materials testing
- invention

4. It was agreed that what we needed was a hierarchical structure.

a. Examined 16+ objectives = highest level.
b. Product design conceptual level = operational course structure.
c. Design skills = base level.

Only the 16+ objectives are actually examined but a clearer structure would enable us to plan more effectively, resource and give a clearer identity as a department.

5. Homework was seen as essential. Again we are working on a structure of skills and concepts from which a termly homework list will be produced as before.
a. evaluation exercises
b. observation exercises
c. research
d. communications - graphical techniques, flow diagrams, logos, maps etc

6. We felt that by planning out the course more effectively we could attack the learning difficulties problem by making more use of various teaching strategies and so improving motivation. We need to stretch all students.

   a. use of team projects.
   b. occasional competition, team or individual.
   c. set briefs - open ended - time allocation to vary.
   d. structured briefs - eg development projects.
   e. simulation exercises.

Within this limited selection there is great scope. It was felt that this would be more interesting to students than the 6/8 week cycle we have settled into.

7. A suggested model was based on the idea of project areas being chosen from the product design concept areas eg ergonomics, and the course planned for the 2 years of each intake. In this way all projects will be decided and their methods of presentation and operation sorted out by staff who would then be allocated specific areas to resource.

Skills would be organized on a resource basis so that students would have access to a catalogue and relevant resource material which would slowly evolve.

Flexibility can be built in. We all saw deadlines as realistic and necessary. Slack time, if a student finishes before a deadline, can be used positively by doing additional skills exercises and short mini projects that would have been resourced by then. We felt the "go and make something to fill in the time" approach was not suitable but had had to be used up to now due to the lack of resources.

Example of a flexible project plan.

mini intro project. ➔ main project area. ➔ buffer time. ➔ deadline.

eg mechanism square mini briefs
The skills and mini briefs that the student completes can be recorded on a staff master sheet for future references and possibly profiling.

**COMMENTS?**

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**APPENDIX 5.**

**TECHNOLOGY BRIEF. STAFF NOTES.**

**Intro.**

This project has been developed from the course structure work done by Paul, Steph and myself over the last few months. The aim is to use the project as a case study in order to gain insight into the workings of mixed ability grouping (MAG) and mixed ability teaching (MAT) in 3D design at Burleigh.

In order for this to work as a piece of research, I will have to insist on a degree of standardization in method. Sorry to upset your professional autonomy but you will have to bear with me.

**Administration points.**

1. Referee - Paul, all points on the competition and assessment side to him please.

2. Date for final staff briefing will be notified as soon as possible.

3. Grouping.- This aspect is very important, please observe the following points.
   a. Working teams of 4 to be set up in each teaching group. No team larger, only one smaller, if necessary.
   b. Each team will have a number for use in marking all project work, eg N2, B3 etc.
c. Select teams on the following criteria:
   1. No close friends. Ensure the social and communications benefits of HAG.
   2. Try to get an ability range within each team.
   3. No more than one "poor attitude" case per group, this is important.

d. Please decide on your team breakdowns early. I will be chasing you for a copy. I will then produce team lists which can be placed on the open area notice boards.

  e. Teams to stay together for all of this project.
  f. Teams to operate from a nominated team table.
  g. Teams to nominate and rotate spokesperson for all report back work. Again, this is important, staff please ensure it is done.
  h. It is vital that no renegotiation of teams is allowed with students.


5. Security. We must minimise "lost" work. At the end of each session teams will place all their paper and practical work in a polythene bag and give it to staff for safe storage.

Teaching points.

1. A major point of this work is that students must avoid getting the impression that everything must be designed on paper before practical work can commence. The sheets are to be used for quick ideas, recording results of trials, modifications etc.

Encourage students to use quick mock up methods to experiment practically. Point out available resources eg pre-cut wood, glue gun, dowell etc.

2. At the start please keep teacher talk to the minimum - students should be in teams and working very soon.

3. Whilst normal team teaching may continue will staff do all registration and necessary talking only to their own group. Groups can base themselves in open area or graphics base. This is an important point, I do not want central registration, etc to 40+ students together.

4. Please ensure a "team identity" forms by insisting on work only within
the teams and that the teams form on their benches together at the start and end of every lesson.

5. At the end of each lesson start packing up at 15 minutes before the end of the lesson. This is VITAL, I want to try to develop a more cooperative packing up procedure, followed by a relaxed debrief of work done in that session for 5 minutes. Students should all leave well on time, without "hassle".

6. Any groups struggling with the paper ideas stage after 15 minutes of work in the first session should be encouraged to quickly glue together a rectangular chassis from the pre-prepared wood and try it out.

7. Any group finishing the overall project early should be given extension tasks. eg:
   a. Build a second entry based on a different principle.
   b. Incorporate a device to stop the vehicle on the finish line. The device must be built and totally carried on the vehicle.
   c. Investigate the effect of different road/wheel surfaces, ie design a device to test traction and use it to evaluate certain surfaces for wheel and road.

8. Wheel making will be an important part of this project. I suggest you give demos to two teams at a time on two basic methods.
   b. Using the disc sander technique.

Points to emphasise to students.

1. Why we have socially engineered the groups, ie to encourage communications, ideas, teamwork, social skills, etc.

2. Emphasise design approach to be far less paper orientated. Use of mock-ups and practical experiment vital.

3. Assessment. This is a CSE brief and as it is a team project assessment is more difficult, therefore:
   a. All practical work to have team number on it.
   b. Each individual to keep up own booklet up to date as assessment will be by this as well as the overall competition.
4. Remind students of these points frequently, do not simply read out and let them forget it!
### STUDENT ASSESSMENT

#### 1. Profile.

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<th>SOMETIMES</th>
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<tr>
<td>Cooperates well with teacher.</td>
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<td>Cooperates well with other students.</td>
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<td>Shows interest in the work.</td>
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<td>Thinks for him/her self.</td>
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<td>Gets on with work well.</td>
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<td>Presents work tidily.</td>
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<td>Shows originality of ideas.</td>
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<td>Can evaluate own work.</td>
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<td>Has self control.</td>
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<td>Thoughtful for others.</td>
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<td>Acts safely in the design area.</td>
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<td>Cares for tools and materials.</td>
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#### 2. Comments on skills.

- **Listening and understanding.**
- **Communicating ideas verbally.**
- **Communicating ideas graphically.**
- **Manipulative skills.**
<table>
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<th>WORK CARRIED OUT</th>
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APPENDIX 8.

INITIAL INTERVIEWS - STUDENT FACTORS.

The following factors were based on the initial analysis down to 11 basic areas.

1. TEACHING METHODS.

a. Too much time waiting for teacher advice.
b. Personality clashes with staff, flexibility needed?
c. Poor staff presentation of work.
d. Staff need to be firmer, and demand more work. Some students' behaviour upsets the work rate of the rest of the group.
e. Teachers who were also house heads were frequently called away from teaching.
f. Friendship groups sometimes reduced work by excessive chatter.
g. Lost coursework, depression follows, frustration.
h. The limitations of the facilities - opportunities for outside work.
i. Too much emphasis on examinations, particularly the 'O' level work.

2. THE TEACHING ENVIRONMENT.

a. Poor layout of area, open area poor for listening/working.
b. Lost coursework - security.
c. Enjoy getting out of school for some work.

3. MOTIVATION.

a. Some students are not trying and are open about it. In some of these cases it is a general apathy to school.
b. Some don't see relevance of evaluation.
c. Students like the choice of options on entering the upper school.
d. Parental support for design often low, due to lack of understanding.
e. Students did not see relevance of design in fabrics when a wide range of patterns are available.
f. Some students were doing examinations in all subject but design, a learning resistance?
g. Some students resented having to do design in core.
h. Students taking the "3 science and French" course often objected to
losing "academic" time.

i. Friendship groups were often preventing work.
j. Attitudes were deteriorating in some cases due to a feeling of helplessness in both design specifically and school generally.
k. Students were very particular about what they liked and disliked in the curriculum.

l. Students appreciated being treated in an adult manner.
m. Continual assessment in design often depressed students after low grades.
n. Students did not see the logic and structure of the design course clearly.

4. EXAMINATIONS/QUALIFICATIONS.

a. Most of the "lower ability" students saw examinations as unimportant.
b. Most average and high ability students saw examinations as important but design was seen as another qualification rather than an important one.

5. VOCATIONAL ORIENTATION.

a. Most students saw design as important only if directly concerned with their own vocational aims.
b. Most students saw a vocational element within design as important.
c. Most students saw "home skills" as reasonably important.
d. Most students saw "leisure interests" as unimportant.

6. METHODS OF ASSESSMENT.

a. Students could not grasp the concepts and practicality of 100% continual assessment.

7. PROJECTS/WORKSCHEME.

a. Interest in a home skills course element is high.
b. The set projects often seen as uninteresting.
c. Homework was poorly received.
d. Students wanted project briefs to be more flexible or a free choice.
e. Students would like more variety in the approach to work in design.
f. Material costing was difficult, a better system was needed.

8. DESIGN SKILLS.
a. Students did not enjoy "paper designing".
b. Students enjoyed the making side of design.
c. Students found designing difficult.
d. The importance of designing is recognised.
e. Students could design "in their head" but not on paper.
f. Students felt that design could give one "awareness".
g. In fabric the wide range of commercial patterns destroys relevance.
h. Self concept as a designer is usually set by the first year of high school.
i. The initial visual communications element of the 3D course was not enjoyed.
j. Frequent failure in drawing caused a low self concept in that area and depressed effort.
k. Should home economics be in core design?
l. Little help from high school 3D staff on drawing.

9. **SELLING DESIGN.**

a. Students need to connect the importance of design with everyday life. At present they tend to see it primarily in relation to vocation.
b. Students did not realise that transfer within the fourth year design course possible if not happy with initial choice.

10. **11-16 CURRICULUM.**

a. Students complain of lack of development from high school to upper school in 3D design.
b. Better communications needed from upper school to students in the high school about course options. The "roadshow" is useful but not enough.

11. **COMMUNITY EDUCATION.**

a. Useful to bring in adults to help in design and put over their skills.
b. Possible to use senior students to help younger ones.
APPENDIX 9.

HIGH SCHOOL INTERVIEWS - FACTORS.

The following factors were extracted from a total of nine interviews which included all high school heads of department and teachers of 3D design. No count of frequency was made, the factors being used simply to ascertain future directions.

The following factors are not in any particular order:

1. Liaison.
   a. Liaison with junior schools very poor. Difficult for staff to get time to do this.
   b. Limited liaison with upper school, staff wanted more direction from the upper school but at the same time resented it.

2. Design skills.
   a. Staff would like design concepts to be introduced at junior school.
   b. Differences in the degree of structure in projects necessary to ensure specific skills, cognitive and manipulative, covered.
   c. Drawing skills rarely taught in junior schools but reached a good standard by end of high school within art classes.
   d. Limited degree of drawing done in 3D design. Poor transfer of drawing skills from art to 3D in high or upper school.

3. Design structure.
   a. All high schools operate a roundabout in design subjects.
   b. Questions in some schools as to whether home economics should be in design.
   c. Technology operated separately from design in two schools.
   d. Lack of linkage with design at the upper school.
   e. One school operates curriculum as a whole on "centres of interest". This is intended to break down curricular barriers. Other high schools are considering following this example.
   f. Resource bases in the high schools limited for a design approach.
   g. Open structures operated in design departments, no direct links between 3D, art, fabric etc.

4. Staffing.
   a. Significant numbers of non-specialist staff operate within design
departments.
b. Heads of design in two schools reported lack of flexibility in some
design staff.
c. Pressure on staff due to changes over last few years and additional
responsibilities, eg display.
d. Possibility of staff exchanges poor.
e. Very limited coordination between staff in one high school design
department. Poor support for probationary teachers.

5. Changes.
a. Many developments over the previous 2/3 years have caused considerable
pressure. Eg co-education, new staff, new courses.
b. Catchment area changes altering school identity reported at one school.

6. Work structure.
a. Roundabouts used in all three schools. Difficulty of finishing work in
some cases leading to lower regard for design.
b. Are projects too open in two of the schools?
c. Students given experience in team work in two schools.

APPENDIX 10.

An example of the self esteem, self concept in design and alienation battery
follows this page. It should be noted that the Brookover '67 scale has been
developed to change the focus from self in relation to the school to self in
relationship to ability in the design area.

The original Brookover questions are listed below from Cohen "Educational
research in classrooms and schools: A manual of materials and methods." pp
112. The modified questions may be found in the questionnaire booklet.

The other two scales were printed identical to the form used in Cohen.
The scaled response sections were identical and so have been left out below.

1. How do you rate yourself in school ability compared with your close
friends?

2. How do you rate yourself in school ability compared with others in your
class at school?
3. Think of all the other classes in your year at school. Where would you place yourself in terms of your school ability?

4. To become a teacher, a doctor, or a scientist, you have to go to college or university and pass difficult examinations. How likely do you think it is that you could do this?

5. For a moment forget how teachers mark your work. In your own opinion, how good do you think your work is?

6. What kinds of marks do you think you are capable of getting?
STUDENT QUESTIONNAIRE.

The following questions are to help us find out how well the courses at Burleigh are helping students. Please answer them honestly and as quickly as you can. We are not looking at individual students so please do not write your name on the paper.

There are three lots of questions, read the instructions for each one carefully.

1. Below are some questions about your school with which some students will agree and some disagree. Please put a circle around the number which best indicates YOUR opinion about your school.

   Remember there are no right or wrong answers. 1 = strongly agree 2 = agree 3 = uncertain 4 = disagree 5 = strongly disagree

   a. I can't make much sense out of what happens at this school. 1 2 3 4 5
   b. I feel I really am part of this school community. 1 2 3 4 5
   c. More and more I feel helpless in the face of what is happening at this school. 1 2 3 4 5
   d. The size and complexity of this school make it very difficult for a student to know where to get help or advice. 1 2 3 4 5
   e. A student has little chance of protecting his personal interests when they conflict with those of the school. 1 2 3 4 5
   f. I seldom feel lost or alone at this school. 1 2 3 4 5
   g. Life at this school is so confusing at times that a student really doesn't know where to turn. 1 2 3 4 5
   h. It's wishful thinking to believe that a student can influence what happens at this school. 1 2 3 4 5
   i. This school is just too big to really look after each individual student. 1 2 3 4 5

Please turn over.
2. Read the 25 statements below carefully.
   Put a tick on the line under LIKE ME if the statement describes how you usually feel.
   Put a tick under UNLIKE ME if the statement does not describe how you usually feel.
   Be sure to put a tick in one or the other column for each statement.
   Remember there are no right or wrong answers.

<table>
<thead>
<tr>
<th>Statement</th>
<th>LIKE ME</th>
<th>UNLIKE ME</th>
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<tbody>
<tr>
<td>a. I often wish I were someone else.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>b. I find it hard to talk in front of the class.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>c. There are lots of things about myself I'd change if I could.</td>
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<td>-</td>
</tr>
<tr>
<td>d. I can make up my mind without too much trouble.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>e. I get upset easily at home.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>f. I'm a lot of fun to be with.</td>
<td>-</td>
<td>-</td>
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<td>g. It takes me a long time to get used to anything new.</td>
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<td>h. I'm popular with kids of my age.</td>
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<td>i. My parents usually consider my feelings.</td>
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<td>j. I give in very easily.</td>
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<td>k. My parents expect too much of me.</td>
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<td>l. It's pretty tough to be me.</td>
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<td>m. Things are all mixed up in my life.</td>
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<td>n. Kids usually follow my ideas.</td>
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<td>o. I have a low opinion of myself.</td>
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<td>p. There are many times when I'd like to leave home.</td>
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<td>q. I often feel upset at school.</td>
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<td>r. I'm not as nice looking as most people.</td>
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<td>s. If I have something to say I usually say it.</td>
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<td>t. My parents understand me.</td>
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<td>u. Most people are better liked than I am.</td>
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<td>v. I usually feel as if my parents are pushing me.</td>
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<td>w. I often get discouraged in school.</td>
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<td>x. Things usually don't bother me.</td>
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<td>y. I can't be depended on.</td>
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3. We would like you to tell us something about the way you see yourself and your ability to do work at school.

Put a tick next to the statements below which best show how you see yourself. Put only one tick against one statement in each section.

a. How do you rate yourself on ability in Design compared with your close friends?
   1. I am the best
   2. I am above average
   3. I am average
   4. I am below average
   5. I am the poorest

b. How do you rate yourself on Design ability compared with the rest of your year group?
   1. I am the best
   2. I am above average
   3. I am average
   4. I am below average
   5. I am the poorest

c. How do you rate yourself on general ability in school compared with your year group?
   1. Amongst the best
   2. Above average
   3. Average
   4. Below average
   5. Amongst the lowest

d. Do you think a qualification, like CSE, in Design is important to you?
   1. Very much so
   2. Reasonably important
   3. I'm not really sure
   4. Not very important
   5. No use at all

e. For a minute forget how teachers mark your Design work, in your opinion how good do you think your work is?
   1. Excellent
   2. Good
   3. Average
   4. Below average
   5. Very much below average

f. What kind of marks do you really think you are capable of getting in Design?
   1. Mostly 10/10
   2. Mostly 7/10
   3. Mostly 5/10
   4. Mostly 3/10
   5. Mostly 1/10
APPENDIX 11.

INITIAL INTERVIEWS - STAFF FACTORS.

The following 9 factors were based on the initial analysis from 89 basic factors.

MOTIVATION.

a. Quick results needed.
b. Build structure and limitations into projects.
c. Bring outside world into department.
d. Large groups mean less attention, boredom often results.
e. Feedback to students is essential - formal and informal methods.
f. Some students don't get their first choice in core design.
g. No options available in fabrics.
h. Low standards of finish/craftsmanship lower motivation.
i. Time limits are artificial. Not used consistently.
j. The wide ability range in the groups makes aiming the level of presentation difficult.
k. Industrial visits add realism and interest.
l. If a student has a motor skills learning difficulty it can be very disheartening when he is unable to match the quality of his ideas with actual practical expression.
m. More time needed to help those with learning difficulties, this is difficult in a large mixed ability group.
n. The CSE/'O' level courses not answering student needs.
o. Group work beneficial, but difficult to assess.
p. Course still emphasises technique and so less dexterity means failure in a very public place.
q. Student apathy to qualifications due, they claim, to present economic climate.
r. Students need to see relevance and a chance of personal advancement.

DESIGN SKILLS / BUILDING A POSITIVE SELF CONCEPT IN DESIGN.

a. Core design in the sixth form?
b. Need to show students they are designers.
c. Build a positive self concept in design for student.
d. Problems faced in putting ideas down on paper.

e. Many students see 3D design paperwork as "art".

f. Students need to be shown the relevance of thinking skills learnt in design to everyday life.

g. Developing an awareness of the designed environment.

h. Many students do not see the relevance of design, including higher ability students.

i. Core design can cause resentment amongst some "academic" students.

j. Staff must recognise that designing is difficult.

k. Poor background of material handling skills from the high schools.

l. Some staff feel the 3D course does not emphasise craftsmanship enough.

m. Students do not see projects set as "real problems."

n. The Leicestershire system of high schools and upper schools causes problems in the development of design concepts and skills.

o. Work in design should start at the junior school.

p. Staff often see skills and designing as a chicken and egg situation.

q. Low standards of workmanship do lower motivation.

r. Staff need to give students confidence with design skills.

s. The "roundabout" is not necessarily the best way of teaching skills.

t. There needs to be more opportunity for aesthetic work within 3D design.

u. Non-design staff in the school often have a poor attitude to design.

v. Students see projects in a very isolated manner.

w. Staff often destroy free thinkers, as soon as they go outside the teachers frame of reference they are cut down.

TEACHING MATERIALS.

a. The teaching teams need better organisation for resource generation and giving feedback to students.

b. More thought needed on project choice.

c. Cost of materials a serious limitation.

d. Are we pitching the concept of design too high?

e. The pros and cons of deadlines for project work.

f. The difficulty in choosing projects to cover ability range.

g. Possible use of a structured introductory project to force students to explore a variety of design areas.

h. Should food be in core?

i. Low ability students need more structure to project work.

j. The teacher is the most important resource, are we using him correctly?

k. Resource based learning cannot cover for inadequate staffing.
1. The most successful projects in the past have been simple.
2. Staff need more time to assess the success of a project.
3. Projects need some flexibility to enable students to go off at interesting tangents.

**FEEDBACK SYSTEMS.**

a. More staff analysis time.
b. More feedback to students, both as individuals and as a group.
c. Better integration of design staff - interchange of ideas.
d. Time for student feedback to teachers on projects.

**ASSESSMENT SYSTEMS.**

a. Present exam based systems not answering needs of students.
b. Students may find aspects of the 16+ course too "academic" and withdraw.
c. Should we re-introduce streaming in design?
d. One teacher suggested design only for 'O' level students, the remainder take craft based subjects.
e. The use of profiles / student records of achievement?

**11 - 16 CURRICULUM.**

a. Should we go further and include the sixth form in core design?
b. Much student dissatisfaction with the work done in high schools on basic skills.
c. Staff get very defeatist on high/upper school liaison.
d. Should design work start at the junior school?
e. Lack of continuity between high and upper school curriculum in design.
f. Staff felt students often spoon fed at high school and lack initiative in their design work.

**TEACHER LOAD.**

a. Group sizes too big. Optimum sizes for 3D design 10 to 16?
b. Need ancillary help.
c. Time allocated for analysis.
d. Possible uses for "floating" teachers.
e. Wandering students in the design open areas.
f. Liaison load.
g. Staff continually involved in crisis management, this prevents good planning.
h. Pressure on teachers to push for examination results.

FINANCE.

a. Problems of capitation and resale cuts.
b. The 16+ and its effects on capitation.

THE DESIGN CENTRE ENVIRONMENT.

a. Bringing the outside world into the department.
b. The design centre is a poor visual environment.
c. Students need a stimulating environment to boost imagination.
d. Many physical dangers in the centre.
e. Many difficult to supervise areas.

APPENDIX 12.

Student self assessment. Learning resistance.

Initial data using fourth year student self assessment forms to investigate the concept of "learning resistance." Composite table printed in main body.

Note. In order to be able to produce this table with reasonable clarity a number of minor subject options have been left off, those with only small numbers of takers from the overall sample.

KEY: E-english; M-maths; D-design; T-typing; C-commerce; H-humanities; HI-history; G-geography; HB-human biology; B-biology; P-physics; CH-chemistry; S-social and personal education; TD-technical drawing; CT-control technology; F-french.
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DESIGN

INTRODUCTION

Since the introduction of comprehensive education in Leicestershire schools in 1957, the authority has had a positive interest in design education. Today, in the majority of our schools/colleges, Art, Technical Studies and Home Economics subjects are assembled within the curriculum through a Design Department or Faculty. This association has brought a new coherence and purpose to Design Education in our schools.

While the national public examinations have continued to promote the separate disciplines of Art, CDT and Home Economics, the opportunity to pursue a different course using Mode 3 examinations at CSE level has been an important factor in the development of Design Education in Leicestershire.

When it became clear that proposals for 16+ National Criteria would be sought from separate subject bases (Art, CDT, Home Economics) it was felt that much of the valuable work developed in our schools could be threatened. Following a conference of heads of design in schools it was decided to set up a working party to propose a 16+ examination which would be applicable to a wide range of design departments and one which would at the same time, support the continued development and progress of Design Education.

The purpose of the syllabus is not to suggest an examination which would undermine or diminish the status of the separate subjects of Art, CDT or Home Economics which will continue to exist as separate examination options. Rather, it is an attempt to present an alternative examination which would be concept based instead of subject based. It uses subject knowledge in the pursuit of ideas and design activities: it does not presume or set out a particular body of subject information.

The examination is about studying and reacting to the man-made world: it is about the practice of designing and realisation.

SYLLABUS

Design

for

JOINT GCE/CSE EXAMINATION

in

1985

40p
A. THE SPECIAL STUDY  30% of the total marks

The Special Study should incorporate historical, social, economic, ethical, functional, operational and aesthetic considerations by the candidate in response to the designed work of others. It may take the form of written, illustrated, filmed, slide-taped, modelled or any other suitable method of communication.

The Board will suggest a single theme for the Special Study. This will be distributed to Centres for the beginning of the Autumn Term of year 4; OR Centres may set their own theme(s); OR Individual candidates may initiate their own theme, subject to the approval of the teaching staff in the Centre. There is no need for any of these choices to be communicated to the Board.

The Special Study will be internally assessed and externally moderated and must be completed by the 31st March in the final year of the examination. This section of the examination is intended to assess the candidate's analytical and critical responses to the design environment and its artifacts. These will be demonstrated in the candidate's ability to —

- analyse and evaluate selected products, places, systems and/or visual communications,
- explore the social, economic, technical, aesthetic, historical and operational reasons underlying the form, content and appearance of the man-made world,
- have insight into the way decisions about the man-made world are taken and to consider the outcomes and effects of these decisions.

With this in mind, the following will be used to measure the candidates' skills of Observation, Description, Analysis, Criticism, Synthesis and Presentation —

the appropriateness of selection,
the understanding shown in recording, documenting, describing, demonstrating and explaining phenomena,
the ability to justify views held by the use of reasoned argument and the support of relevant information,
the ability to structure and organise material towards an appropriate conclusion,
the quality and appropriateness of the style of presentation to the content.

1. AIMS

DESIGN

Through study and practice

(a) to develop a critical awareness of the man-made world, the environment and culture,
(b) to promote an understanding of the potential of and an expertise in those activities which are involved in designing and making,
(c) to foster curiosity, ingenuity and imagination through a personal involvement with ideas and materials,
(d) to encourage the special aptitudes and interest of the individual.

2. ASSESSMENT OBJECTIVES

Demonstrate an ability

(a) to analyse an idea, concept, situation or subject and to research and record relevant information,
(b) to communicate a number of ideas centred on a chosen study,
(c) to develop one idea and to plan those activities appropriate to a final realisation,
(d) to realise the proposal by using appropriate skills, materials and processes,
(e) to evaluate ideas and products through the use of suitable criteria.

The examination will consist of

A. A SPECIAL STUDY  30%

B. DESIGN STUDIES  70%

Section B1 DESIGN FOLIO  30%
Section B2 DESIGN REALISATION  30%
Section B3 EVALUATION REPORT  10%

A. SPECIAL STUDY

Candidates are required to look at the influence which designers have upon the world in which we live and to display a critical awareness of their observations.

B. DESIGN STUDIES

Candidates will be involved in the activities of designing and making in an area of study appropriate to their aptitude and interest. Candidates should also show that they have the ability to form conclusions about the appropriateness of their final submissions.
The ability:
- the level of awareness and recognition that may have resulted from the consideration of one or more of the following standpoints:
  - Historical, Cultural, Social, Environmental
- the range and development of alternative suggestions and investigation.
- the understanding shown in the application of appropriate technologies/processes/materials.
- the ability to select and organise media/materials towards an appropriate solution.
- the quality and appropriateness of the style of presentation.

B2. DESIGN REALISATION – 30%

A presentation of the final resolution of the chosen problem.

The projects may be realised in any material and are not intended to be exclusively three dimensional. Graphic design and work in non-resilient materials are equally intended.

While it is anticipated that a range of materials and process will be involved in the projects, it is admissible that a candidate should pursue a particular idea through a limited range of materials or even a single material.

The following variables will be used to measure the candidate’s ability to realise his/her chosen solution through appropriate materials and processes.

The ability:
- to plan and organise a course of action appropriate to realising the proposed solution.
- to handle the chosen materials and processes with skill and sensitivity.
- to change and effect such modiﬁcation as may be felt necessary.

B. DESIGN STUDIES 70% of the total marks

1. This section of the examination is intended to assess the candidate’s personal response to a particular situation, problem or observation through the presentation of:

   B1. A Design Folio 30%  
   B2. The Design Realisation 30%  
   B3. An Evaluation Report 10%  

   70% of the total marks

2. The Design Studies can stem from either the candidate’s own propositions or from suggestions made by the teacher. In the latter case a number of candidates might respond to the same suggestion.

3. It is essential that, in completing the course, each candidate collects together and collates his/her complete output over the two years. This is seen as a vital educational advantage for all candidates.

   This work should then be retained and be available for internal assessment and external moderation.

B1. DESIGN FOLIO – 30%

The folio should contain appropriate research materials, initial observations and investigations, and a record of experiments.

The folio should contain a clear record of the progress of ideas as they were pursued from ﬁrst thoughts to the ﬁnal drawings/conclusions.

It should also be clear from the folio the extent to which the candidate has understood relevant technologies and processes. An awareness of speciﬁc historical/cultural/social issues should also be apparent within the folio.

The Design Folio should therefore contain ALL relevant information, written and graphic, models and trial materials which lead to the making of the practical interpretation/realisation.

The following variables will be used to measure the candidate’s skill of analysis, observation, imagination, invention, proposition, synthesis and presentation.

- the level of understanding shown as a result of initial investigations/analysis of stated problem/issue.
THE NON-CONTENT SPECIFIC GRADE DESCRIPTIONS...

C.S.E.

Grade 5
Follows a course in a generally acceptable manner but produces work which deals only superficially with the appropriate skills and falls within the more marginal interpretations of the intention and requirement of the syllabus.

Levels of achievement fall only within the range encompassing the most generalised fulfilment of the objectives of the syllabus.

C.S.E.

Grade 4
Follows a course in a complying manner and produces work which broadly recognises the appropriate skills and is within the wider context of the intention and requirement of the examination syllabus.

Levels of achievement fall within the more generalised fulfilment of the objectives of the syllabus.

C.S.E.

Grade 3
Follows a course in a purposeful but guided manner. Produces work which shows recognition of the appropriate skills and is within the context of the intention and requirement of the examination syllabus.

Levels of achievement reflect the generalised fulfilment of the objectives of the syllabus.

C.S.E.

Grade 2
Follows a course in a purposeful manner and produces work which demonstrates a knowledge of the appropriate skills and which falls into some of the more demanding intentions and requirements of the examination syllabus.

Levels of achievement reflect an overall use of the objectives of the syllabus.

C.S.E.

Grade 1 or Grade C
Follows a course in a competent manner and produces work which demonstrates relevant ability in the appropriate skills and intellectual and/or intuitive levels of proficiency which fall within the context of the intentions and requirements of the examination syllabus.

Levels of achievement reflect understanding of the objectives of the syllabus.

G.C.E.

Grade B
Follows a course in a competent and interpretative manner and produces work which demonstrates a comprehensive grasp of appropriate skills, interprets the intentions and requirements of the examination syllabus, and involves a personal intellectual and/or intuitive degree of proficiency.

Levels of achievement reflect mastery and understanding of the objectives of the syllabus.

G.C.E.

Grade A
Follows a course in a competent and interpretative manner, demonstrating an independence of mind. Produces work which clearly demonstrates proficiency in the appropriate skills, efficient understanding and interpretation of the intentions and requirements of the examination syllabus, and a high degree of personal intellectual and/or intuitive content.

Levels of achievement show a consistent mastery of the objectives of the syllabus.

These Grade Descriptions refer to the 'type' of candidate it might be expected to find in each category. They deliberately do not refer to any particular subject content or mastery of skills which might be expected as evidence in any part of the examination. These are contained in the descriptions used in the Assessment Form, A.F.I., and exemplified in the objectives and variables specified in the syllabus.

B3. EVALUATION REPORT — 10%

This should take the form of a written comment made as a result of the candidate's own evaluation of the projects. The Report should critically review the projects and make suggestions for improvements and/or alterations for each one.

The Reports will vary in depth and breadth according to the ability of the candidate, and it is expected that the spread of marks will reflect this range.

The following variables will be used to measure the candidate's skill in evaluation.

The ability:
- to observe, measure and compare.
- to appraise the success of the projects including a statement of possible modifications and developments.
- to compare the realised solution against the stated idea or intention.
- to make coherent and well argued statements.
- to present findings in an effective and appropriate manner.

N.B. There is no insistence that every candidate should use each of the variables throughout the syllabus. The candidate should be made aware of the variables in each case, but the form and content of the work and the candidate's level of ability will dictate their use.
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