

# 'That's where the library fits in'

## Design and Technology in the National Curriculum

Gillian Klein  
formerly *Centre for Learning Resources, ILEA*

'The capability to investigate, design, make and appraise is an important as the acquisition of knowledge'.

This is the stated approach to Design and Technology (D & T) as a foundation subject in the National Curriculum. It involves pupils in a process of learning and acquiring skills of which information handling is an integral and crucial part, whether the information derives from print, graphic illustration or three dimensional model. This article demonstrates that information handling needs to be considered and built into the school's D & T curriculum at the planning stages and that the school library and its staff have much to contribute both at the planning stages and in delivery of the curriculum.

The article reports on a pilot project undertaken by librarians in conjunction with the D & T departments in two ILEA secondary schools, with the support of a librarian from the Resources Support Group who acted as Research Officer.

The librarians in the two pilot schools had already established good relationships with the teachers of D & T, and both schools were involved in the early stages of implementing the Hargreaves Report and the London Record of Achievement, of which more later. Consequently, both schools were keen to support the project, despite difficulties caused by industrial action at the time.

Information handling is a key factor in the National Curriculum for Design and Technology. To cite just a few examples from the Proposals to the Secretary of State (June 1989):

AT1 Level 3 asks for: 'finding information from relevant sources (for example books, databases, people)'; AT4 Level 7 requires that pupils 'should draw upon information which they have systematically gathered about the characteristics of the product and about the reactions to it...'. In AT3 we find Level 9 stipulating that pupils

'make judgements about the quality and usefulness of their sources of advice and information' specifically and, equally and at the same level in AT2, that they 'develop ideas by drawing on relevant information and understanding from a broad knowledge of sources...'

These four sets of Attainment Targets are grouped into Profile Component 1. There is also a second Profile Component devoted wholly to Information Technology — for which the effective school library is bound to be a prime resource.

The librarians' pilot project, then, has implications for all teachers concerned to deliver the National Curriculum in D & T effectively. There is little doubt that the enhancement and evaluation of pupils' information handling skills will also have relevance to other subjects in the National Curriculum.

### AIMS

In evolving its aims, the project drew on two main sources, the London Record of Achievement (LRA), and the Hargreaves Report, *Improving Secondary Schools* (1984). Records of achievement were being piloted in London, and profile statements on information handling skills were incorporated in evaluation of pupils. This approach was endorsed by the National Steering Committee, whose *Report* of January 1989 specifies 'Library Skills' as important and covers matters such as the ability to find, analyse and present information and to frame and test hypotheses.

The Hargreaves Report (1984) offers a 'new definition of what is meant by educational achievement'. It regards improvement in public examinations as only one of the aims of education and identifies four aspects of achievement. These aspects of achievement are incorporated in assessment in ILEA secondary schools and this pilot project naturally incorporated them. The Report describes them as follows:

**Aspect 1** is the most strongly represented in current 16+ examinations dealing with the capacity to remember and use facts.

**Aspect 2** is concerned with the practical and spoken skills rather than those which are theoretical and written.

**Aspect 3** is concerned with personal and social skills and the ability to communicate and co-operate with other people.

**Aspect 4** is the ability to accept setbacks without either losing heart or the determination to succeed, readiness to persevere and the self-confidence to learn in spite of the difficulty of the work; the Committee considers this to be an achievement in its own right and very important because the other three are improbable without it.

As well as seeking to meet these national and local authority aims, the library project outlined specific objectives:

- to investigate strategies for linking the D & T curriculum and the teaching of information skills, working with the professional staff of both the library and the subject department;
- to evolve a model applicable to the teaching of D & T in other years and in other schools;
- to investigate the applicability of this model of teaching and learning to other schools;
- to investigate the extent to which this model contributed to other developmental work in the school, notably work on incorporating the 'four aspects of achievement' (outlined above) into the curriculum and possible links with the London Record of Achievement.

### Setting up the Project

In both schools, the planning meetings at which the D & T teachers were able to



*Fig 1a The Original Homework Sheet*

## DESIGN & TECHNOLOGY

### 2nd YEAR

### HOMEWORK

*Words that are used when we think about designing.*

*Look up the meaning of the words given below and write the meaning in the space beside the word.*

#### BRIEF

#### SPECIFY

#### INVENT

#### PLAN

#### MAKE

#### TEST

discuss with the librarians exactly what they wanted certain classes to learn and what process would be addressed, were the arena in which many positive changes to curriculum delivery took place. Here the potential impediments to learning — difficult or unclear terminology, unrealistic assumptions about pupils' existing knowledge and skills, likely special needs of bilingual children etc. — were identified. Here resources in the form of worksheets or special collections of books were prepared or modified and here teaching methodology was decided e.g. the presence of a language support teacher in the library when needed. In both cases, the Librarian and the Research Officer had planned their strategy in advance and had clarified the possible nature of their contribution. The limited period of one term necessitated a sharp focus on special topics chosen by the teachers, and on the aims and objectives of the project itself.

#### SCHOOL A

In the one term in which the project ran, the librarians responded to problems as perceived by the D & T department. First

there were the *Homework Sheets*. The D & T department already had a programme of investigative learning in which pupils were required to complete homework sheets in their own time. The teachers were not satisfied with the resulting work. The librarian was also dissatisfied: because the pupils were expected to use the library in their own time, it was difficult for her a) to give them as much help as she would have liked to and b) to assess how well the pupils were using the library.

The problems appeared to lie in the homework sheets themselves. They assumed a high level of information skills on the part of pupils. There had been no attempt to build into them a progression of such study skills through years one to five. Nor was there any guidance provided for using the library.

The terminology on the worksheets had also proved problematic — is 'Brief' (see Fig 1A) a noun or an adjective; 'Plan' a verb or a noun? In clarifying these matters, it was clearly appropriate to look at language in the light of support to bilingual pupils, and accordingly the ESL

teacher who liaised with the D & T department worked with the librarians on rewriting the homework sheets.

The rewrite was analysed in a full meeting late in the term and considered still to be rather difficult! One useful outcome of the whole exercise was that some teachers were persuaded to try out for themselves the process of completing a worksheet using the library — which helped to clarify for them the difficulty of the Worksheet and accordingly to plan revisions.

The element of information handling skills and their progression became recognised as a matter of pedagogical relevance to the teachers in the department. It is clear that the National Curriculum is concerned with these aspects of process and that the school librarian — a 'teacher whose subject is learning itself' (Davies 1956) is the appropriate staff member to work with subject departments in this area. The librarian set out the following diagram of information handling skills for discussion in the department.

A second problem arose with a *Fifth year design project*. The brief was to design and construct a trophy for an orienteering event. The teacher had explained orienteering and the pupils had all fixed on the aspect of cross country running and had based all their designs on it.

The problem was that he wanted pupils to explore more than one idea before starting work on their trophies, but instead of producing several different designs and then choosing which to build, they stuck with their first idea. 'This', said the school librarian and the researcher librarian virtually in chorus, 'is where the library fits in!'

Investigation is a significant stage in the design process and the school library is the appropriate location for investigation, the librarians the appropriate professionals to foster and develop the investigation skills.

The Design process diagram devised by A. Yarwood and S. Dunn; *Design and Craft* (1986) provides insights into the process and was adapted for the investigation of the orienteering project.

Before pupils came to the library, the librarians checked out the information available. The definition of 'orienteering' in the dictionaries were clear and straightforward. The books on orienteering were also helpful, with pictures that could stimulate ideas, and keywords that would enable the pupils to



**Fig 1b WHAT IS A DESIGN BRIEF?**

Work in pairs. Write down the name of your partner.

1. Look up design brief in a general dictionary. You may have to look each word up separately. Does it make sense?

2. Use the subject index to find the numbers for the following terms:

Design.....  
Technology.....

3. Now go to the shelves and look for the following books:

*Craft Design & Technology* by A. Breckon & D. Prest  
*Design & Technology* by A. Yarwood & A.H. Orme  
*Design & Realization* by A. Marden

4. Use the contents and/or index pages to find the information. Look for design brief, brief or design.  
Read the information that you find.

5. Discuss with your partner what you now think a design brief is and write down your definition in the space below.

6. Look at the following design briefs. What do they specify.

Purpose    Material    Energy

i. Laminate and shape a piece of acrylic to make a paperweight. The paperweight must be attractive to look at and to hold. Use harmonizing or contrasting colours.

ii. Make a vehicle that will move as far as possible, using 500g silver sand as the source of energy.

iii. Make an article for storing things in a bathroom. Use 3mm acrylic sheet. Use the line bending technique. Your teacher will tell you how big the acrylic sheet is.

iv. Make a mechanical toy box that works when you put a coin in a slot.

Use a dictionary to find the meaning of any words you do not know. Add them to the vocabulary page in your folder.

search out more information. A library worksheet was prepared which focused on some fundamental research skills:

**LIBRARY TASK:  
ORIENTEERING**

Working in pairs; find a dictionary and look up the definition of orienteering.

Pick out three keywords which will help you get ideas.

Write up the keywords onto a flip chart and be sure you understand them.

Discuss how to find books which would supply information on these keywords.

Divide into three groups. Each group to find books on one of the keywords and bring them to the table.

Make a note of any resources you think may be useful for the topic.

Swap groups until you have all had a chance to look at all the resources.

Now look at the resources you have noted and negotiate with whoever else want to use the same item.

**Objectives of this lesson**

D & T purpose — to find ideas for trophy topic

To develop Learning Skills

ILEA aspects of achievement — to foster co-operation.

The ten pupils working on this sheet in the library still needed a good deal of guidance from the librarians. Clearly, they had forgotten any information handling skills they may have been taught

in the library lessons in the first year and they were also not used to discussing their work. The staff began to recognise that this way of working needs to be implemented from the first year to have maximum success. Nevertheless, the pupils did come up with some alternative designs and became so involved in the topic that three came to the library the following week to use the books on orienteering.

The immediate outcome of this exercise was a recognition by the department that in every year, pupils should conduct part of every investigation in the library, and in accordance with a programme planned in advance by the teacher and the librarian. Subsequently a first-year group was despatched to the library to research their topic on trains and were able to find the books they wanted more quickly and easily than the 5th years. Information handling skills recently taught in the library lessons were now being contextualised and reinforced.

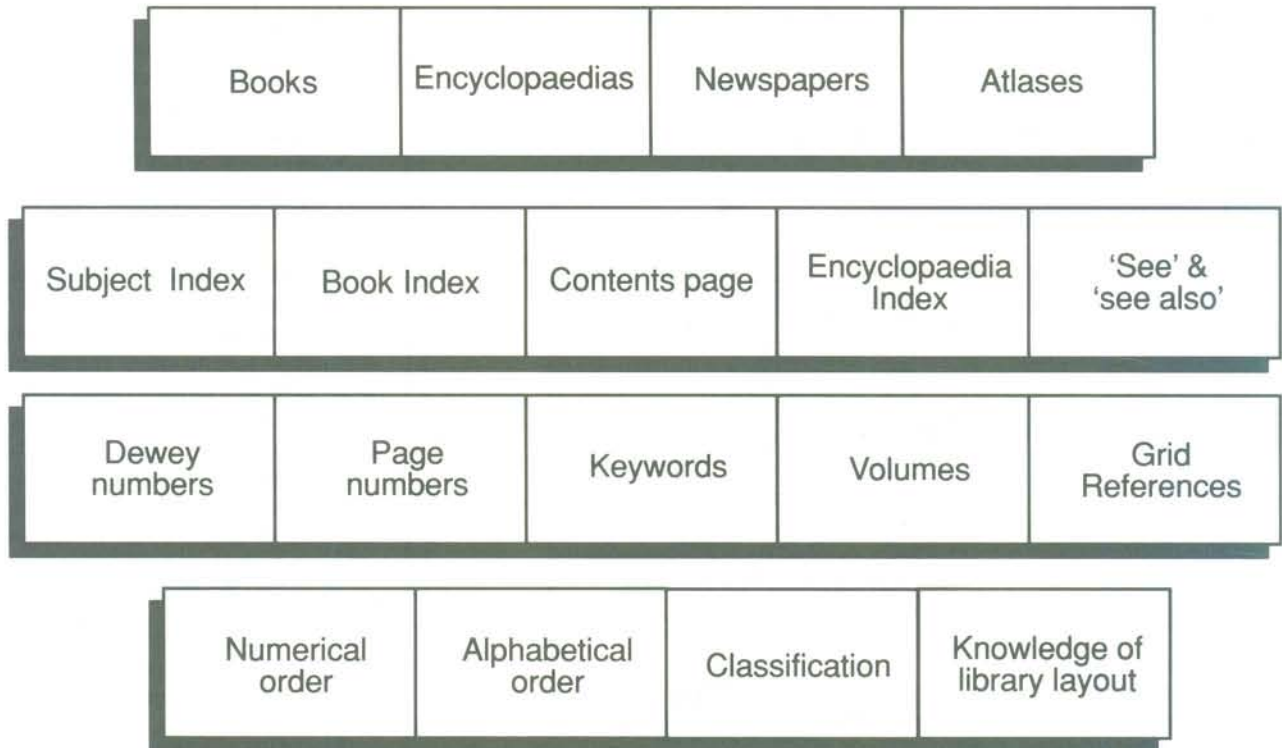
Another and more important result was the recognition by the department that early planning discussions with the library would enhance effective delivery of the curriculum. It was decided to follow up the pilot with continued liaison between the department and the library. Pupils would in future be brought to the library at the investigation stage of their projects. Because pupils could work more effectively in smaller groups in the library, the teacher and the librarian would each take half the class. Finally, it was agreed that one teacher would take responsibility for maintaining a permanent liaison between the department and the library.

The pilot project and the joint departmental meetings has other less measurable and conclusive but arguably more significant outcomes. The D & T process was more overtly defined and the vital role of information handling as part of the investigation aspect of the process recognised. The observations by teachers of how pupils solve problems — what D & T is about — and how their learning might be evaluated, considerably enhanced the delivery of the D & T curriculum in terms now required by the National Curriculum.

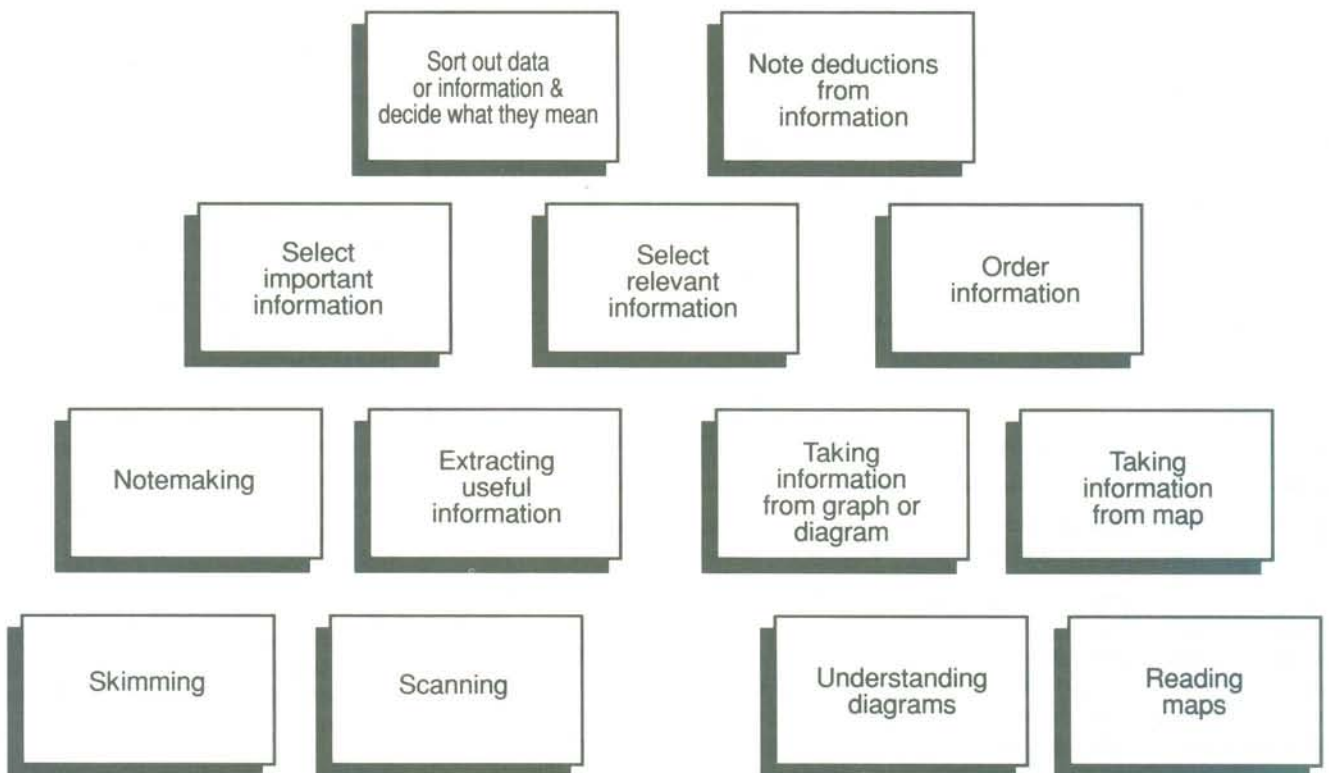
**School B**

In this school the problem was rather different and the project took a different course. The librarians and the department were already working together on pupils' research and the issue to be addressed was this: how can we build into a design

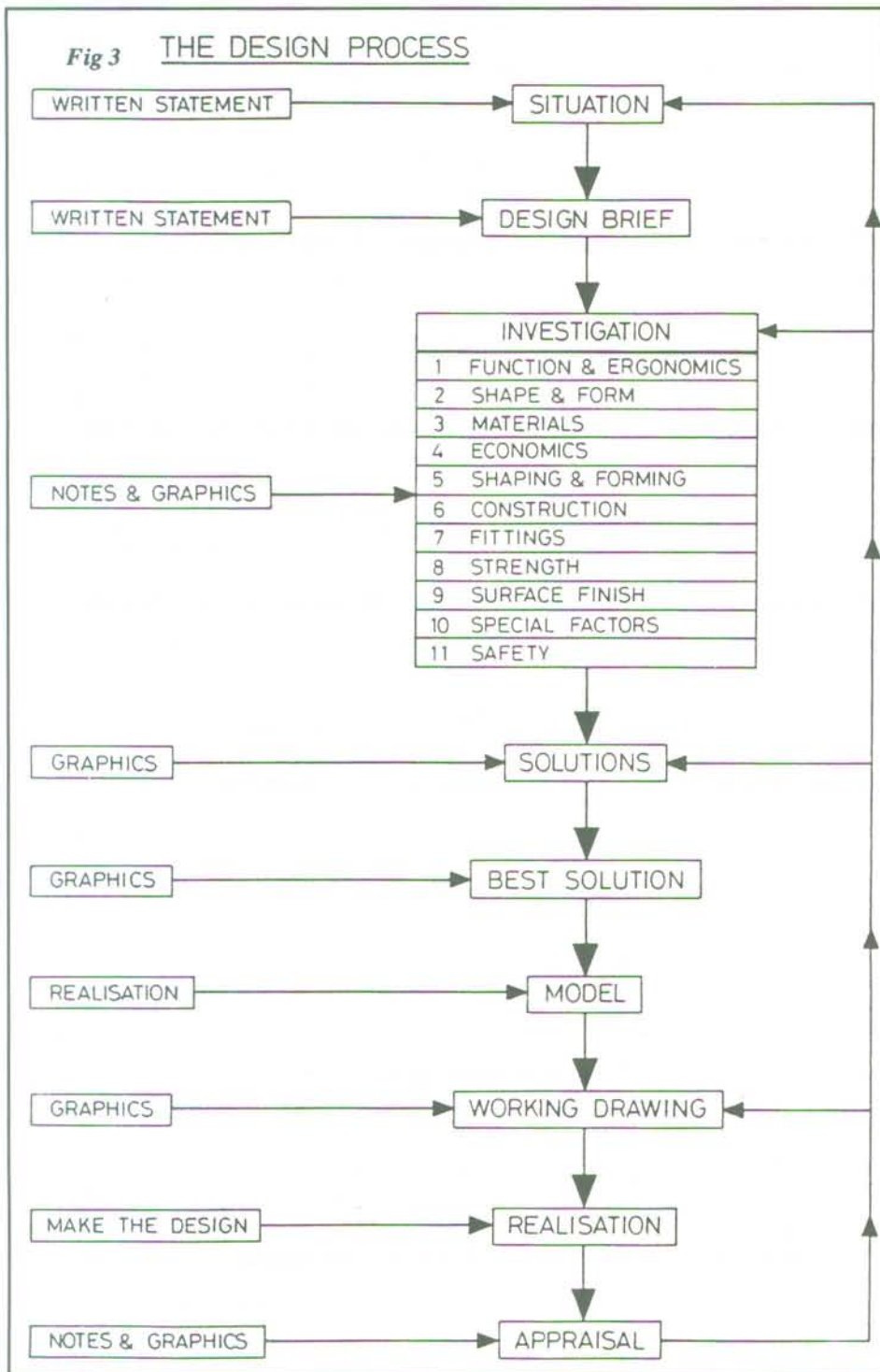
**Fig 2 Locating Information (written sources)**



**Extracting information from written sources**





**Fig 3** THE DESIGN PROCESS

project a mechanism for evaluating pupils' information handling skills?

It was decided to concentrate on one year, the fourth, and one topic, weather. In the initial planning discussions, it was decided to build in the important element of information handling skills in the form of self assessment. Fourth years could be expected to look at the process by which they found information for the project. Accordingly, they were expected to fill in a self-assessment sheet at the end of the project, evaluating their own strengths and weaknesses in using the library to

find the information they needed. (See Fig. 5)

The librarian produced for the department an outline of the research process, based on the Yarwood and Dunn chart shown in Fig. 2 and the "Nine steps" with which this article ends, taken from the Schools Curriculum Bulletin 9: *Information Skills in the Secondary Curriculum*. These sources informed the aims of the project, which were set out as follows:

#### AIMS:

make sure all pupils understand the brief;

elicit any relevant information they already know;  
encourage them to fill the gaps in their knowledge;  
make sure they knew where to find the relevant information in the library;  
provide pupils with a framework of the research process that they could refer to while carrying out the project;  
encourage them to look at their own performance.

The pupils come into the library with the worksheet already prepared by the department, and the librarian explained the project and its aims. The project was to be used as a mock examination, giving the pupils an opportunity to assess their own strengths and weaknesses. Their investigations in the library were an important element and they would be expected to assess for themselves how effectively they had used the library and its resources for their research.

The worksheet listed the meteorological variables for which pupils might design instruments for measuring:

- a) wind speed
- b) rainfall
- c) temperature
- d) humidity
- e) atmospheric pressure
- f) relative humidity
- g) hurricanes

The first class of fourteen pupils worked in two groups, initially identifying key words by which they could research their information, their first suggestions were Instrument; Measure; Weather. Later they added Sun; Wind; Temperature. When they checked their design brief, they found that there were some words about which they were uncertain e.g. Aspect, Instrument, so added dictionaries to their list of resources required. In subsequent sessions they searched for the encyclopedias, dictionaries and the books on weather that would give them the information they needed on the weather.

The second class of 4th years had four bilingual pupils in one of the two groups, and a language support teacher worked with them throughout the investigation process.

Building in an evaluation by pupils of their own capabilities of handling information was a vital phase. Time was allowed for every pupil to complete the self-assessment sheet (Fig. 5)



In School B, as in School A, the initial planning meetings between the department and the library had proved invaluable in clarifying the investigation process in design, and developing the understanding of all the staff involved of the information handling skills pupils need in the process of a design project. But in the school the planning produced another bonus: the involvement of a language support teacher so that language support was given to bilingual pupils, both for the curriculum and for the investigation process itself.

## RESPONSES

The D & T departments involved with the project and the librarians were unanimously enthusiastic about the value of planned collaboration that allows for full discussions, in delivering a process-based curriculum. The teachers were anxious to introduce these methods from year one and follow through, so that pupils would progress with their learning skills and handle information competently by the time they undertook projects in their 4th and 5th year. The staff recognised that library resources could be used to expand and diversify projects. One school resolved to build a research session into the initial stages of every design project and to develop a policy on resource based learning which, they believed, should extend across all curriculum areas.

The librarians for their part welcomed the opportunity to learn more about an area of the National Curriculum and to extend their knowledge of stock requirements. They emphasised the value of teaching and evaluating information handling skills in a curriculum context, so building a real perception of their relevance to learning by pupils and working towards speed and competence by all. Concerned about the unwarranted assumptions of language and research competencies in departmental worksheets, they offered their perspective in re-writing them — and incidentally created an opportunity to involve language support teachers in re-writing and also in investigation work. One librarian did make a plea that teachers should themselves be expected to work through a project worksheet, using the resources of the library, before expecting the pupils to do so!

## CONCLUSIONS

Despite its restrictions of scope and time, this pilot project has implications for other schools — and for other areas of the curriculum. Of inestimable value to delivery of the National Curriculum was the way that the initial discussions

**Fig 4 THE RESEARCH PROCESS**

### Questions to ask yourself

Do I understand the problem?

Do I understand the question?

What did I know already?  
What do I need to know?  
Where am I likely to find the information?

REPEAT AS NECESSARY

Have I collected enough information?  
Have I collected too much?  
Have I answered the question?  
Does it solve the problem?

How should I present the information?  
Who is it for?  
Have I chosen the best method of presentation to answer this problem?

Do I need to use any graphs/maps/diagrams that I have found?  
Was what I already knew useful?  
Looking back, could I have done this better?  
How well have I done this?  
What have I learnt?

### Capabilities required

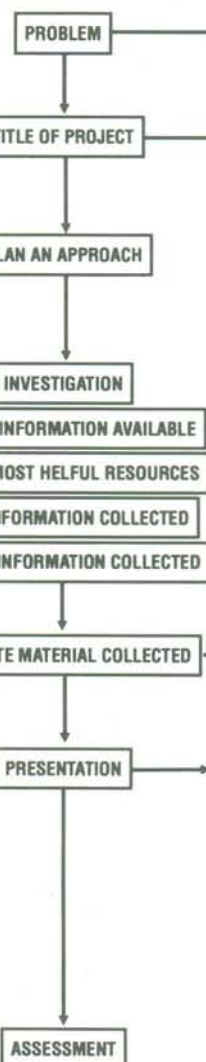
Use of dictionary  
Use of KEYWORDS  
Use of encyclopaedia

Lateral thinking  
Organisational skills  
Planning skills

Use of the library  
Numerical and alphabetical skills  
Use of museums  
Interviewing people  
Use of outside organisations  
Use of contents page  
Use of index  
Use of subject index  
Oral communication skills  
Skimming and scanning  
Notetaking  
Recording sources (page number, references etc.)  
Decision about relevant questions  
Evaluation skills

Written and oral communication skills  
Translation of material original work

Self assessment skills



involved teaching staff in examining in some detail the planning and delivery of curriculum and particularly in paying attention to both progression and evaluation.

It was revealed that teachers were making some false assumptions about pupils' levels of competence in handling information. The project highlighted the need to pay more attention, throughout the curriculum, to the progression and evaluation of pupils' information handling skills. The requirements of the National Curriculum make this need even more urgent. Within the Design and Technology Curriculum, the project demonstrated that the information needs and information handling skills associated with problem solving need to

be consciously and consistently addressed. It was also clearly demonstrated that for their part, information handling skills have to be taught in context of the curriculum if they are to have any meaning for pupils. This is true for every school, whether or not it has a professional librarian.

The pilot helped evolve clear procedures that could serve as a model for future collaboration between the librarian and a subject department in teaching a curriculum unit or topic. In any event, keeping information handling skills to the fore will lead to more effective delivery of the curriculum on four fronts:

1. there will be closer analysis of the processes by which pupils carry out their learning of the curriculum;



**Fig 5 Self assesment on library & research skills**

**Weather Project November 1987**

Use this to help you assess —  
How well you have used the library to find information for this project.  
What your strengths and weaknesses are.

I can find the resources I need in the library  
easily                      with some help                      with a lot of help

I can use the subject index  
easily                      with some help                      with a lot of help

I can use a dictionary  
easily                      with some help                      with a lot of help

I looked up the following words in the dictionary

I can use an encyclopedia  
easily                      with some help                      with a lot of help

I can locate information in books  
easily                      with some help                      with a lot of help

I can use the contents page  
quickly & easily                      with difficulty                      with help

I can use the index  
quickly & easily                      with difficulty                      with help

I can skim  
quickly & easily                      with difficulty                      with help

I can scan  
easily & quickly                      with difficulty                      with help

I can take notes  
quickly & easily                      with difficulty                      with help

I can locate information in other resources  
quickly & easily                      with difficulty                      with help

For this project I used sources other than the school library. They were:

I selected materials to use because of the  
title  
pictures  
writing  
other

I make a record of useful sources of information  
always                      sometimes                      never

I can ask for help  
easily                      with difficulty                      not at all

2. the major areas will emerge in which use of the library can contribute to pupils' learning;
3. the learning skills most required by pupils for their work in the curriculum will be identified and procedures established by which these skills can be developed;
4. evaluation of pupils' learning will include — as required in the Design and Technology Attainment Targets — evaluation of their investigatory, i.e. information handling, skills.

Teachers concerned to develop the information skills required of pupils in the National Curriculum will need to include in their curriculum development meetings a full exploration of ways to build these skills into delivery of the curriculum. They need to look no further than *Schools Curriculum Bulletin 9: Information Skills in the Secondary Curriculum*, which sets out nine steps:

**What do I need to do?**

(formulate and analyse need)

**Where could I go?**

(identify and appraise likely sources)

**How do I get to the information?**

(trace and locate individual resources)

**Which resources shall I use?**

(examine, select and reject individual resources)

**How shall I use the resources?**

(interrogate resources)

**What should I make a record of?**

(record and store information)

**Have I got the information I need?**

(interpret, analyse, synthesize, evaluate)

**How should I present it?**

(present, communicate)

**What have I achieved?**

(evaluate)

**REFERENCES**

DAVIES, R.A: *The school library: a force for educational excellence* Bowker 1969

DEPARTMENT OF EDUCATION AND SCIENCE AND THE WELSH OFFICE: *Design and Technology for ages 5 — 16*; proposals to the Secretary of State for Education and Science and the Secretary of State for Wales. National Curriculum Council, for DES, June 1989

DEPARTMENT OF EDUCATION AND SCIENCE AND THE WELSH OFFICE: *Records Of Achievement*; report of the Record of Achievement National Steering Committee. January 1989

INNER LONDON EDUCATION AUTHORITY: *Improving skills in the Secondary Curriculum* edited by Michael Marland. Methuen Educational, 1981

YARWOOD, A and S *Design and Craft*. Hodder & Stoughton, 1986