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# An evaluation of mixed ability and team teaching methods for the delivery of Avon Modular Design and Technology to all pupils at GCSE

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## Abstract

*The delivery of National Curriculum Design and Technology for all in key stage 4 will be a significant concern of all teachers working in the area. In 1990 staffing changes at The Sir Bernard Lovell School made it possible for us to re-organise our teaching area in such a way as to facilitate the implementation of team teaching. In 1991 timetabling changes gave us the whole Year 10 population to teach. The first cohort have recently completed their course-work and examinations in Year 11.*

*This paper sets out to evaluate that experience in terms of both pupil and teacher perceptions. I will present data in respect of pupil achievement in Design and Technology and Science (where they are set by ability and 'traditionally' taught.)*

*The paper will also discuss briefly the applicability of the mixed ability/team teaching approach to the delivery of KS 4 National Curriculum Design and Technology (ATs 1-4) in the future.*

*Methodology: Semi-structured interviews with students and teachers. Questionnaire relating to the course in the context of their overall performance (sample of 50 students across the ability range). Presentation of results in Design and Technology and comparison with predicted results in other subjects.*

## Context

The Sir Bernard Lovell School is a mixed 11-18 comprehensive school which serves a predominantly urban community in Kingswood on the eastern outskirts of Bristol, as well as several villages extending towards the neighbouring city of Bath. The families from which the pupils come represent a wide range of social and economic circumstances. Opened in 1971 as a school with ten forms of entry it has now been reduced to six forms in each year. There are 950 pupils on the roll with 160 in the sixth form.

Since 1989 the Design and Technology department of the school has undergone fundamental and far reaching re-development. In 1989/90 most of the CDT wing of the department was moved from the school's second site where it was housed in prefabricated sheds set up to serve the old secondary boy's school (which merged with the secondary girl's school in 1971 to form the new comprehensive). In the new school it occupied converted facilities which reflected the department's bias towards engineering, woodwork and technical drawing.

In 1990 staffing changes led to a re-structuring of the school's faculty system which resulted in CDT Design and Technology being incorporated into the new Science/Technology faculty while Home

Economics and Textiles were administered by the Expressive Arts faculty. At this time the author and Terry Hewitt (the other full time CDT technologist) resolved to trial a team teaching approach in Years 7 and 11. This was felt to be successful and led to the publication of some small scale research (Hewitt, Webster 1991; Hewitt 1992).

In the light of this experience we decided to address the issue of accommodation in order to see if we could re-model it in order to facilitate the application of team teaching methods. The first phase of this restructuring involved the dismantling of one workshop to provide design/technical drawing facilities and a large enough space to house two (occasionally three) groups of students during teacher presentations. All workshop equipment, therefore, was housed in a large space central to the two design areas (figure 1).

Around this time the school timetable was re-organised so as to make CDT Design and Technology compulsory for all students from September 1991. Home Economics and Textiles continued to be offered in option blocks up to GCSE.

**General organisation of the course, procedures for dissaplying science set boundaries and a brief description of the syllabus**

GCSE Design and Technology (the Avon Modular Scheme) is taken by all students in Key stage 4 at The Sir Bernard Lovell School. Currently (92/93) this involves the whole year 10 and 11 population of (approximately) 320 students. Each year is divided into seven groups of 18 - 25 students per group using setting procedures operated by the Science Department. These groups are presented to the Design and Technology Department as two double groups and one triple so that, as far as possible, the set boundaries may be disappled and the larger groups are team-taught under a mixed ability regime.

All groups receive two consecutive hours Design and Technology per week. Usually all groups are taught within the main Design and Technology facility (figure 1) which was re-modelled in 1990 to permit the application of team teaching strategies. When extra space is required a Science Technology room and the Project/Workshop area (an old motor vehicle workshop) are used.

The Avon Modular Scheme comprises five modules taught and examined in three units.

1. The Double Foundation Core modules - 'Design' and 'Resources for Design', examined after two terms at Easter - comprises 40% of GCSE.
2. Optional Module - all SBL students take the 'Product Design' option which is examined at the end of the third term - comprises 20% of GCSE.
3. Double modules, 'Design' and 'Realisation' - examined very early in third term of Year 11 - comprises 40% of GCSE.

When each student completes a module they are awarded a level 1 - 4/U (1 being the highest score). At the end of the course these levels are added together to determine the GCSE grade. There are five modules and the scoring works as follows:-

	A	B	C	D	E	F	G
U	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20					
+							

(U awarded for a single module scores 5)

**Managing the course content**

**Introduction**

At the outset of year 10 all students were given a 'short form' syllabus which contained a broad timetable covering the two years of the course, details of the course content and copies of the mark schemes applicable to each module.

The content of the first two terms (preparation for modules 1/2) consisted of a graphics/materials unit followed by four 'mini-projects' concentrating on finishing single materials together with the presentation of high quality graphics.

- Spaghetti measure - 2 or more holes for different portions in hardwood, shaped for the hand with an abraded finish - ie no polish, varnish etc.
- 'Pop-up' Christmas card - card engineering incorporating some kind of mechanism and high quality graphics.
- Jewelry - sets (eg necklace/earrings) made from acrylic and other plastics and packaged or displayed.
- Decorative bracket - made from mild steel with a polished finish.

One of the above invariably took place in term three to make way for preparation for the 'seen' Design and Resources for Design exam at the end of term two.

The Product Design 'unseen' exam at the end of term three was addressed by a combination of video/slide sessions followed by quizzes (corrected versions used as revision notes) together with investigations and product disassembly/re-assembly exercises.

The final two terms work involved students in working individually to produce an artefact supported by a folio of design work. This (unlike the preceding modules) was internally marked and externally moderated..

**What do we do?**

Using the space - Teaching two or more groups together doesn't only give you more students, it also gives you the space they would have occupied as separate groups to use in a different way. We move students around quite a lot. For instance, at the end of year 10 students need to decide what they are going to make in year 11. We identify the ones who need help in deciding by moving out those who have decided. We establish 'high status' areas, specialist areas, secluded areas. We can easily

break up unproductive groupings of students and set up very productive groups. When timetabling permits we are able to involve our sixth formers in short term support and send out small groups to work briefly with teachers from other curriculum areas.

Using the staff - Having more than one teacher on duty with a group provides considerable freedom. One teacher may take individuals or groups of students away to show them something without affecting the continuity of supervision. One may become involved with work in depth while the others field general enquiries (students were particularly appreciative of this phenomenon and very understanding about the resultant fall in the level of general attention).

Celebration - This freedom also allows us to share students' work with others in the school. One or more student is often borne away with their work to show it to another member of staff who shares that student's interest and may provide them with useful comment. Staff and other students can be pulled in to see our students' work. This creates a very positive atmosphere and, incidentally, helps to publicise what we do.

Review - Each teacher in the team is responsible for the recording and assessment of the students in a (science) group's progress. In year 10 this takes the form of levels recorded for project work/tests etc. and is held centrally by the KS4 Technology Co-ordinator. In year 11 the review takes place on a 'rolling' schedule which means that the teacher should review 4/5 students per session - thus each student should be reviewed every 4 or 5 weeks. Students keep their own review log (figure 2) which allows for an accurate record to be made of their progress in terms of the module 4/5 mark scheme. Provision is made for parents to comment on the review log and it is used as their year 11 Design and Technology Record of Attainment.

Gender - Prior to 1991 students were able to opt for CDT Design and Technology in year 10. Records for the two years prior to 1991 show that boys opting for the subject outnumbered girls by 15 to 1. We felt that it was necessary to take steps to ensure that girls felt more comfortable with our subject. Accordingly we modified or changed completely the coursework in both KS3 and 4 to ensure greater gender neutrality. We also felt, though we had taken no formal decision, that we had been operating a policy of positive discrimination in favour of girls in Technology. Research that I am carrying out concurrently with that presented here indicates that this is the case.

Display - The department has extensive 2 and 3D display facilities sited in the corridor outside the workshops. The inclusion of students work here is a significant motivator.

### What did we find?

Results - The modular nature of this course allows us to accurately allocate GCSE grades long before the actual certificates are received.

Module levels show that 70% of all students will receive grades A - C

30% of all students will receive grades D - G

79% of girls will achieve A - C

64% of boys will achieve A - C

This compares with 63% (overall) A - C in 1992\*

51% (overall) A - C in 1991\*

\* these figures represent the results of opted groups whereas the 1993 figures are for a whole year group.

Teachers' impressions of the course - Three teachers were involved in the team which delivered this course to the year group studied here - the author, Terry Hewitt (Course Director) and Alan George (Science teacher and Head of Science/Technology Faculty).

Both teachers were interviewed and their impressions are summarised under the headings below:-

Strengths of Mixed ability grouping -

- No students were 'labelled' or 'binned' as a consequence of setting.
- Students felt responsible for their own learning and the great majority achieved their best potential.
- Students were stimulated, occasionally inspired beyond their own and teachers' expectations, by the work of their peers.
- The individual nature of students' approaches to tasks.

Weaknesses of mixed ability grouping -

- We all felt that there was a danger that we might not stretch those students at the top of the ability range - however none of us could think of an example of this taking place. It was suggested

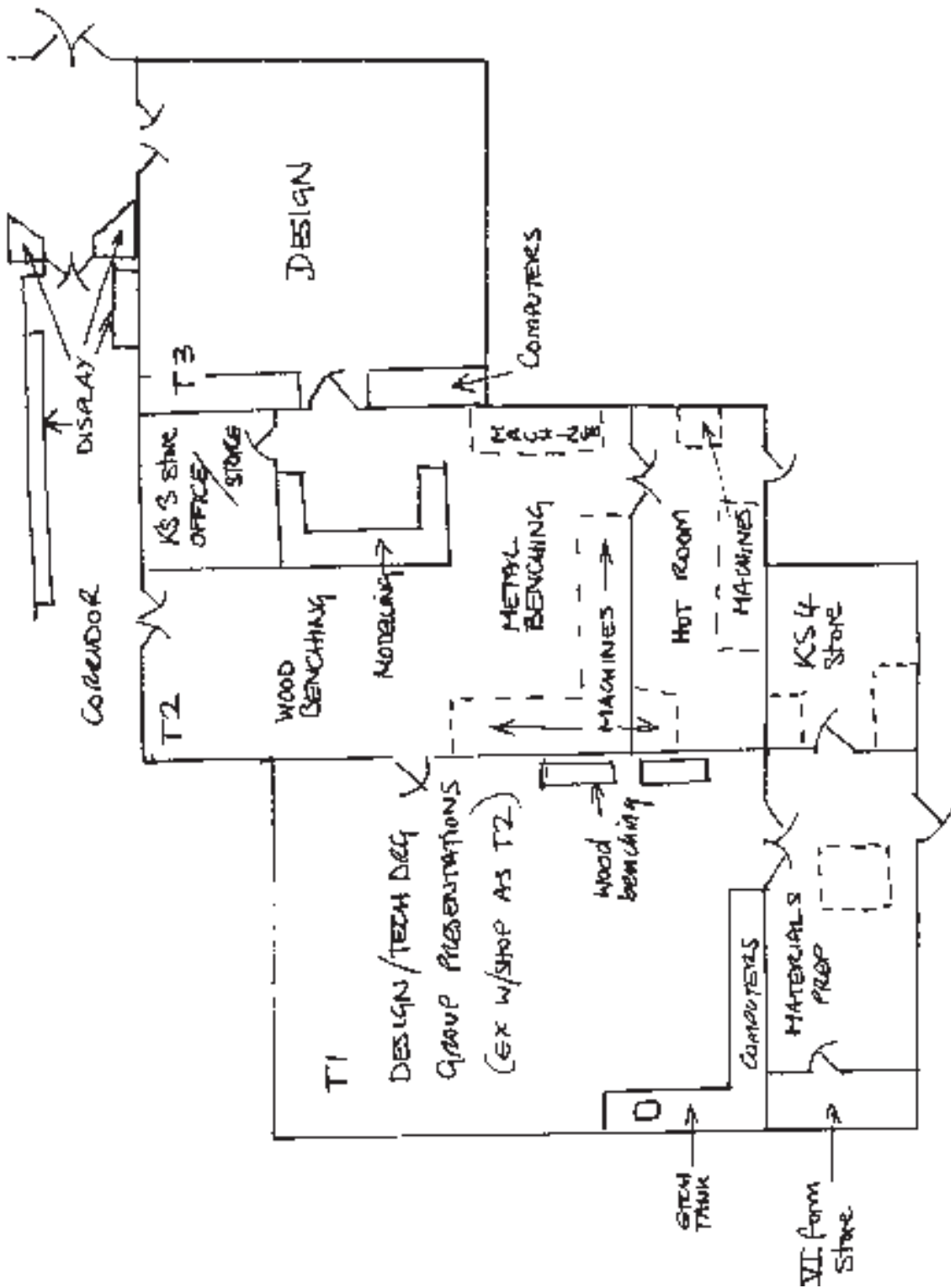


Figure 1 : Layout of the main D & T faculty at SBL

**THE SIR BERNARD LOVELL SCHOOL FACULTY OF SCIENCE AND TECHNOLOGY**  
**AVON MODULAR DESIGN AND TECHNOLOGY IN YEAR 11 STUDENT'S REVIEW LOG**

NAME: \_\_\_\_\_ CANDIDATE NO: \_\_\_\_\_ SC/TECH GROUP: \_\_\_\_\_

LEVELS ATTAINED IN YEAR 10:	MODULE 1 & 2	MODULE 3
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LEVEL TOTALS GCSE GRADES (TYPICAL)																	
GCSE GRADE	A	B	C	D	E	F	G	U									
LEVEL TOTAL	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	+

D & T Tutor please record impressions as level estimates for the five assessment objectives (see mark matrix, modules 4/5) and comment as appropriate.

**KEY:** PIA - Problem Identification and Analysis; DR - Design Research; DD - Design Development; M - Design Realisation; DE - Design Evaluation.

REVIEW DATE:	PIA	DR	DD	M	DE	MODULE TARGET:
Tutor Comment:	Signed: _____					
REVIEW DATE:	PIA	DR	DD	M	DE	MODULE TARGET:
Tutor Comment:	Signed: _____					
REVIEW DATE:	PIA	DR	DD	M	DE	MODULE TARGET:
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Tutor Comment:	Signed: _____					
REVIEW DATE:	PIA	DR	DD	M	DE	MODULE TARGET:
Tutor Comment:	Signed: _____					

**PARENTS/GUARDIANS**

We would like this log to be used as a basis for discussions with Parents/Guardians during Subject Evenings etc. Please use this side to comment and/or make notes of issues you would like to raise at these times.

Please date and sign comments/notes to help us build up a picture of your son/daughters progress.



Co-ordinator for Technology in Key Stage 4  
 R.D. Webster

that we set up temporary support groups throughout the ability range in the future.

- Alan George was surprised at how quickly he adjusted to the 'gear change' one has to make when moving between individuals of greatly differing ability but found the process very tiring.

#### Strengths of Team Teaching -

- Staff absences very rarely lead to curriculum discontinuity - there is almost always one of the team to deliver current material to the combined groups.
- Students can work to the teacher they prefer and teachers can 'pass on' to another any student with whom they might be experiencing some frustration !
- The way in which a teacher not involved in the formal presentation of material can 'pick up' on gaps and support the deliverer.
- Very helpful to a new teacher or one new to the subject.
- Good to see a range of students' work, not just one's own group.

#### Weaknesses of Team Teaching -

- Are we as 'sharp' in our delivery to such large groups as we would be with smaller groups?
- Some discomfort experienced by large groups of students during presentations (sometimes up to 75 students in a room with seating for only 35).

#### General disappointments -

- Working environment somewhat cramped and poorly ventilated - finances did not allow the provision of quality materials or equipment.
- Many students were not well skilled following Key stage 3 (this year group was in KS3 at the time we made so many changes and no doubt suffered as a result).
- The very few students who did not achieve their best potential.
- A wish that we could have found the time to organise our resources better and to use the review system more fully.

#### Particular pleasures -

- Students' joy at working.
- Exam results best possible for nearly all students.
- Working with colleagues inside the classroom/workshop.
- Working with such a high proportion of well motivated students.

- The fact that the results of this area of education are so clearly visible.
- The way students helped us with patience and forbearance when we were disorganised !

#### Students' impressions of the course

This information was obtained by interview and by the analysis of a questionnaire presented to all students in the year group.

Students felt generally positive about the course. Particular pleasures included -

- Being able to refer to more than one teacher.
- Taking responsibility for one's own work.
- Using the workshop.
- Being able to select where and with whom one worked.
- 'Getting good marks' - a frequent comment from some of the least able. Several of these students genuinely thought we were pulling their legs till they saw the official grade sheets.

Disappointments included -

- The (sometimes) cramped conditions in the workshop - a particular problem with three groups together.
- The module 3 exam (the 'unseen' product design test at end year 10).
- Queuing to use scarce machinery.
- The lack of quality materials (several students managed to produce good artefacts from scrap pallets!).
- Students waiting to get the attention they needed.

#### The pupil Questionnaire

The questionnaire was given to all students in year 11. Both low ability sets were used in the analysis (due to the low numbers of students in these sets at the time of the survey) together with one middle ability and one high ability set. The questionnaires were filled in anonymously. Students were identified for the purpose of analysis by gender, projected GCSE grade and ability set (given by the name of their science group).

The questionnaire is very simple in design and sets out to collect data in the following broad areas.

- Student response to the teaching/grouping strategies employed.
- Student perceptions of their performance in

Design and Technology in relation to the rest of their Key stage four courses.  
 The students' responses were scored very simply, using a positive/neutral/negative value as shown in figs. 3 and 3a. **Figure 3 - The questionnaire as presented to students**

Are you male female ? Science group? \_\_\_\_\_

What is your overall projected GCSE grade ? \_\_\_\_\_  
 (this is a very accurate prediction based upon latest grades)

	pleasant surprise	OK	disappointed
How do you feel about that grade?			

	very much	OK	not much
How much did you enjoy the course?			
How much did you enjoy working in a large group?			
How much did you enjoy working with more than one teacher?			
How much help were the reviews?			

	confident	didn't know	worried
Think back two years (!) and tick the box that best describes how you felt about doing D&T at the time.			

	Yes	No
If D&T had been optional then, would you have chosen it?		
If you answered NO are you pleased now that you have done it?		
If you answered YES do you wish that you hadn't done it?		
Are you doing 'A' level D&T next year?		

How does your result in D&T compare with projected results in other subjects?

The best	Among the best	About average	Among the worst	The worst

Write down one feature that was the best thing about the course

Write down one that was the worst.



Figure 3a - The questionnaire showing scores for analysis

Are you male female ? Science group? \_\_\_\_\_

What is your overall projected GCSE grade ? \_\_\_\_\_  
 (this is a very accurate prediction based upon latest grades)

	pleasant suprise	OK	disappointed
How do you feel about that grade?	<b>1</b>	<b>0</b>	<b>-1</b>

	very much	OK	not much
How much did you enjoy the course?	<b>1</b>	<b>0</b>	<b>-1</b>
How much did you enjoy working in a large group?	<b>1</b>	<b>0</b>	<b>-1</b>
How much did you enjoy working with more than one teacher?	<b>1</b>	<b>0</b>	<b>-1</b>
How much help were the reviews?	<b>1</b>	<b>0</b>	<b>-1</b>

	confident	didn't know	worried
Think back two years (!) and tick the box that best describes how you felt about doing D&T at the time.	<b>A</b>	<b>B</b>	<b>C</b>

	Yes	No
If D&T had been optional then, would you have chosen it?	<b>1</b>	<b>-1</b>
If you answered NO are you pleased now that you have done it?	<b>1</b>	<b>-1</b>
If you answered YES do you wish that you hadn't done it?	<b>-1</b>	<b>1</b>
Are you doing 'A' level D&T next year?	<b>1</b>	<b>-1</b>

How does your result in D&T compare with projected results in other subjects?

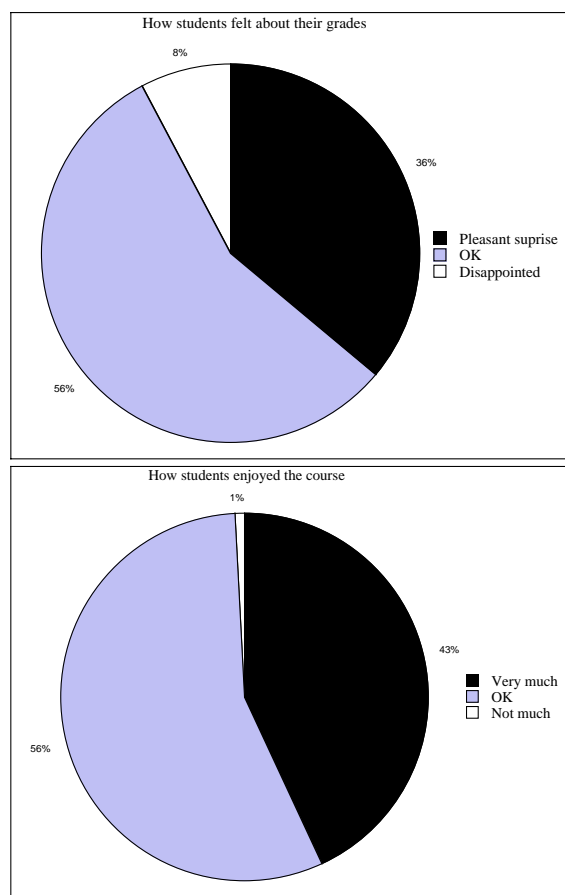
The best	Among the best	About average	Among the worst	The worst
<b>2</b>	<b>1</b>	<b>0</b>	<b>-1</b>	<b>-2</b>

Write down one feature that was the best thing about the course

Write down one that was the worst.

## Analysis of questionnaires

### General



23 girls and 27 boys questionnaires were analysed - these proportions reflect the relative numbers of girls and boys in year 11.

Students' overall responses were positive. For the questions relating to teaching/grouping strategy (3,4,5) there were 65 positive responses and 2 negative responses - the rest were neutral. Thus 43% were very pleased with the strategy, 56% were satisfied and 1% were dissatisfied.

In response to the review system - 6 (12%) felt that it was very useful, 34 (68%) felt that it was alright, 10 (20%) felt that it was not much use to them.

With respect to their expected grade compared to those of other subjects - 18 were pleasantly surprised, 4 were disappointed, the rest felt that it was as they expected.

37 students (74%) recorded projected GCSE grades A - C. 13 (26%) recorded grades lower than this.

11 students (22%) recorded that it would be their best grade, 23 (46%) recorded that it would be among their best grades, 14 (28%) felt it was

average, 1 (2%) felt it was among their worst and 1 (2%) felt it was the worst.

17 students (34%) recorded that they would not have chosen Design and Technology given the choice. 29 (58%) indicated that they would have chosen Design and Technology, 4 students left this question blank.

23 (46%) indicated that they were confident about the course at the outset, 19 (38%) indicated that they didn't know (or perhaps couldn't remember), 7 (14%) said that they were worried at the outset.

All but 2 students (4%) recorded that they were pleased that they had done the course.

42 students have opted to take Design and Technology at 'A' level with us in september - this represents more than 25% of the year group.

### What next ?

We have a whole key stage to run through before we commit the current set of Technology orders to the shredder! Thus we, in common with all other teachers of Technology in England and Wales, have been asking ourselves - To what extent will what we are doing now serve the best interests of our KS4 students in the context of National Curriculum Technology'.

At first sight the 'tier' system of entry for students to National Curriculum exams looks like streaming by statutory instrument or the kind of advice which comes carved on tablets of stone! However I suspect most exam boards (we have chosen to stay with SEG) will be flexible about the point at which decisions about students' tiers of entry have to be made. Moreover the broad central tier (5 - 8) will accommodate most students and allow decisions to be made regarding the high flyers and the least able as and when necessary. So we will not need to abandon either the principle or practice of mixed ability grouping.

Course content we feel will be very similar. One regret associated with the Avon Modular Scheme was that much excellent design and practical work produced by students in year 10 was only of value formatively. Under the National Curriculum this work can be assessed and used summatively as well.

Team teaching is something we embraced wholeheartedly three years ago - currently all CDT Technology lessons are delivered using some form of team teaching. Staffing problems made it necessary for us to use a lot of non - specialists to teach

Technology. Team teaching made this possible. The enthusiastic participation of staff and students has made it outstandingly successful. Already in Key stage 3 we are moving toward a greater proportion of tutor based teaching within the team framework and it is likely that in Key stage 4 we will be examining new ways to define groups of students in order to improve our level of support. However, the team inside the classroom/workshop as well as outside is a fundamental part of our approach and will remain so.

### References.

Webster, R and Hewitt, T The D & T Experience, *Learning Matters* 7, October 1991.

Hewitt, T, Keynote Address, *How do they do it - teacher/pupil perceptions of National Curriculum Design and Technology*, B.E.R.A. conference, Kingston University, 1992.