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DISSERTATION ABSTRACT DESCRIPTION

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TITLE : TECHNOLOGY IN THE ART ROOM.

In this dissertation I begin with various definitions of technology in an educational and social perspective. This is followed by an investigation into the status of Teachnology in the Irish educational system. In this section I deal with the training provided for those teachers wishing to teach Technology at second level and the advantages and the disadvantages of this system of training.

The following section examines the provision of grants etc.in schools introducing Technology to their students. An investigation into the realistic sums of money needed for such a subject is also dealt with here.

The next chapter looks at how other countries teach technology in their schools and these are subsequently compared to the curriculum in this country.

Next I look at the use of materials tools, and equipment used in technology and see how these could be incorporated into the art room. The chapter on Methodology shows how I used such tools etc. in my lesson schemes to show the cross curricular links available to both Art, Craft and Design and Technology.

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TECHNOLOGY IN ART, CRAFT AND DESIGN

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INTRODUCTION

In this investigation into Technology in the Artroom I will begin with defining the term "Technology", primarily in a social context and progressing to its interpretation in educational circles. Views on why Technology was introduced to the national curriculum in 1989 will also be presented along with how it has progressed since that date to its status in schools today.

This will bring into account the training of teachers of Technology and relevant in-service training. I will describe, through the use of newspaper articles, how Technology training for teachers is provided at third level and its relevance to teaching. The provision of grants and the funding for schools introducing Technology as a Junior Certificate subject will also be looked at. Opinions from certain teachers in the area of Technology on the financial support from Government authorities will also be presented.

In the following chapter I will give an account of the Technology syllabi in the U.K. and other European countries as well as in the State of New York. The purpose of this is to make a connection with the course in Ireland and what similarities or differences are visible in Technology, at home and abroad.

The two following chapters look at the use of materials, tools and equipment in both Art, Craft and Design and Technology. This particular subject highlights the

connection between the two subjects and shows many possible cross-curricular links. The first of these two chapters deals with the above while the second outlines how I, as a student teacher, put into practice some of my ideas on how to link Art, Craft and Design with Technology.

CHAPTER 1.

WHAT IS TECHNOLOGY?

Technology is one of the most influential mediums of today's society. It is used by everyone, from the very young to the very old. The importance of this medium has recently been recognised by the Department of Education and as a result "Technology" was added to the national curriculum in 1989 as a foundation subject at junior level. To fully understand the subject one must first of all be aware of what "technology" is generally and educationally. The Encyclopaedia Americana states that,

> Technology refers to ways of making or doing things. The term "technology" is derived from the Greek *techné* meaning "art" or "craft" but it is generally used in either of two more restricted senses. In the narrower sense "technology" refers only to the industrial processes that succeed craft operations. In the broader sense in which the term is used in the present article, "technology" refers to all processes dealing with material. Technology always has to be learned, whether in the form of manual dexterity or as an applied science.[1]

This view of technology is a very general one and only mentions technology education towards the end. To define technology in educational terms one could quote Colin Caborn and his colleagues, "Design and technology is a problem-solving activity"[2] or as Peter H. M. Williams states in his book *Teaching Craft, Design and Technology, Five to Thirteen*,

> ...technology is the development of the ability to make purposeful use of knowledge, materials and resources to satisfy human needs and, in the school context for any age and ability level, this would be based upon an extended view of the pupils own environment and understanding.[3]

On researching the subject of technology in the curriculum one tends to have to look towards the United Kingdom and Wales for information. This may be due to the fact that the subject is relatively new to our schools whereas it has been on the British National curriculum since the 1970's, under the title of "Craft, Design and Technology" (CDT) or "Design and Technology" (DT). The British school authorities realised the need for technology to be introduced to their schools some ten years before this country. Therefore British literature on the subject is far more advanced than in Ireland and as a result much of the information I present will originate from Britain.

Establishing Technology in the Curriculum

As stated previously during the late 1980's the Department of Education introduced a new subject, Technology, during their updating of the national curriculum. According to Sheelagh Drudy and Kathleen Lynch in *Schools and Society in Ireland*, "there was a belief that the curriculum of second level education needed substantial overhauling, and that the changes should be in the technical direction".[4] Students were first introduced to the subject in 1989 and as yet technology is still in its early stages. However it is gradually becoming more popular "with 213 schools taking technology in '94/'95"[5] especially among the female population attending second level education.

> Technology has been particularly successful in recruiting girls to the practical arena - 30 per cent of students taking technology are girls.....[6]

However, I feel that for a subject that was initiated almost seven years ago there should be more information on areas of technology, for example, the application of

practical aspects of the subject or publications of some work being produced by students taking technology at junior level.

Art, Craft and Design was introduced at the same time as Technology but for some reason has been more popular with students and teachers than the latter subject. The popularity of Art, Craft and Design is probably due to the fact that art was already present in schools and the changes to the subject improved student learning whereas technology was a completely new subject. People often reject or are wary of new introductions to the educational system as pointed out by Peter H. M. Williams, "External constraints coupled with grave suspicion of anything 'new' result in a resistance to change and a very conservative and traditional approach to educational method."[7]

One factor that hinders the development of technology in our schools is that there is no specific training for teachers of technology. According to an article in the Irish Times "Education & Living" Supplement (Oct. 10th '95) journalist Anne Byrne writes:

> There is no specific qualification for technology teachers. About 35 per cent are metalwork teachers, 25 per cent are woodwork teachers, 25 per cent teach science, while the remaining 15 per cent include art, language and commerce teachers and even one classical studies teacher."[8]

Teachers introducing technology receive a week long foundation course which takes place in the Marino Institute of Education, Dublin. This in-service training is undoubtedly helpful but most subjects in schools require teachers who have a four

year degree in their specialist area. Hind Makiya and Margaret Rogers put forward a very apt summary of what is required of teachers in the area of technology:

> In-service training for classroom teachers, facilities and equipment provision of hardware for information technology, implications for equal opportunities - these are issues which will be addressed over the years to come.[9]

This statement, whether Makiya and Rogers meant it or not, automatically devalues the importance of technology. The above was followed by:

> Initially, however teachers will be using and developing skills and expertise they have been so successful with in the past to embrace, integrate and enhance design and technology in their classrooms.[10]

Another report published in the Irish Independent on March 2, 1995 opens with reporter John Walsh writing:

> Specialist subjects such as home economics, physical education and technology are in danger of disappearing from many school programmes because of a shortage of qualified teachers, a teachers' union has claimed.[11]

It is obvious that if technology is not reviewed in the near future it is in danger of being dropped from the second level system. Although technology has been a subject on the Junior Cert syllabus since 1989 it still has to establish itself in the curriculum of second level schools. Technology was introduced to British schools at primary level also and apparently faced many of the problems then that it is encountering in Ireland today. On this particular subject Peter H. M. Williams says:

> With educational content to the forefront and with no loss in standards of skill or craftsmanship, the subject is recognised as having relevance and importance for all age and ability levels, the content and teaching styles have probably undergone more changes and the importance of the subject

> activity is at last becoming recognised by government, industry and society as a whole.[12]

Technology can be helped in establishing itself through the support of other subjects. Many subjects in the curriculum give a range of opportunities for cross curricular- activity, namely technology; art, craft and design; home economics and science subjects. These cross-curricular opportunities are constantly being connected with Design and Technology in Britain:

> This emphasis on attitudes and awareness in the field of design and technology means that the process is closely connected with cross-curricular activity.[13]

I believe that technology could be integrated into art, craft and design, as it has been done in Britain (Craft, Design and Technology) thus enhancing cross-curricular education. This partnership could easily take place with the above mentioned subjects as they both deal with problem-solving and the correct use and manipulation of materials and equipment.

> The collection of activities included under the heading of Craft, Design and Technology has an advantage over other traditional and long established school subjects in that it covers no specific body of knowledge and therefore it can permeate all areas of the curriculum.[14]

These above mentioned topics will be dealt with in more detail as a means of highlighting the importance of Technology and Art, Craft and Design and their prospective partnership.

Footnotes to Chapter 1

1 ***Encyclopedia Americana*** - Vol. 26
Sumatra To Trampoline
Gropher Inc. 1990
p. 357

2 Caborn Colin, Ian Mould and John Cave
Design and Technology
Thomas Nelson & Sons Ltd, Surrey. 1989
p. 1

3 Williams, Peter H. M.
Teaching Craft, Design and Technology - Five to Thirteen
Croony Helm Ltd., Kent. 1985.
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4 Drudy, Sheelagh and Kathleen Lynch
Schools and Society in Ireland
Gill & MacMilllan, Dublin. 1993
p. 214

5 Byrne, Ann
A Technological Breakthrough?
Irish Times "Education & Living" Supplement
Tuesday October 10, 1995.
p. 8, 9

6 ibid.

7 Williams, ***Teaching Craft, Design and Technology***
p. 30

8 Byrne, ***A Technological Breakthrough?***
p. 8, 9

9 Makiya, Hind and Margaret Rogers
Design and Technology in the Primary School
Routledge, London. 1992.
p. 31

10 ibid.

11 Walsh, John
Subjects May Be Axed Over Shortage Of Key Teachers
Irish Independent, March 23, 1995.

12 Williams, ***Teaching Craft, Design and Technology***
p. 2

13 ibid. p. 3, 4

14 ibid. p. 63

CHAPTER 2

TECHNOLOGY TEACHING - TRAINING & QUALIFICATION

Technology in the curriculum in Ireland faces numerous problems, among them a lack of qualified teachers. Ireland is far from being the only country with such problems, France, Germany and other mainland European nations came across such obstacles when they decided to introduce technology to each individual curriculum. Tony Dodd, in his book *Design and Technology in the School Curriculum* points out that,

> Most countries seem to find difficulty recruiting and training teachers of the right kind for such work, and schemes are being devised where teachers with technical knowledge and expertise coupled with pedagogical understanding may be supplied.[1]

This shows that when introducing a new subject to the curriculum one of the first questions to be addressed concerns teacher provision.

So what of Ireland in the 90's, how do our technology teachers gain qualification for teaching technology? As mentioned previously our teachers of technology come from a number of varying disciplines; metalwork, woodwork, science, art and even one classical studies teacher, to name but a few. Unlike other teachers in our second level schools technology teachers do not acquire a BA or Hdip. in the subject area, but should that matter? The basic training for a technology teacher in

this country is a week long course provided by the Marino Institute of Education under the supervision of Brother Rory Geoghegan. This is then followed by continuation courses or in-service training. One particular in-service day was held in the National College of Art and Design for Technology teachers. This was run by Rory Geoghegan in association with Professor Iseult McCarthy of NCAD's Faculty of Education and consisted of a day where the teachers became the students, participating in various problem solving activities. However, how sufficient is this form of training, is it enough? Teachers need to deal with a lot more besides the teaching of skills and knowledge.

This lack of adequate training could further damage the delicate position of technology in our schools. "The difficulty" says Dodd, "in recruiting and training teachers of Technology with sufficient breadth and depth of understanding is seriously affecting its progress"[2]. He goes on to say that "the educational benefits which might accrue are limited and progress towards important development slow"[3]

Funds And Provision Of Grants

If Technology is to gain any status in our educational system it needs to provide, among other aspects, adequate training for its teachers. Summer courses or sabbaticals could be arranged for interested candidates. Another area that needs to be addressed is the provision of sufficient funding for the new subject on its introduction to schools.

> ... in practical terms the emphasis and direction of many courses will depend on the training and expertise of teachers, the varying facilities of schools and the vocational status of certain kinds of activity[4]

After in-service training courses, how do teachers put into practice what they have learned and what facilities are provided by the Department of Education.

Funding

On the introduction to technology in schools a grant to the value of £5,000 is provided by the Department of Education's building, furniture and equipment unit. This is considered a sufficient sum for the purchase of electrical and mechanical equipment, benches, hammers, saws and other relative tools and equipment. The following is a paragraph extracted from the Irish Times Education & Living supplement. In my opinion it perfectly sums up the lack of support for such an important subject:

> [Rory] Geoghegan points out that equipping a practical room costs in the region of £40,000, not £5,000, while Christopher Conville, Chairman of the Association of Engineering and Technology Teachers, puts the figure needed some what higher, at about £60,000.[5]

Therefore because of the lack of adequate funding the majority of schools are understandably unwilling to get into a situation or provide a subject that will ultimately cost the school, parents and students a great deal of money. Not surprisingly many schools are discouraged by the financial strain of providing technology to their students. However, parents and teachers alike realise the importance of Technology for the future of the rising generation. Technology gives students the opportunity to deal with the local community and industry,

"those who complete the courses find that there is a wide range of career options open to them particularly in the crafts and trade areas".[6] Students gain the foundation of experience in the engineering industry. Teacher John King from St. Colemans Community College, Middleton, points out that,

> The projects encourage an entrepreneurial spirit among students and this is reflected in the number who have gone on from this College to establish their own successful small industries in the area.[7]

This alone is another reason why technology should not be discouraged through lack of funding in our educational system, the benefits are enormous in an age that is ultimately technology dominated. In the teaching and technology publication by the Council of Europe it is said that "an educational system which will not accept technology is an education system which turns out cultural cripples."[8]

Technology not only relies on the sufficient training of teachers but as a whole on the support and backing it needs and strives for from the institutions to establish itself;

> Institutions of education can and should offer real and worthwhile support for the educational service by providing specialist opportunities for practical research, re-orientation and re-training in addition to general activities.[9]

For an example of the provision of a Technology course, one should look towards the New York State Schools. In the NYS they provide Technology for low achievers in the form of BOCES (Board of Co-operative Educational Studies). These are similar to Vocational Schools and provide an education for adolescents who have disciplinary and learning difficulties. In relation to Technology they offer

a variety of courses e.g. trade technology, information technology, carpentry, mechanical technology, and other vocational subjects with each student receiving a certificate on completion of each course. The success of these courses is due to the support of the State in providing sufficiently trained teachers. Unlike our system in Ireland professionals are employed to each the subject of Technology "many of whom come from industry to work with young people. They are all qualified teachers".[10]

Footnotes to Chapter 2

1 Dodd, Tony ***Design & Technology in the School Curriculum***
Hodden and Stoughton, London. 1979.
p. 64

2 Ibid p. 67

3 Ibid p. 67

4 Ibid p. 64

5 Byrne Ann, **"A Technological Breakthrough?"**
Irish Time Education & Living Supplement
Tuesday, October 10th 1995.
Page 8.

6 **"Traditional Crafts" The Basics Of Technological Education**
Cork Examiner,
May 17, 1993

7 Ibid

8 Council Of Europe
The Teaching of Technology
[CCC/EGT (72) 14]. 1972.

9 Hendley, David
Technology In The New York State Education System
Department of Education, Swansea.
p. 3

10 ibid.

CHAPTER 3

TECHNOLOGY IN EUROPE AND AMERICA

The previous chapter brings me to a point where I feel it is necessary to examine the approach to teaching Technology in other countries besides Ireland and see how they compare to the teaching of Technology in this country. For this reason I will put forward curriculum plans from France, Britain, Sweden, Germany and the New York State. I also hope to examine which areas of the Technology syllabus for each country could be linked with the Art, Craft and Design syllabus in Ireland.

Primarily I will be looking a the aims and objectives of individual courses and their use of content and their teaching methods. The best way to improve the status of Technology in Ireland is to study and follow some of the examples set by educational systems, namely those mentioned already.

England and Wales

As with most countries there was a "widespread recognition in the industrial world of the importance of education in Technology"[1] and this belief was recognised in Britain in the 1970's. This country believed that they should have "a curriculum which focused upon the process of planning, designing, making and evaluating in design and technology, rather that prescribing specific content"[2]. School authorities also wished to abolish the separation of the practical and academic subjects,

> The place where the abstract and the practical met and there were high hopes in its ability to end the rigid separation of the academic from the vocational.[3]

There is one significant difference between Technology in England and Wales and Technology in the New York State, one can see this by noting the different definitions for the subject in each country or state. David Hendley writes that the definition of Technology in England and Wales is as follows,

> Pupils should be taught to develop their designing and making skills with knowledge and understanding in order to design and make products;[4]

Whereas the definition in the New York State is:

> The systematic approach to solving problems through human and man made and natural resources[5]

The difference between the approach to teaching technology in England and Wales and in the New York State is that the former concentrates on designing and making products and the latter stresses problem solving skills and "how technology affects society and vocational training"[6] as seen in the BOCES.

The Technology syllabus in Ireland seems to be a combination of the above but with a slight veering towards the example set by Britain, with the use of materials being a strong characteristic of the definition of the subject in Irish schools.

> Technology is the achievement of human purposes through the disciplined use of materials, energy and natural phenomena. Education in and through technology involves appropriate resources; suitable tasks; and the interplay between the two. The resources involved are the knowledge and skills

acquired by the student. A task is an undertaking in which the student seeks to apply those resources of knowledge and skills.[7]

The wording of this definition leaves a lot of room for experimentation with Art, Craft and Design in my opinion, with an opening for cross-curriculum links with the more aesthetic subject.

New York State

Before describing the role of Technology in New York State Stools (NYS) I would like to point out that the United States has no national curriculum and the curriculum is decided State by State. In the elementary school (6/7 years to 12/13) very little technology is taught. Britain on the other hand has long since introduced Technology to its primary schools as a compulsory subject as well as its secondary schools and Ireland, even though the subject is available in some 213 second level schools, has yet to make it compulsory at both primary and secondary level. In the high school the first two years introduces a compulsory technology course, this consists of 40 weeks of the two years and is usually divided into 2 blocks of twenty weeks each.

> The State has produced a ten-module course. All the following must be covered in the 40 weeks:
> Getting to know technology
> What resources are needed for technology
> How people use technology to solve problems
> Systems and subsystems in technology
> How technology affects people and the environment
> Choosing appropriate resources for technological systems
> Controlling technological systems
> Technology and society: now and in the future
> Using systems to solve problems[8]

The learning objectives of other European courses outline elements such as planning, manual work, testing designs and designing all of which are incorporated into study visits. Each of the courses in the appendix use group teaching methods and some stress the importance of creativity

> The child's creativeness and inventiveness applies to concrete objects with results that can be immediately checked and also graphic expression.[9]

One obvious element of all the technology courses is that they stress the importance of two dimensional work and drawing. All students must learn how to sketch and draw using perspective (an Art, Craft and Design element), isometric and orthographic drawing. Rendering and colour in design are also learned.

What is the most evident aspect of the technology courses throughout Europe is the huge amount of practical work, this is also apparent in the New York State, involved in the subject which in turn is in the form of project and group work for the main part. Each student must work from a source, through the process to the final product. The process is at the core of each syllabus. Similarly, the syllabus for Technology in Ireland is evolved from the 'task' which is at the centre of all work during the three year duration of the subject.

> The central activity in the course is the TASK. The selection of the task will vary according to the stage of development of the student. Every task will require input in terms of knowledge and skills. The interplay between these appropriate resources and suitable tasks is the essence of the course. Knowledge and skills are not treated as independent courses on modules in themselves.[10]

The process is of utmost importance and the "essence of technology is the process of finding a solution to a problem".[11]

This is not particularly revolutionary because as with many practical subjects the task is the primary objective of the course. However, I find that technology is particularly linked to Art, Craft and Design in its approach to project work. Both subjects work towards a better knowledge of subject areas and the acquisition of skills through the students own research. Similarly, these two areas of our national secondary curriculum stress the importance of presenting research, either through drawing or reports etc. and the links with the students local community and an awareness of that society may also link both subjects in relation to technology.

> Students who have completed the Technology course should be able to discuss the environmental issues arising from the use of Technology [and] demonstrate an understanding of the evolution of technology as a response to the needs of society;[12]

and at the other end of the scale,

> The Art, Craft and Design course develops the students ability to develop an awareness of the historical, social and economic role and value of Art, Craft and Design and aspects of contemporary culture and mass media.[13]

Refer to appendices as an example of the curricula in other European countries namely, Sweden, France, Federal German Republic and the United Kingdom.

Footnotes to Chapter 3

1 Hendley, David
Technology In New York State Education System
Department of Education, University of Swansea.
p. 1

2 ibid.

3 ibid.

4 SCAA, 1994

5 New York State Education Department, 1987

6 Hendley, David
Technology In New York State Education System
p. 1

7 Junior Certificate Technology Syllabus
Department of Education, Dublin. 1989.
p. 2

8 Hendley, David
Technology In New York State Education System
p. 2

9 ***Junior Certificate Art, Craft and Design Syllabus***
Department of Education, Dublin. 1989.
p. 8

10 ***Junior Certificate Technology Syllabus***
Department of Education, Dublin. 1989.
p. 4

11 ibid.

12 ibid. p. 3

13 ***Junior Certificate Art, Craft and Design Syllabus***
Department of Eudcation, Dublin. 1989
p. 2

CHAPTER 4

MATERIALS, TOOLS AND EQUIPMENT

Previously the definition of Technology has been presented and in this section an investigation into the use of materials, tools and equipment will be put forward in the hope of making an advancement of the awareness of a possible relationship between Technology and Art, Craft and Design besides those pointed out already. It is in this area that I find the closest resemblance of the two subjects and a heightened possibility of a cross-curricular relationship.

Since the updating of Art, Craft and Design in the former Intermediate Certificate, the subject has been developed into a course where the use of previously suggested tools etc. can be used to produce higher standards of excellence in a students work. Media and tools range from dry and wet drawing and painting media, print making, photography and graphic design media. In three-dimensional Art, Craft and Design, students will use materials such as clay, papier-máchê, carving materials, wood for subtractive and additive processes and cardboard, wire, wood, nails, cloth, metal and other tools and equipment associated with the constructional process.

Art, Craft and Design and similarly, Technology encompass all aspects of practical subjects and, in my opinion, do not remain as isolated as subjects like metalwork or

woodwork, "students have at their disposal a suitably wide range of materials to realise the full potential represented by the subject".[1]

The syllabus for Technology in the Junior Certificate programme suggests that students "should work with a range of materials from the following categories:

> metals (steel brass, copper, aluminium etc.)
> woods (hardwoods, softwoods manufactured boards etc.)
> ceramics (glass, clay, enamels etc.)
> fabrics: natural (wool, linen, leather etc) man-made (nylon, polyester, rayon etc.)
> plastics (acrylic, polyester resin, glass, fibre, plastic dip coating powders etc.)
> composite materials (concrete's, plasticine, plaster, cardboard, paper etc.)[2].

Throughout my teaching practice I have used a vast majority of tools and media from the list above in the Art, Craft and Design classroom, these will be addressed in more detail in the following chapter. Some of which had to be detained from other rooms in particular schools and most were already present in the Artroom.

In his book, *Materials and Design and Technology*, John Fulton gives the following description of materials that are used in Technology and not surprising compares Technologists to Artists and Craftworkers.

> Technologists tend to refer to materials by their function, with words like; abrasives, fluxes and fuels. Craftworkers may use categories that reflect properties which are of importance in their craft with words like; plain or figured, natural or synthetic. Artists materials are often grouped according to their usefulness as media, hence, oils, acrylic, collage, film, papier-mâché and so on.[3]

Before going any further with this area of discussion I feel that one must first of all look at tools used in the technology room and what such a room should contain to

enable students to manipulate and work with the materials listed from the syllabus of Technology.

A selection of tools for construction should be available to students e.g. hand drills, saws, craft knives, pliers. Electrical work will be aided by automatic wire strippers, electrical screwdrivers and soldering irons. While students will need access to sewing machines, irons and ironing boards, weaving cards, scissors, looms and a selection of sewing and embroidery tools for textile work. All of the above would naturally need to be well supervised by the Teacher and safety rules strictly adhered to.

Art and graphic work is also an important element in Technology and the students should find drawing equipment e.g. compasses, set squares, protractors and dividers, printing materials, stencils etc., readily available in the Technology room. Some of the above will undoubtedly be borrowed from the Art Department in the school as students are also required to learn to

> Use a T-square, set square, drawing board, compass and measure accurately with a ruler.[4]

The following is a list of similarities that may be found in relation to tools and equipment simply by observing the aims and objectives outlined by the syllabus of Technology and Art, Craft and Design:

Table 4.1

Art Craft & Design	Technology
Craft: Emphasises the right use of tools and equipment. Design: Emphasises planning, problem solving and completion using drawing as a means of thinking. use a variety of materials, media tools and equipment	to contribute to the students preparation for life by stimulating the students interest and confidence in working safely with equipment and materials demonstrate an understanding of the properties of materials
Vocabulary	terminology
Understanding relevant scientific, mathematical and technological aspects of Art, Craft and Design	appraise critically the work for quality and design, function and finish and take any measure necessary

5

This table briefly outlines similarities in both Art, Craft and Design and Technology in relation to the use of materials and equipment use during the process of particular course work. These are taken from the list of aims and objectives of both courses.

Educational Technology

Art, Craft and Design, more so in 'design' share another similarity with Technology in the use of software and hardware. Educational technology has been evident in our schools for a long time and there are two main views regarding technology in schools:

1. Technical equipment and media of education - overhead projectors, television, tape-slides programmes, computers etc.
2. Educational technology involves a clinical systematic analysis of the entire teaching/learning process in an attempt to maximise its effectiveness.[6]

Throughout education teachers are encouraged to use visual aids in the classroom and these often come under the heading of audio-visual aids. In the Artroom these forms of technology are frequently presented to students through hardware and software.

Hardware

Hardware is the term used for teaching equipment e.g. projectors, T.V. monitors, tape recorders etc:

Software

These are the items used in conjunction with the equipment mentioned above e.g. overhead transparencies, slides, audio tapes, video tapes, computer programmes etc.

The hardware side of educational technology was developed first but when these technologies became readily available and therefore expensive, schools became

aware of "a shortage of suitable software to use"[7] with these. After they were up-dated the teaching and learning situations were developed.

> The role of educational technology is to help improve the overall efficiency of the teaching/learning process.[8]

Fred Percival suggests that educational technology benefits schools by:

1. Increasing the quality of learning on the degree of mastery
2. Decreasing the time of learners to attain desired goals
3. Increasing the efficiency of teachers in terms of numbers of learners taught, without reducing the quality of learning
4. Reducing costs, without affecting quality.[9]

Percival is basically talking about audio-visual aids but in Art, Craft and Design and Technology there are numerous tools that are technological and beneficial to the teaching and learning process. The Technology syllabus allows students to "use video or audio recording, photography or prepare a personal presentation using such aids as an overhead projector", "as a supplement or an alternative to the production of reports on paper"[10] . It also states that:

> It is necessary that the student be aware of the possibilities of the computer.[11]

and that for graphic work the "generation of graphic images and the production of drawings either by programming or by use of available software"[12] could aid presentation.

Even though the course syllabus does not mention the use of computers in Art, Craft and Design many successful schemes are introducing students to software

particularly in the area of Graphic Design, e.g. designing menus or letterheads. This is particularly important in equipping students with adequate information on visual communication and the use of different type faces,

> In awakening the students interest in the whole field of visual communication, graphic design and display... e.g. on shop fronts, the sides of vans, newspapers and magazines, road signs.[13]

Footnotes to Chapter 4

1 ***The Junior Certificate Technology Syllabus***
Department of Education, Dublin. 1989
p. 6

2 ibid.

3 Fulton, John
Materials in Design and Technology
The Design Council, London. 1992.

4 ***The Junior Certificate Art, Craft and Design Syllabus***
Department of Education, Dublin. 1989
p. 8

5 A chart showing a combination of Junior Certificate Art, Craft and Design and Junior Certificate
Technology aims and objectives.

6 Percival, Fred
A Handbook of Educational Technology - 2nd Edition
Rogan Page Ltd, London. 1988
p. 12

7 ibid., p. 13

8 ibid., p. 14

9 ibid.

10 ***Technology Syllabus***
p. 6

11 ibid., p. 5

12 ibid.

13 ***Art, Craft and Design Syllabus***
p. 10

CHAPTER 5

METHODOLOGY

INTRODUCTION TO CLASSROOM APPLICATION

As a support to the points presented in this dissertation, concerning the relationship between Art, Craft and Design and Technology, my lesson schemes for the year contained a number of elements that illustrate a link between both subjects. Areas investigated were, problem solving and the use of tools, materials and equipment. The year groups vary in each case or lesson sequence from first year to second year and also fifth year.

In this chapter I will give a brief description of three lesson plans from the teaching year outlining particular areas where the Art, Craft and Design lesson has been aided by the use of technological and technology related tools and equipment. Some use of certain equipment was limited due to previous circumstances that resulted in the Art Department being restricted from using some types of hardware.

The lessons outlined will begin with a scheme involving a second year group with a weak ability level, working on flier design. The following lessons deal with a problem solving project carried out by a first year group and finally I will discuss a scheme relating to 3 dimensional construction work produced by a fifth year class.

FLIER DESIGN

CLASS GROUP: **Second Year**
CLASS DURATION: **40 minutes**

Description

The theme of this sequence was entitled "Entertainment in Advertising" and the students were required to make a flier to promote a nite-club of their choice, real or imagined. The first two lessons looked at descriptive and emotive words with each student choosing a work from a list under each particular heading. The activity here was to describe the meaning of the chosen word colour and other graphic media. The aim of these lessons was for the students to become familiar with manipulating letters and words through graphic media to a certain standard of finish.

The following lesson was spent discussing the appreciation of advertising by referring to a variety of fliers promoting venues in the city centre. Points discussed included information presented, typefaces, use of colour, quality of finish and type and image relationships. Proposals for changing certain designs were put forward for 'better' advertising.

Because of the weak ability of the group it was decided that students would take the image for their fliers from a collage containing images associated with the name of their club (illustration 5.1). These images were cut from magazines using a viewfinder each student selected a 'balanced' composition from the collage and

made a line drawing, (A5), of this section. This involved some design problem solving in an aesthetic manner. The line drawing was then rendered in tones using one colour (illustration 5.2). Tones were achieved by referring back to the collage.

The next step was for students to design or use an appropriate typeface to present information about the nite-club alongside their image. Ideally students should have had access to a computer programme for this work, instead letterset books, photocopies and magazines were used as a typography source. The students worked on chosen typefaces manipulating and changing type to suit individual designs (illustration 5.3).

Finally each student incorporated the necessary information onto the A5 image using their typeface. It was decided by the group that each completed design would be colour photocopied for a more 'professional' finish.

PROBLEM SOLVING

CLASS GROUP: **First Year**
CLASS DURATION: **80 minutes**

Description

At the beginning of this project I presented the group of students with three different activities each containing a different 'problem'. The first was to design a game similar to dominoes for people who are unable to count e.g. young children. The second activity was to design a game that could be played by two blind people

while the third involved designing a 'motorised' vehicle using cardboard, cotton reels, dowel rods, elastic bands etc.

On presenting these activities a group discussion was held so that a collection of ideas could be exchanged. Elements like the use of textured materials, shapes and varying sizes were highlighted. Following this the group was divided into three teams each one having to choose and solve one of the problems. The scheme required that each group keep a visual progress of ideas, tests and work being carried out.

As the teacher I was required to provide a degree of relevant information to back up ideas suggested by the students (illustration 5.4) but due to the nature of the project all final solutions would have to be the students own work and ideas. My role was therefore to be a supplier of requested materials and equipment.

3-D CONSTRUCTION

CLASS GROUP: **Fifth Year**
CLASS DURATION: **80 minutes**

Description:
The theme for this sequence of lessons was "Distortion in Foreshortening". The project began with 2D studies of the human figure investigating foreshortening in life-drawing. The final piece was to be a painting showing foreshortening with the foreshortened area being represented by a chicken-wire and papier-mâché

sculpture, thus distorting the foreshortening. To do this a section of the 2D drawing, an arm or leg, was chosen and modelled into a 3D form using chicken-wire. During this stage the students used a variety of tools and equipment from chicken-wire to pliers to papier-mâché. Two varieties of gluing agent were tested to see which was best. It was decided that P.V.A. worked better than wall paper paste because of its stronger finish and less layers would have to be applied thus wasting unnecessary time (illustration 5.5 and 5.6).

One problem that faced both the students and myself as the teacher was how to give the impression of or portray the sole of a shoe for the sculptures. We decided once again to test two different methods, one using a mould and plaster cast the other being papier-mâché pulp. First of all we made a print in clay using a shoe and filled the print with plaster. The other method was to apply papier-mâché pulp to the base of the sculpture giving the impression of the sole of the shoe. The former turned out to be very heavy and the clay cracked when removing the plaster whereas the latter was more time consuming it was lighter, therefore making the sculpture easier to suspend, and easier to attach to the sculptured limb. Much of this sort of trial and error problem solving took place throughout the project and was a valuable learning experience (illustration 5.7).

In this lesson scheme the students were given the opportunity to use equipment that came under the headings of HARDWARE and SOFTWARE. This opportunity arose when the students were transferring their 2D compositions onto the boards in preparation for painting. Photocopies were made of the drawings

onto acetate and these were subsequently used with an overhead projector to project that image onto the boards so students could trace the composition (illustration 5.8).

The use of glue guns, saws (for cutting the boards down to size, A2) hammers, nails and other materials and equipment discussed in Chapter 4 were successfully used throughout this project.

EVALUATION

To critically evaluate these three schemes it is obvious that in relation to tools and equipment that 3-D construction project encompassed the use of more technological or electrical equipment. This may have been due to the groups age and ability level and my confidence in a student teaching position. There was never any fear of injury to students or damage to equipment and as a student teacher I could not afford for either to happen even on a small scale. This does not mean to say however that the success of this particular project surpassed that of the other two. In relation to age and ability level I believe that each group gained an adequate introduction to Technology elements in the Artroom.

In relation to the second year group the one recommendation I would make would be that a computer package like Adobe Illustrator would have been useful in the manipulation of type for the fliers and an accompanying scanner and printer would undoubtedly have given a higher standard of finish, unfortunately none of the

above were available. However, one could follow up the flier design project with a sequence of lessons investigating computer aided designs working alongside hand rendered work in, for example, poster or logo design. This would involve cross-curricular links with the Computer Teacher and Department in the school.

The students involved in the project on 'problem-solving' worked well in groups and each finished design had very little working or aesthetic influence from me. The students made quite a few tests with each item during the 'process' and in the case of the 'motorised vehicle group' it was decided that a boat would be made with an elastic band with a paddle in its centre acting as the motor. Twisting the paddle resulted in an untwisting of the elastic band thus enabling the boat to move.

The group dealing with the designing of a game for two blind people decided to make a deck of cards that relied on 'touch'. The numbers were in relief and made out of thick card with a relief circle at the bottom right hand side of each card indicating the correct direction of the numbers. Meanwhile the group designing the dominoes game produced images of fruit that would be linked as opposed to numbers.

ILLUSTRATION 5.1

This is an example of a collage produced by the students where the images were associated with the name of the nite-club, Eyes.

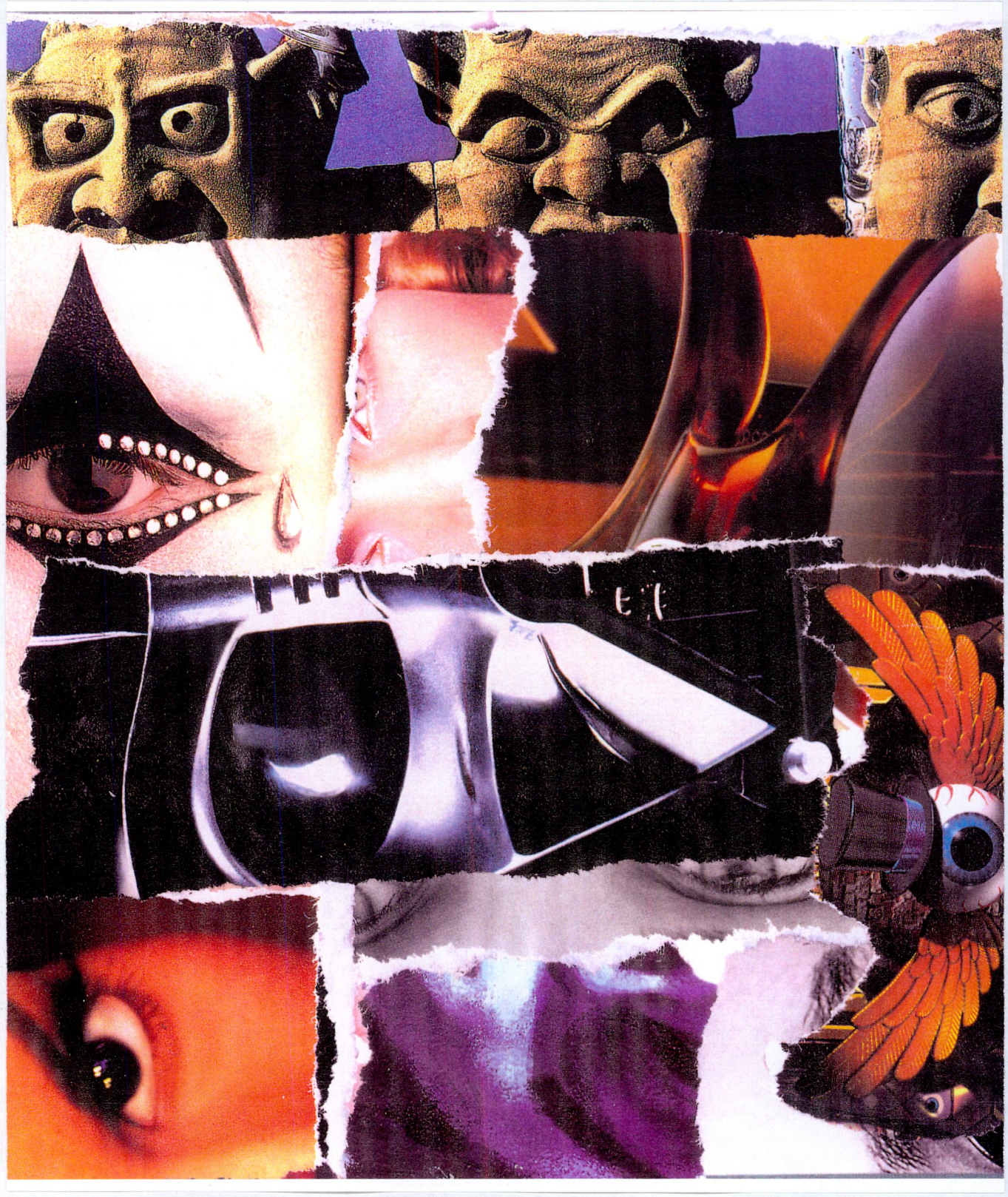

ILLUSTRATION 5.2

An A5 cropped section of the collage rendered in tones of one colour.

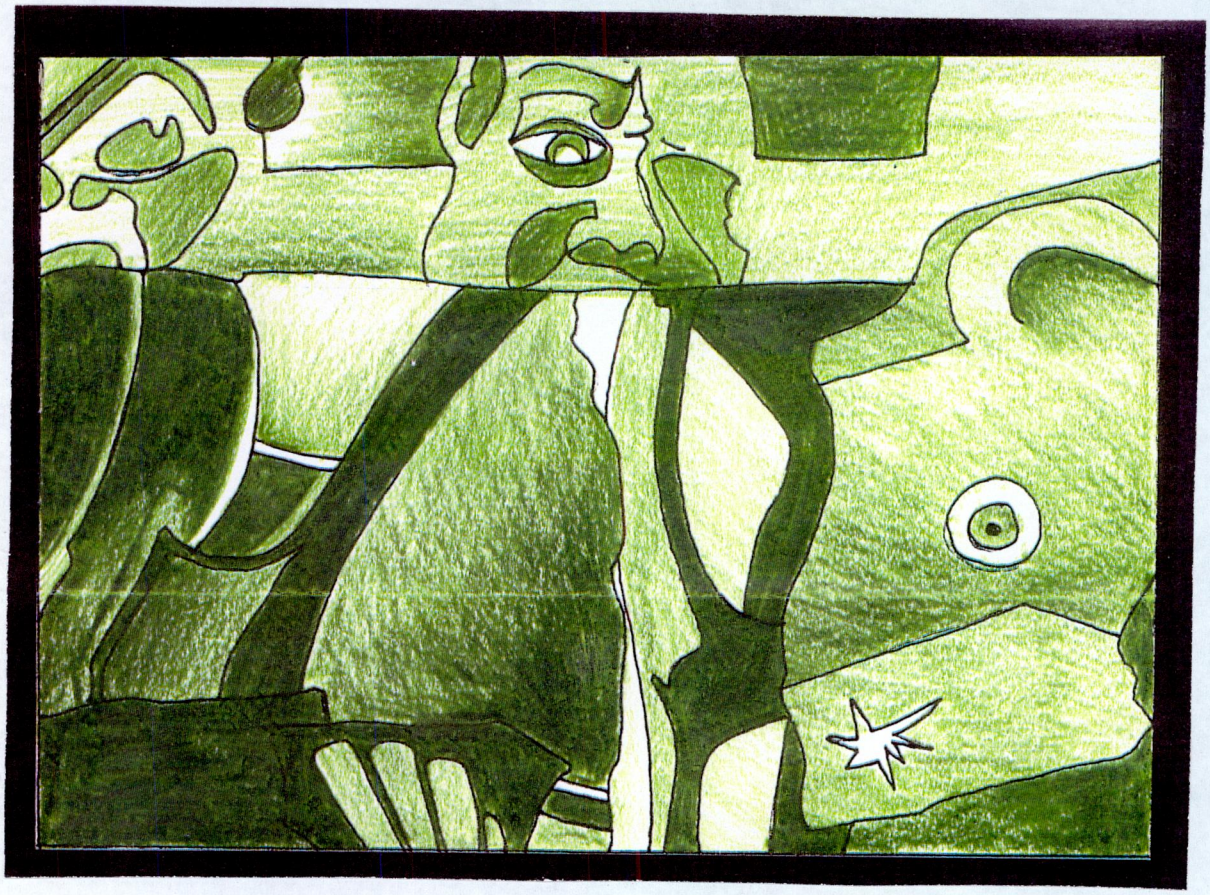

ILLUSTRATION 5.3

Finished type design ready for transfer onto A5 image.

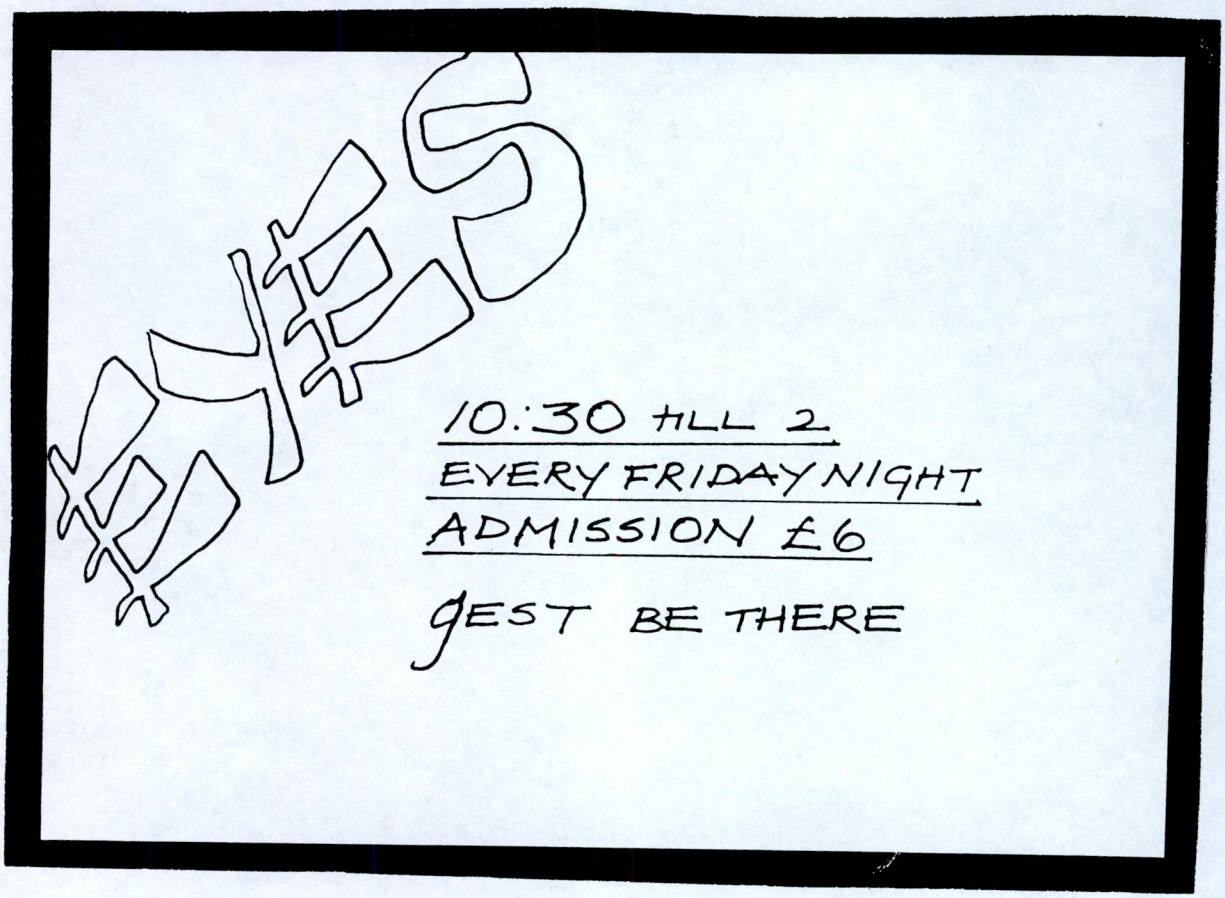

ILLUSTRATION 5.4

Suggested ideas for the construction of a 'motor'.

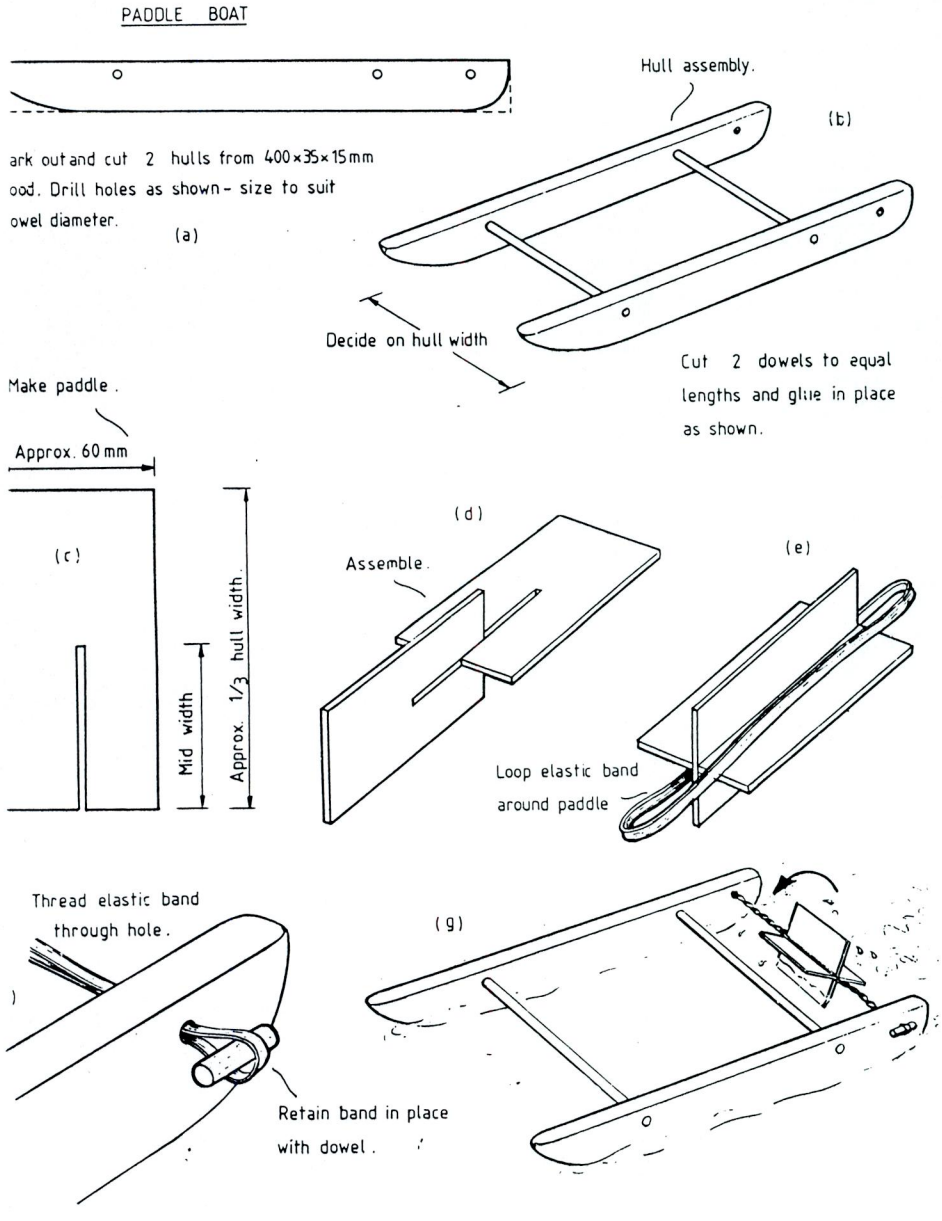

Fig. 1 A paddleboat

ILLUSTRATION 5.5

A students chicken-wire sculpture in its early stages.

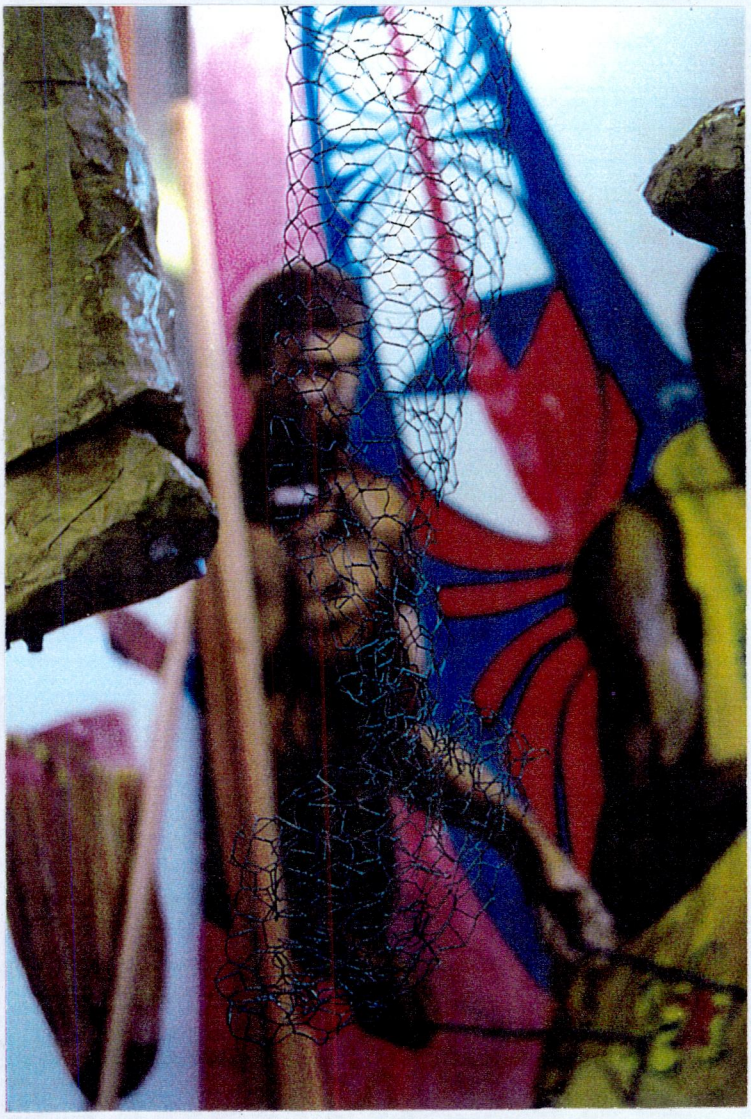

ILLUSTRATION 5.6

A chicken-wire sculpture covered in papier-mâché.

ILLUSTRATION 5.7

A chicken-wire sculpture showing the construction of a shoe using papier-mâché pulp.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

Throughout this dissertation I have looked at the status of Technology and its progress since its introduction into the national curriculum in 1989. Much of my findings show that although it is becoming a little more popular in some schools, its progress to the status of other subjects at secondary level is relatively slow. The obvious necessity of education in and through technology is a view shared by a great number of people at home and abroad.

One of the many problems facing Technology is, as we have seen, the lack of financial support available to the subject. Grants do not cover adequate training, in-service training or the necessary sum to cover the cost of building and furnishing a technology room. It is known that finding money for educational purposes is a constant battle but surely the Government could, and indeed should, locate some finances for such an important and vital subject. The promotion of Technology should be a primary concern for members of our Department of Education as the future of this country could well depend on the quality of technology education received by today's students.

Teacher training is being looked into and if money is spent in this area the subject will gain a higher status in our schools, more time spent training teachers will result in a higher standard of work thus showing others the advantages of studying this subject. Even publishing finished work, as done with Art, Craft and Design

projects, could give students and teachers a better understanding of what to aim for.

There are many opportunities for cross-curricular links between Art, Craft and Design and Technology and it is my belief that if Technology were somehow linked with or aided by the former subject its status may improve. The popularity of Art, Craft and Design has risen among both sexes and already encompassed areas and subjects that use many Technology tools and equipment, especially in the Design and Craft areas.

Technology is a highly advantageous subject to have in secondary schools as it deals with so many aspects of students' futures, particularly when they are required to look towards industry for employment. It is a subject that will not doubt become more popular, but not without support from the Government and individual school authorities. It is evidently present in schools who do not officially offer the subject to students, in areas like Art, Craft and Design, so why not add Technology to the schools curriculum?

Characteristics Aims/Objectives	*Curriculum Content*	*Teaching Method*	*Organisation*	*General Comments*
Aim of *TECNIK* is to acquaint the student with technical products, with services making use of technical equipment, and with technical processes of importance to modern society, thereby imparting to him/her a knowledge of the main characteristics of different industrial fields. The course should provide opportunities for the student to develop manual skill, to analyse, to plan and work constructively. Thus the student should learn to understand that all work has both a manual and an intellectual aspect. The course of study should show the interaction between the technical and other fields of knowledge as well as between industry and society. Furthermore, it should aim at imparting an understanding of the importance of technical work and the effect of technical products on our pattern of culture and its development.	1 Important industrial activities which affect our daily lives, the conditions which make them possible, the bases on which they are founded, how they work. 2 Different branches of engineering within industry and, ultimately, the more generally accepted divisions of industry as a whole. 3 Planning: the ability to understand the purpose, function and design of a product; how work is divided up between individuals and groups; the sequence of operations to produce optimum results; the selection of the most suitable materials, tools and other equipment; some consideration of the time involved and how the work is costed. 4 Manual work: the making and assembly of objects and other types of technical work to be performed in a well-thought-out manner, with or without written instructions, and using tools, machines and materials efficiently.	The activities are at first divided into broad categories according to the experience and understanding of the students. As views broaden these activities are re-classified in other ways. Independent groupings. Organising themselves. Properly documented exercises including visits to factories, public services, school workshops and labs. Each team reports back to whole of class through audio-visual aids, reports and experiments. Teachers of different disciplines advise on final report.	*Upper School* Technology is one of four options in the upper part of the (nine-year) school. There are 29 periods devoted to obligatory subjects out of a 35 period week. Technology is grouped with Languages (French or German), Art and Economics. Time available for interdisciplinary work (project sphere). No examinations, but a five-part assessment procedure. First year *Gymnasium* 70% of work common to all students. Economics and Technology divide into branches in grades 3 and 4. Technical pupils given spell of vocational practice in vacations.	
	5 Activities associated with planning and making. Testing, experimenting, designing, reporting, using drawings, diagrams and other graphical means of communication. 6 Study of industrial plants – understanding of co-operation and interdependence of those employed. Interaction with local community. 7 A study of basic technical components and other important principles used in designing and manufacturing. Care of tools and equipment. Safety. 8 Study visits. 9 Evaluation of results.	1 Project method 2 Practical work } involving team work Subject chosen by group can last for three years (seventh, eighth and ninth) *1st Year* – general aspects *2nd Year* – research into technical activities, organisation and marketing *3rd Year* – social and human aspects of productive work	Individual assignments are an important part of the course. *Continuation School* Three lines: social; economic; technical. No exams but more career orientated than *Gymnasium*. Stresses importance of study technique. *Vocational School* Large variety of trades courses.	All three now together 1971/72 fused into the *New Gymnasial School*. An organisational reform, but a radical reform of vocational training also.

Technical Education – France (Physics and Technology)

Characteristics Aims/Objectives	*Curriculum Content*	*Teaching Method*	*Organisation*	*General Comments*
Classified as a basic subject – the only European country to give technology such a place in the curriculum. It is compulsory and generalised in the first two years of the middle school. *Technology* – is a language; – is a subject concerned with construction; – is a science; – is a means of culture. It will be centred on the technical 'object' which will be common, simple and mechanical: the child to study relationships, the teacher to act as catalyst. 'No distinction is made between girls and boys, and the classes, which will generally be mixed, will thus be characterised by a strong, stimulating competitive spirit.'	Essential topics are the two elementary functions of *translation* and *rotation;* to these are added *transmission* and *transformation of motion.* These topics form part of the study of kinematics whose analysis, in addition to logical reasoning, calls for: – diagramatic representation of an abstract concept which strips the object of its tangible qualities and reveals its elementary function and essential internal relations; – measurement and observation of their numerical expression which, carried out accurately, form the basis of all scientific work; – graphic representation of the measurements and their analysis; – mathematical interpretation of the graph; – the dismantling and re-assembly of the object which requires the ability to pick out from the whole co-ordinated unit the	Teaching by 'active' method – observation, analysis and study of a particular object. Application of relationships. Organised in similar way to some of the primary work – individual assignments. After the simple 'assignments' a record is kept of the child's performance and aptitude. A drawing course often follows which is intended to teach the language rather than the skill of graphics. The two-year course is concluded with project work based on technical objects – the purpose of this being twofold: 1 Observational assessment of those who have a flair for this kind of work.	Subject groupings (8th Year) are as follows: *Basic compulsory subjects* (incl.) French, Maths, first modern language and Technology. *Compulsory 'stimulus' subjects* (incl.) History, Geography, Natural Sciences, Handicrafts, Art and Physical Education. *Optional subjects* (incl.) Latin, Greek, second modern language and intensive study of first modern language. Technology is not a workshop subject in spite of the fact that the technical 'object' needs to be handled.	The teaching of technology in French schools can be attributed to the foresight and determination of Monsieur Capelle, the Directeur General. First introduced experimentally in 1963. An interesting research programme in the training and re-training of technology teachers is based on the University of Aix.
Handicraft is also on the time-table (perhaps an hour a week). The principle is that 'all education should impart knowledge, the ability to communicate and to do – *savoir, savoir dire et savoir faire*'.	main parts, the secondary parts and then connections, and involves both logical thinking, mechanical intuition and manual dexterity; – the child's creativeness and inventiveness applied to concrete objects with results that can be immediately checked, and also graphic expression.	2 The opportunity for all to gain insight into the world of technology and to appreciate the end-products of the engineers' problem-solving process.	Handicraft is sometimes used to 'complete the circuit', and 'making' may be added to the Technology programme by the co-operation of the teacher.	

Technical Education – Federal German Republic *(Arbeitslehre)*

Characteristics Aims/Objectives	*Curriculum Content*	*Teaching Method*	*Organisation*	*General Comments*
Arbeitslehre for the most part is based on modern 'work processes' and is seen as an introduction to the world of work and economic life. The underlying aims of technology teaching are summarised as follows: a) To give pupils elementary technical education, to prepare them to cope with the technical side of their environment at work and in the home. b) To give pupils a preliminary understanding of economic and social factors in the world of industry and work and to give them examples of the links between technical, economic, political and social elements.	There are different curricula according to the *Lander*, but those of North Rhine-Westfalen and Berlin seem to be the most significant. *NORTH RHINE-WESTFALEN* – this sees technology as the road to the world of work. The curriculum is divided into three subjects – Technical Handwork, Economics and Domestic Science. *Technical Handwork* – covers manufacturing and processing techniques (general technology), mechanical engineering and technical engineering (building). The three categories of practical objects – that is, *everyday objects* (equipment, tools, toys, furniture), *buildings* (housing, community amenities, industrial plant and traffic facilities) and *machinery* (power-producing plant, machines and data processing equipment) – are integrated into the above three categories of subject matter.	Consisting either separately or in combination: courses, exercises, projects, industrial surveys and practice. *COURSES* – to pass on information to the pupils, mainly by deductive means, on technology, economics, sociology and occupations. *EXERCISES* – to develop skills in handling materials and tools or in collecting, ordering and evaluating information. *PROJECT (Vorhaben* and Project both apply). *Vorhaben* includes a piece of work planned and	Teaching of technology restricted to seventh to ninth or tenth years. A specific number of periods are devoted to technology on the weekly time-table (4-8). *'Arbeitslehre'* is a term used to cover a number of subjects. Teaching follows a syllabus specially designed for the subject (BERLIN) though there is room for teacher initiative. There is a move to introduce *Arbeitslehre* as an independent teaching subject in the *Hauptschule*.	The North Rhine-Westfalen curriculum syllabuses have been criticised (1) for splitting up technological instruction into three separate and relatively unrelated subjects and also for (2) outdated treatment of the overall economic subject matter. One of the reasons for the variety of *Arbeitslehre* experiments is that teachers' knowledge of the occupational, economic and social factors in work and industry vary considerably and may be inadequate. A programme for further training is, therefore, offered by Ministries of Education and individual educational authorities. T.V. network available for in-service training short courses and correspondence courses are also available.
c) To instil in pupils a proper attitude to work (determination, tenacity, open-mindedness, flexibility and adaptability, etc.) so that they can meet the requirements of their profession in co-operation with others. d) To give pupils an opportunity for vocational guidance, or to develop 'vocational selection maturity'. These four aspects vary according to the *Lander* and the experience and interest of the teacher who may determine the final aims. There is a lack of primary aims – only the secondary goals available. Technical education is compulsory and applies from the fifth to ninth years of education.	*Economics* – divided into 'fields of orientation' – needs, types of economy; market, prices, money; business cycles; economic systems and economic management. *Domestic Science* consists of principles in nutrition, home hygiene, care of members of the family at different ages, health education and principles for the use of leisure. *BERLIN* – this syllabus conceives of *Arbeitslehre* and its various aspects as a single, indivisible subject. Subject matter is covered in three stages: 1 production for personal needs; 2 production for an individual contractor; 3 production for the market in general. Selection of teaching matter to enable pupils 'to see how economics and technology are conditioned by social factors, to assess them from the point of view of their own interests and to further technical, economic and political developments in the world of work and consumption so as to give every individual citizen a greater opportunity to be his own master'.	executed by the pupils with the help of the teacher, but to a large extent independently, leading to a predetermined result. *Vorhaben* aims at illustrating and bringing out the relationships to be found in industry by means of practical work. *Vorhaben* includes the necessary courses and exercises required for the execution. Project refers to the actual relaisation of the end product of the *Vorhaben*. *INDUSTRIAL SURVEYS AND PRACTICE* are both to be taken on *Vorhaben*, for both aim at analysing factors in the world of industry on the basis of specific examples.		

Characteristics Aims/Objectives	*Curriculum Content*	*Teaching Method*	*Organisation*	*General Comments*
'Free enterprise' activity with encouragement of initiative, inventiveness and creative response. Activity regarded as more important that the objective. Technology is increasingly being regarded as of general educational importance for all boys and girls. *SPECIFIC AIMS OF TECHNOLOGY:* 1 to encourage pupils to be inventive, and to produce original and imaginative work; 2 to help pupils to analyse a new situation and decide upon the significant factors; 3 to help them to apply their knowledge of principles and procedures in reaching a possible solution, or solutions; 4 to give experience in planning and constructing devices so conceived; 5 to train pupils to recognise the limitations of a design and to suggest modifications; 6 to promote confidence in the use of unfamiliar and possibly complex equipment; 7 to encourage pupils to keep faithful and methodical records of failures as well as successes. A.A. Haimes HMI	This varies from school to school and between LEAs. It is not compulsory and may include many extra-curricula activities. It needs to be flexible to allow for pupil choice, co-operation between teachers and other groups where necessary. Industry, higher and further education, LEAs and others may also be asked to contribute. Emphasis on variety and personal interest in aspects of technology or local problems. Two Schools Council projects which have affected curriculum content are; 1 Project Technology; 2 Design and Craft. Both projects by publishing resource material and engaging in in-service training have indirectly affected the content of curricula. Project cards, articles, booklets, magazines and reports of successful material have been given national coverage.	By helping pupils to design, make, test, modify and use devices and equipment the teachers seek to stir their imagination and sense of wonder, build up their knowledge, develop their skill and heighten their respect for man's efforts. . A.A. Haimes The emphasis is on activity rather than the acquisition of knowledge. A general trend towards a form which includes the project method and which uses forms of problem-solving. Generally it leads towards a construction of an appliance or mechanism of original design, though sometimes reports, research and other 'design' projects may be included. Themes or topics are often used in cross-disciplinary enquiries and often extend into the community or the world of work.	In some schools technology is regarded as an activity associated with one or more of the traditional subjects. The organisation of technology courses will depend on many variables and there is no set pattern for such work. Teachers, courses offered, equipment, subjects involved, accommodation and school type will all impose patterns of organisation which may form the basis of integrated courses.	There is a fair amoun of agreement over curriculum content, mainly because of the influences and constraints of the system. Examinations exert a strong influence as do the professions and higher institutions by their insistence on standard entry qualifications. It is interesting to compare the objectives in column 1 (Haimes, HMI) with the published objectives of Project Technology: '. . . to encourage technological activities in schools and thereby develop a range of abilities and provide motives which are often overlooked by more traditional approaches'. The overall aim is: 'to help all children to get to grips with technology as a major influence in society and, as a result, to help them lead effective and satisfying lives'.

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