

UNIVERSITY OF SOUTHAMPTON

'INFORMATION' IN SECONDARY SCHOOL CURRICULA

by

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ABSTRACT

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'INFORMATION' IN SECONDARY SCHOOL CURRICULA

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'Computer Education' has made impressive strides during the past few years. From the dilettante interest shown by Mathematics or Science Departments in a few schools, the study of the computer has become a subject in its own right in almost 2000 schools in the United Kingdom, a development encouraged by the introduction of public examinations in the subject.

Nevertheless the subject suffers badly from its history as the foundling of the Mathematical Sciences, and a disproportionate emphasis is laid in most syllabuses on the computer as a machine, the way in which it is programmed and the logic by which it performs its function. In spite of the undoubted attractions of computer programming as a motivator of some children, and the value of the machine as a symbol of the modern world, it is the author's contention that the real importance of Computer Education lies in teaching all children about the impact of its applications and implications.

The 'Information' course presented as Volume 2 was written during the period of research to broaden the scope of the school computing course, and to provide teaching material for teachers of any subject discipline. A description of the course and the reactions of the teachers who have tested the material in two Hampshire schools forms the major part of this thesis. Also important however are the insights gained by the author into the complex subject of 'Information', and its potential role in lending coherence to, and promoting expansion of, secondary school curricula.

Foreword

In the following pages will be found:

- a) A description of the educational scene in which the need for an amount of defined teaching material is discussed.
- b) A description of a course entitled 'Information' written by the author between September 1973 and December 1974, during the period of research.
- c) An account of the testing of the course in two Hampshire schools and the reactions of teachers and pupils to the material provided. The main emphasis of this account will relate to the usability of the teaching material by teachers.
- d) Some reflections on these reactions and on the place of the 'Information' course in the general curriculum of secondary schools.
- e) In volume 2, teaching notes and pupil worksheets of the 'Information' course mentioned in b) above.

No attempt is made to devise or use techniques which measure 'progress' or the 'learning' of concepts by teachers or children; the development of measurement procedures which would be adequately sensitive to the complexities of classroom teaching situations is a subject worthy of a research project in itself.

The impetus for the development of a course on 'Information' came from perceptions and realisations of inadequacies in that branch of education known as Computer Education, not only by the author but also by others with longer experience in the field. Worthy of special mention in this respect since they were instrumental in making the course development administratively possible and in promoting many of the ideas included in its subject matter are Mr. M. D. Meredith, Tutor in Information at the University of Southampton and the author's personal tutor during the research period, and Mr. J. D. Tinsley, formerly Head of Education at the National Computing Centre, and currently Staff Inspector of Schools for Birmingham Education Authority.

The methods employed and approaches adopted in its presentation through teachers to the children emanate from the experiences, intuitions and opinions

of the author as a former teacher, educational technologist and computer professional.

The reporting of the teachers' reactions to the material is mainly factual, most of the source material being taken from recorded conversations with them. The interpretations placed on the reports of the teachers can only be based on personal observations, intuitions and impressions gained by talking to them about the material, their backgrounds, opinions, preferred approaches, strengths and weaknesses, perceptions of the classroom and of children and their place in the teaching-learning environment. Mostly, these aspects were articulated and expressed in discussion; occasionally the teachers themselves were unable or unwilling or unaware enough to express these relationships for particular lessons.

Lastly there are the insights and experiences gained by the author himself over the period of development and testing. From a study which originally bore the title 'Informatics as an Approach to Computer Education' has come a course in which the Computer Education aspect has seemed to be increasingly irrelevant to the real needs of teaching about 'Information'. Thought and interaction, coupled with the need to exploit and discover means of implementing both, have given their own perceptions of something akin to, but different from, the original intent.

I am indebted to the following people and organisations for their help and encouragement in the writing not only of this thesis but also of the course which it describes.

To Mr. Maurice Meredith, my tutor at the University of Southampton, whose helpful guidance and fund of ideas lightened the dark corners of my research.

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To a whole host of people not connected at first-hand with the project but whose interest in, and enthusiasm for, the curriculum developments I was trying to engender led them to read, appraise and advise at each stage. Among the many were Mrs. Barbara Dutton, former HMI, Mr. Bob Gammon, Director of the Southern Science and Technology Forum, Mr. David Bothwell, Senior Secondary Adviser for Hampshire and teachers, lecturers and administrators far too numerous to mention.

To my employers, IBM United Kingdom Limited, and in particular Captain John Trechman, manager of Community Affairs Department, and Mr. Ivor Bush, Community Affairs Projects Manager, who made the project possible in the first place and supported it in many ways, not least by paying my salary.

To the many contacts I made in developing Case Studies for the 'Information' course, Mr. C. Grimmer, Miss. B. Sabey, and Mr. G. Taylor of the Transport and Road Research Laboratory, Mr. Keith Guard of the Southern Gas Regional Board, and Chief Inspector George Baker of Hampshire County Police. These and others gave without complaint, their time and expertise when it was needed.

To the Headmasters, staff and children of the Yateley and Henry Beaufort Secondary Schools, and in particular to the teachers who took part in the pilot tests, Mr. Ray Cackett, Mrs. Sheila Oviatt-Ham, Miss Rosemary Trew, and Mrs. Jackie Lord at Yateley, Mr. Harry Wright, Mr. Steve Ward and Mrs. Jenny Leigh at Henry Beaufort. All gave time and expertise in discussion and in the classroom, criticism where it was due and effort when it was necessary. I salute them all.

Lastly, and by no means least, to my wife, Margaret, and two children David and Jeannette. They have suffered my frequent presence at home, endured my frustrations, made allowances for my preoccupations and, most important, encouraged my aspirations.

Norman Longworth March 1976

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CHAPTER 1

Background to the Information Project

- 1.1 Some historical developments in education about computers in the schools.
A brief overview of the short history of Computer Education to illustrate the context in which an 'Information' course was thought to be relevant.

1.1.1 Introduction

This thesis represents the history of a project from its initial conception, through its development into a course for schoolchildren and its testing in two Hampshire schools, to the interpretation of feedback obtained from the teachers involved. It charts the progress of an idea from birth to realisation and describes the changes which have occurred and the growth of insights, some of them unexpected, as a result. The intention was to fill a recognised gap in Computer Education by writing a course based on information; the realisation was that the filling of the gap transcended the subject itself and education about computing as such became just one aspect of the much more global concept of information.

This first chapter deals with the background to the project and outlines the way in which the intention became translated into a specific action; that of developing a course for schoolchildren which would help them understand the nature of information and its place in their lives and in the modern world.

It describes historical and current developments in the field of Computer Education and how the experiences of the author in this field led to a concern about the direction and practice of these developments in the schools. It argues, and produces philosophical backing for the view, that education about the implications and applications of using the computer is more important than education about the way in which the machine operates. The author believes that most children of secondary school age can be taught to appreciate these more nebulous and intangible aspects given the right approach and the sympathetic teaching which should be every child's right.

1.1.2 Difficulties in Computer Education

The exact date of the genesis of the electronic computer is not generally agreed upon even in the best-informed computer circles. Indeed the exact definition of the word is open to a variety of interpretations. Some people would attribute the word 'computer' to the pile of stones used by the caveman to keep count of his food stocks; others would point to the stored program, the means by which the computer can hold within its memory the instructions it has to perform, as being the major distinctive factor which separates the computer

from the ordinary calculating aid. Certainly, in the thirty years which have passed since ENIAC (Electronic Numeric Integrator and Calculator) first began to calculate the trajectories of ballistic missiles for the United States Military in the basement of the Moore School of Engineering, Pennsylvania, and in the twenty years since the early British computers LEO and ATLAS replaced the laborious manual methods of assessing and verifying scientific premises, the electronic computer has evolved more rapidly than any other single artifact in human history.

For the schools, keeping abreast of such rapid development is a particularly difficult problem. The transition from valve to transistor to integrated circuit has resulted in smaller, faster and much more versatile and reliable machines, and at the same time left the amateur far behind in terms of understanding techniques, concepts and computer architecture. In many schools which operate a computing course today, the concept of ferrite core storage, the tiny doughnuts strung on wires which magnetise one way or the other depending on the direction of current along the wires, is still taught as if the method were still used in modern computers. Such methods have not been incorporated into machines built since 1970. Semiconductor storage, in which as many as 4192 bits of information can be placed on a single silicon chip less than a quarter inch square, has replaced ferrite cores and no doubt will be itself shortly replaced by other methods, perhaps based on magnetic bubbles or laser techniques.

In one sense this is sad. The ferrite cores were a very convenient way of teaching children the essential binary nature of the computer, and it is perhaps not important that the actual method is no longer in use. Nevertheless, this example does highlight one of the problems of the teacher in keeping up with developments in a high technology field and a rapidly changing society.

1.1.3 Historical Development in Computer Education

Some teachers have, however, made the attempt. During the 1950s and early 1960s, schools interest in this relatively new machine, the computer, centred in a few Science and Mathematics Departments, the former using the then fairly well-known thermionic valve technology to construct such units as binary adders and tape readers, the latter more interested in programming in the machine and autocodes of the day. The relative complexity of both these activities ensured that only the more able pupils were likely to take part. At this time, too, the needs of the embryonic computer industry for staff,

operators, programmers and systems analysts provided some impetus and justification for including computing as a school activity.

Towards the end of the 1960s the impact of the computer on the society we live in was beginning to be felt. The enormous growth in the number of applications the computer is capable of performing, the effect the machine has had in accelerating the pace of change in society, its potential for solving, and perhaps for causing, some overwhelming social problems, the likelihood that people in the future will directly or indirectly be coming more and more into contact with the computer, the ramifications of the use of the machine in many different ways and in many different industries - all these and more led some of the leaders in the field of schools computing to realise that dabbling with mathematical programming or electronic construction is only the tip of a very large iceberg of Computer Education.

The Schools Committee of the British Computer Society was constrained to produce a document 'Computer Education for All' in 1969¹, in which it was recommended that all school children need to know something about computers if they are to be able to cope with the society in which they will mature as adults. In Scotland, which in many ways has advanced further than other countries of the United Kingdom having centralised its educational computing resources in accordance with a definite plan, the Bellis Report² recommended that 'An introductory course in Computer Studies should be provided for the great majority of pupils. Teachers of various subjects should be encouraged to co-operate in presenting this course.' What is perhaps more laudable is that the Scots produced action as well as words, setting up six regional centres each with its own computing resources and at which children are able to study.

In England and Wales, local regional computing groups, often based on formerly established Computer Education groups of interested people and using the facilities of a Polytechnic, College or Local Education Authority computer, have achieved varying degrees of success in providing computer time and advice for schools. The Hertfordshire Advisory Unit for Computer-Based Education³ is an excellent

1 Computer Education for All - a report by a working party of the British Computer Society Schools Committee. Printed and published by the British Computer Society, 29 Portland Place, London, WC1 in 1970.

2 Curriculum Paper No.6 - 'Computers and the School' (The Bellis Report). Published by HMSO, Edinburgh and the Scottish Education Department 1969.

3 The Advisory Unit for Computer Based Education A descriptive booklet. Printed and published at the Unit Office, 19 St. Alban's Road, Hatfield, Herts. 1972.

example of this, having a full-time advisory and secretarial staff, and encouraging teachers from all over the county to set up small working groups to assess and satisfy their own Computer Education needs, and to make use of the resources offered by the Unit.

Nevertheless, the connection between Mathematics and Computing still exists and is seen by many to be more relevant than other considerations. Many of the local centres owe their existence to the enthusiasm of mathematicians, are staffed by mathematicians and produce teaching material with an unashamedly mathematical bias. Not surprisingly, the computer is regarded as a mathematical instrument by the vast majority of teachers, notwithstanding the efforts made in some areas to broaden its area of influence.

1.1.4 Recent Developments in Computer Education

We have already seen that the use of the computer raises a number of important social questions which might be better discussed by a social scientist in the school environment, since the impact of the machine on society is the sort of open-ended, indefinite topic which the mathematician tends, if possible, to avoid. Since 1971 a number of very interesting developments in the non-mathematical uses of the computer have been initiated. Largely from the initiative of the Scottish Computer Education Group, but also carried out separately by other independent bodies, much work has been done to create package programs which assist the teacher of any discipline to put over concepts not easily taught by didactic or other means. An example is the 'HAIKU' program¹, which could be of much use to the teacher of English in giving children a feeling for words, their meanings and their syntactic framework. A fuller description of this is given in figure 1.1, while figure 1.2 describes another package program², by which a teacher of Home Economics may impart the elements of nutrition to children of all secondary ages. There are now many programs of this type which use the computer as a direct (and expensive) teaching aid; some of them do not teach any better than the normal method, but there are many areas in teaching in which the particular qualities of a computer to diagnose and simulate would be extremely useful.

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- 1 HAIKU - a program to write this 17 syllable Japanese verse form. Description and program from Moray House College of Education, Holyrood Road, Edinburgh. First printed 1972.
 - 2 DIET - a set of conversational programs dealing with nutritional content of food and budgeting. Teachers Manual published by Advisory Unit for Computer Based Learning, Hatfield, Herts, 1972.

Recent developments in Computer Education have tended to accentuate the trend away from its mathematical origins. In 1973, two projects were set up to investigate its uses in two entirely different areas. The Schools Council 'Computers in the Curriculum' project, based on the Centre for Science Education at Chelsea College, has already produced several package programs of the type described in the last paragraph, but mainly with a scientific bias. The National Development Programme for Computer Assisted Learning was allocated two million pounds of government money from six government departments to investigate and instigate many different projects associated with the use of the computer to direct the learning process. Few details have been published of the progress being made but the most exciting aspect of this is that the government is at last taking an interest in Computer Education, and that its interest is not confined to the mathematical or the programming functions of the machine.

Nor have other bodies been entirely idle. The philosophical document 'The Computer in Secondary Education'¹, in a chapter which the author of this thesis wrote, floated the idea of computer education as a link between subject disciplines in the schools. The Local Authorities Management Services and Computing Panel (LAMSAC) produced a document² containing guidelines for Local Authorities which wish to provide computing services for schools. The International Federation for Information Processing has also recently produced a document³ extolling the virtues of teaching about 'Information Processing' in schools.

Other developments are still at a very early stage or need decisions about the feasibility of introducing them into the schools. Among them are the making available of Local Authority databases, for example the Census data, to the schools for retrieval and project work, the use of computer terminals in schools to access large career files (a feasibility study has just been completed in Cheshire in conjunction with IBM)⁴, the use of computers to solve many of the school administration problems and to provide the Headmaster with an information system, computer-

1 The Computer in Secondary Education - a report by a working party of the British Computer Society Schools Committee. Printed and published by the British Computer Society, 29 Portland Place, London, WC1. 1974.

2 Requirements for a Basic Schools Computing Service (LAMSAC) 1974
35 Belgrave Square, London, SW1X 8QB.

3 Information Processing - published by IFIP Technical Committee 3
3 Rue du Marche, 1211 Geneva, Switzerland. Nov. 1975.

4 'Interactive Careers Guidance System' - a manual published by IBM United Kingdom Limited Science Centre, Neville Road, Peterlee. June 1975.

assisted-instruction, the direct interaction of computer and learner to achieve a particular learning objective and the equipping of schools with computer terminals so that they can perform all these things and perhaps also build up, process and retrieve information collected locally by the children themselves.

None of these are fundamentally mathematical activities by nature and all of them require the knowledge, expertise and specialist background of teachers from all sections of the educational spectrum. But the numbers of non-mathematicians prepared to investigate what the computer can do for them is very small. Computer Studies is still, in the minds of most teachers, the province of the mathematician: of 600 teachers asking for information from the IBM Schools and Colleges Computer Information Service and stating their specialisation, 580 were mathematicians. Perhaps the emphasis in the past on Computer Education (ie the machine) rather than Computing Education (ie what the machine can do) has helped to create this situation: perhaps the historical development of the subject as a study of how the machine works rather than why the machine is used has established the blockage. Whatever the reason, the 'Information' course which forms Volume 2 of this thesis and is its main subject, was written to rectify this imbalance of interest. In concentrating on the information which the computer can process and in putting this information into its context in the real world, the course was hoping to offer a different perspective of Computer Education to the non-mathematical teacher.

Figure 1.1 How the program 'HAIKU' works in the classroom situation

(A Haiku is a seventeen syllable Japanese verse form which describes a mood or a scene.)

- A The child completes a data sheet giving lists of words to be chosen by the computer. The number of syllables in each word is also given.

List 1		List 2		List 3		List 4	
Children	2	Straggling	2	Supperwards	3	Tearfully	3
Teachers	2	Ambling	2	Homewards	2	Eagerly	3
Staff	1	Extruding	3	Schoolwards	2	Slowly	2
Kids	1	Toothpasting	3	Pubwards	2	Noisily	3
Visitors	3	Bussing	2	Mumwards	2	Sadly	2
		Perambulating	4	Bedwards	2	Rapidly	3
List 5		List 6		List 7		List 8	
From	1	Yateley	2	School	1	Peace!	1
				Prison	2	Bedlam!	2
				Academy	4	Poetry!	3
				Paradise	3	Thanks Be	2
						Despair!	2

- B The child now specifies in which order the computer is to extract words from the lists, and how many Haiku to be printed.

1 2 3 4 5 6 7 8

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- C The computer selects one word from each list at random and produces as many Haiku as are asked for. The following is a selection from the above lists.

Children	Staff	Teachers	Children
extruding	ambling	extruding	straggling
mumwards	supperwards	pubwards	schoolwards
tearfully	rapidly	eagerly	slowly
from	from	from	from
Yateley	Yateley	Yateley	Yateley
paradise	prison	prison	Academy
Peace!	Poetry!	Thanks Be	Despair!

- D The computer selects at random and always produces a verse containing 17 syllables. Some of these verses will be rubbish, some adequate, and some good. Thus the child is thinking at three levels in completing this exercise.

- (1) Which words go into my poem?
- (2) How can I make the computer put them into a sentence?
- (3) Which are the good, bad or indifferent Haiku?

Figure 1.2 How the program 'DIET' works in the classroom situation

This program can be run in batch mode or interactively using an online terminal in the school. This description refers to the batch version.

- A The child is to devise a diet. On a data sheet he/she specifies how many people the diet is for, which sex/age/occupation group the people belong to, whether the diet is to be vegetarian and the number of days.

```
3      -- state here how many people are to be fed
9      -- state the sex/age/occupation group for person 1
10     -- group for person 2
5      -- group for person 3
NO     -- is the diet to be vegetarian?
1      -- state the number of days planned for
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- B Using a list of foods for which the nutritional elements are specified, the child now enters the detailed diet. The example below shows that given for one meal.

FOOD	Shd Wheat	Fried Eggs	Toast	Butter	Milk	Coffee
CODE	22	42	11	26	37	197
WEIGHT	90	180	90	20	500	10

- C These are now taken to the computer, entered by means of punched paper tape, and the diet is examined for its nutritional elements by the program 'DIET'. The elements examined are:

Protein (grams), Energy (KCalories), Calcium (mgms), Iron (mgms), Vitamin A (mcgms), Vitamin D (mcgms), Thiamine (mgms), Riboflavine (mgms), Nicotinic Acid (mgms) and Ascorbic Acid (mgms).

- D The child is given a breakdown of the complete diet in terms of the above elements and particular deficiencies or surpluses are indicated.
- E The child is now encouraged to correct the diet. Several variations of this program are in use, some offering various special diets, others offering the facility of pricing the items. For this latter application, a databank of up to date prices is needed and this leads to practical follow-up work in the supermarkets and shops.

1.2 Information and Education

The context of information in modern industrial society, and the present and future needs of school children for understanding how and why it affects them.

1.2.1 Information - a social problem

In his highly publicised book 'Understanding Media'¹, published in 1964, Marshall McLuhan mused that 'automation is information and it not only ends jobs in the world of work, it ends subjects in the world of learning'. Notwithstanding the contentious nature of his assertion about a correlation between automation and unemployment, a thesis which has yet to be demonstrated, the main theme of this statement concerns change and the speed at which it takes place. An extension of this idea is taken up later in the same chapter when, in comparing the nature of electronic power to the old mechanical systems it has succeeded, he cites the separation of the source of energy from the process of translation of information as a major contributory factor.

The theme of change is taken up with gusto by the journalist Alvin Toffler in 'Future Shock'², a book he describes as a 'study of mass bewilderment in the face of accelerating change'. In typical journalistic, but entertaining, style many examples of 'the swift and relentless change in the techno-societies, such that yesterday's truths suddenly become today's fictions, and the most highly skilled and intelligent members of society admit difficulty in keeping up with the deluge of new knowledge'. As examples of what has been the exotic title of the 'information explosion' and the difficulties it has caused, Toffler quotes Dr. Rudolph Stohler, a zoologist at the University of California, ('You can't possibly keep in touch with everything you want to'), Dr. I. E. Wallen, chief of Oceanography at the Smithsonian Institute, ('I spend 25 to 50% of my time trying to keep up with what is going on') and another Oceanographer who is reputed to have said, 'I don't really know the answer unless we declare a moratorium on publications for the next ten years'. Even the language cannot distort the broad general truth known by all who do some kind of research work that the amount of information available is outstripping the researcher's capacity to absorb it.

In 'Computers, Managers and Society'³, published in 1969, Michael Rose takes

1 M. McLuhan, Understanding Media (Abacus, 1964)

2 A. Toffler, Future Shock (Bodley Head, 1970)

3 M. Rose, Computers, Managers and Society (Penguin Educational, 1969)

up the theme of change and applies it much more directly to the influence of the computer. In talking about computers he states, ' . . . in the last ten years the pace of technological advance has been even more rapid and each step has become so bewilderingly impressive that there is surprise when the next comes that there was any frontier to cross. The same goes for computer applications . . . ' He is, too, much more precise in his use of terms, believing that, 'automation is a word which has been overworked almost to meaninglessness', and arguing for 'computerisation' as a process whose 'raw materials are data and whose chief product is information'. Later, in evaluating the role of the manager in society, Rose suggests that the computer's economic value is derived primarily from its use as a tool which enhances the manager's own performance, but that this responsibility goes beyond securing purely economic benefits for himself, his company or even for society. Whoever exploits a new technology, he suggests, must shoulder some responsibility for ensuring that its potentialities are not misused. In the four areas of possible misuse, which he describes as being oversystematisation, impersonality, centralised control and elitism, there are already many examples of overenthusiastic responses to potentialities and too much ignorance of pitfalls and dangers. 'Computerisation must be by actual or implicit consent of the people who will be concerned with it, and this can only be given or withheld realistically if the parties involved have some genuine appreciation of what the machine is, how it does its work and how it will affect their own jobs and lives.' Thus although Rose is arguing a general case as it affects one section of society, his thesis concerns the dangers of ignorance in all sections of society.

A more futuristic, optimistic and enthusiastic series of cameos of life in the computerised society is offered by James Martin and Adrian Norman in 'The Computerised Society'¹, published in 1970. Although it is dotted around with aphorisms and platitudes such as 'After growing wildly for years the field of computing now appears to be approaching its infancy. (Opening sentence of the report of the US President's Science Advisory Committee on Computers in Higher Education, 1967.)' and, 'We have to bring the entire human race, without exception, up to the level of semi-literacy of the average college graduate. This is what may be called the minimum survival level . . . (Arthur C. Clarke)', the book nevertheless offers some fascinating extrapolations by two authors who can also genuinely

1 J. Martin and A. Norman, The Computerised Society (Pelican, 1970)

be said to be technologists and researchers. They begin by acknowledging that 'the man in the street has felt the impact of computers only indirectly . . . he does not, and he need not, understand them . . .'

They go on however to point out some of the possible effects of such things as networking of computer systems, the use of telephone lines and other telecommunications media, the potentialities of the new machines in which contact between computer and consumer is likely to be much more direct and personal, applications such as the Retail Store System, the direct ordering over the telephone of groceries and other items, Computer-Assisted Instruction, a whole range of information services for the home, the school and the place of work. In the light of this, they say, 'we need new laws, new education and new attitudes . . .'. The danger is that two cultures exist, those that know about, influence and are able to cope with the implacable growth of computer interference in our lives, and those who ignore the implications. 'Most sociologists', they say, 'trail along some way behind, usually not quite knowing what is happening. Behind them come the majority of civil servants, clergy, lawyers, politicians, and last of all teachers who are preparing people to live in this new age. They are bewildered, misinformed, and more often than not, disinterested. They belong to the other of the two cultures. Meanwhile, society hurtles onwards down the lines of least technological resistance'. The rest of the book goes on to tell us, in glowing terms, about the changes computers will bring into our lives - about how the police might use the machine, how the child may be educated by the machine, how the computer will be an essential feature of every home, how the cashless society may be created, all examples of direct man-machine interactions and all convincingly argued from a sound current technical knowledge.

These are quotations from just four of the many books and pamphlets on the effects of computerisation on our society, whether they be messengers of the technological chaos and doom to follow or presagers of the enhanced quality of life to be expected in the years ahead. The great majority of them point to the effective education of both children and adults as a first necessity in enabling people to cope with the changes which will inevitably come about; education to alleviate the effects of mass unemployment (McLuhan), mass bewilderment (Toffler), mass ignorance (Rose), or mass misunderstanding (Martin and Norman). And yet, as Martin and Norman also point out, the education service is at present ill-equipped to answer the demands made upon it. There is a shortage of awareness among teachers, a shortage of teaching material for both teachers and

children and a shortage of communication between the opposite sides of the 'two cultures.'

1.2.2 The Individual and the Organisation

Modern man has been conditioned to accept certain criteria as evidences of his progress - faster and more reliable systems of communication and transportation, greater social mobility, the availability of more and more labour-saving gadgets - are some of these, and what must now be added as an essential ingredient is the availability of information and his capacity to store, process and retrieve it at a personal level. The devolution of decision-making power to the citizen has always been a tenet of true democracy. As society becomes more complex, as information becomes more available, its interactions more involved and the means of its dissemination more sophisticated, the burden on the individual to act as a clearing-house is vastly increased. And as decision becomes more and more equated with information, from the business organisation operating its management information system to the punter betting at the races to the farmer seeking to maximise his crop production, so does the possibility of powerful authority misusing the channels of information communication increase. One essential criterion of the value of education to the individual of the future, especially within a democratic system of government, will be in his capacity to receive, assess critically, store methodically, retrieve dynamically and communicate effectively the information he needs to know in order to carry out his function as a citizen and a worker. Gut feeling and emotion will still continue to colour interpretations, as they have always done, but the complexity of the computerised society demands that information be an increasingly important adjunct to decision-making at the personal level.

As with individuals, so it is with organisations. The needs of, for example, a Research Establishment for information has long been acknowledged though not often expressed in these terms. The Transport and Road Research Laboratory at Crowthorne, which forms the material basis for module 5 in the 'Information' course (volume 2) can be likened to a large computer. The experiments carried out on its research track provide information from which decisions about the future design of cars, roads and safety features are made. In addition, information from a wide range of external sources, from Police Stations all over the country and other research establishments throughout the world for example, is processed at the laboratory, and the whole purpose of the

exercise is to make recommendations to the Government about transport policy in the country. In effect it is a data collection, analysis, preparation, storage, processing, retrieval and communication operation and exactly the same can be said about any computer system. Information is both the *raison d'être* and *modus operandi* of the Transport and Road Research Laboratory, and the only justification for its existence. And of course, within this huge information system there are a great number of subsystems each involving different people at different levels and each contributing to, or sometimes detracting from, the success of the whole. Parallels can be made with almost every other business, cultural or educational establishment in the country.

1.2.3 A summary

To summarise, the social importance of information education in modern society covers three main areas:

(a) It postulates that the computerised society, as it has been called by at least two of the references, demands an awareness among people at a level far greater than exists at present. If this awareness is not taught, then the potential abuses of the machine by unaccountable authority are far more likely and far more serious, and the potential capacity of the computer to help solve some of the problems with which we are faced is reduced.

(b) At the level of the individual, his capacity to become involved in the computerised society and his ability to adapt to the changes it will inaugurate will rely on his personal information handling ability. Also related to this is the amount of personal freedom the individual is able to maintain within a democratic framework of society.

(c) At the organisational level, the efficiency of its results is directly related to the efficiency by which it sets up and analyses its information systems and subsystems. This demands a high degree of insight on the part of senior management and much awareness of the objectives and purpose of the organisation on the part of those who work for it.

Martin and Norman first published 'The Computerised Society' in 1970, McLuhan published 'Understanding Media' in 1964. In terms of the adoption of new ideas from genesis to fruition this is not a long period of time. Only now are educationists beginning to take the ideas and warnings seriously. The fact that they are expected to adapt so rapidly says something about the speed of change in the modern day. The fact that very little is done in schools says something about the

reaction time of the education service. The apparent paradox is tenable only if one considers that sooner or later the education service will have to catch up with society; it cannot be the other way round. The 'Information' project is one device by which it is hoped that this process may become sooner.

1.3 A rationale for an 'Information' course.

The scope of the subject.

1.3.1 Introduction

The historical development of education about computers in schools has, as outlined in section 1.1.2, led to a situation in which, by and large, the Mathematics Department teaches the elements of programming and logic, and few applications and implications are discussed. It is often only in schools where Computer Studies is taught as a subject in its own right, usually to examination level, that these extra dimensions have been introduced into the curriculum, and then they are often taught in desultory fashion as an afterthought to the main business of effective programming. Thus the machine is treated as if it were an inevitable part of the world outside, which it often is, and no attempt is made to explain its existence, to justify why it is so widely used or to assess its importance in a changing world. The question 'why?' is subordinate to the question 'how?', not a healthy situation in what is meant to be a fully rational approach to computer education.

Recent developments in the field of package programs and information retrieval exercises have not altered this situation. While they may help to arouse interest among teachers of other disciplines and act as indicators of one relatively minor application of the machine at school level, they do nothing to teach children about the great computer issues of tomorrow, nor do they contribute anything to computer literacy in the modern world. The operational characteristics of the terminal and whatever method is used to interact with the package are all that is required when using the computer as a learning tool in this way.

It is in section 1.2 that the postulate that children should be made aware of the applications and implications of the computer in society, if only to forestall some of the misuses which unscrupulous or unwitting technologists may inflict upon society, and to preserve some of the democratic freedoms they now enjoy, was mentioned.

Thus the largest gap in computer education has been identified. On the one hand the computer is being presented to children as a tool which they can use if only they learn the techniques of presenting the right instructions, in perfect syntactic form and in the right order; on the other, but far away from the level of the children, the computer is presented as being the spearhead of the second great industrial and technological revolution, a machine which can change our lives,

for the good if it is treated sensibly and with the consent of the people, for the bad if left in the hands of a few socially unaware specialists. But, of course, the computer itself is quite dead. It can do nothing it is not told to do; this certainly is one of the valuable messages which children learn in their programming trials. It is a tool, they are rightly told, for storing and processing information, and as they feed in their series of numbers for solving quadratic equations or enter randomly selected letters for sorting into alphabetic order, they learn the truth of this.

1.3.2 The Scope of the subject

But the nature of the information in the world outside of the school is not usually of the type used in solving the small mathematical problems which children practise with. There is sensitive information, such as personal facts and figures, vital information, that which may provoke decisions about the saving, or taking of lives, and financial information which may lead to the issuing of right or wrong invoices, the taking of right or wrong decisions, the ordering of the right or wrong quantity of spare parts. There are also the everpresent problems of updating and verifying information, of whom it should be made available to and for what purpose, of how it should be processed and how valuable the end-product of this processing is, of how the nature of information is changed after it has become data to the machine and then become information again in a modified form. If the computer is a powerful tool for processing information, this is only so because of the power of the information in the ultimate analysis. In the context of the 'Information' project it seems much more appropriate to study the information rather than the tool which processes it.

Expressed in these terms, the scope of Computer Education broadens out considerably. Information is a word which has connotations far beyond the world of the computer and stretches out into such problems as personal relationships, media control and communications. The scope of an 'Information' course should not be confined therefore to the narrow requirements of the computer: it is an attempt to look at the subject in its total context. One way of doing this might be to take an organisation and to study it in terms of its need for information, the nature of the information it uses and the ways by which it is obtained, assessed, processed and communicated. In so doing, of course, one naturally comes across the computer, but only as a storer and processor of the information being studied and strictly in its context as a tool for that purpose. Having done this the energetic teacher may wish to take the subject further by teaching how the machine

works and pointing out some of the implications of the use of the computer in this way.

An 'Information' course cannot be all about information. The ramifications of the subject are too wide and varied for this, but if children can recognise the information problem, understand how it may be solved, using perhaps their own personal resources and the mechanical tools which can be made available, the broad objective of the course has been met. Mechanical tools do not always imply the use of the computer. In many cases this would be like using a power-saw to cut a dahlia. The use of edge-punched cards, of time-honoured methods of quill pen and ledger, are as appropriate in some cases to solve the information problem, and these too should be suggested in the course. The scope of the actual course will become clearer in the next chapter in which details of its subject matter are discussed, but considerations of method and approach are also intimately bound up in any good course development as are the problems of introducing it into the existing school system and these are discussed in the next section on course design.

1.4 Barriers to Curriculum Development

Some of the difficulties faced by schools in introducing new courses into the curriculum. An 'Information' course as a curriculum link and the flexibilities which should be inherent in it.

1.4.1 Subject Barriers

Most teachers are now prepared to question the practice of presenting information in watertight subject parcels, as happens in the vast majority of British schools. Not only does it tend to mislead children into unnecessarily rigid channels of thinking, but also it obscures the real interactive and relative nature of the information they are receiving. The objective of most school lessons is to pass on information or to arrange for its communication in some way; and while it is possible to postulate various ways of classifying it, methods of crossreferencing are more difficult to devise. The rigidly adhered to timetable is a good example of a classification system with no crossreferencing facility. The search has been going on for many years among curriculum development agencies, teachers and advisers for the common core subject, the link which will tie up together into a sensible bundle the broad generalisations which go under the headings of English, Geography, Science, History and so on in the curriculum of the average school. The British Computer Society document, 'The Computer in Secondary Education'¹, suggests that the computer may fulfil that function; just as the computer is the central point, the vital element in the information flow between the departments of a large organisation, so may it be so in the school. The analogy may hold good in the future, but at this point in time it tends to ignore the fact that schools do not have computers.

The thesis presented here is not that the computer acts as the missing subject link but that information, in all its guises, fulfils that function. If, for example, one takes the school itself, an environment familiar to children, and examines the role of information in it one can study it in several ways. As a generator, storer, processor and disseminator of information the school's function can be studied in two quite different areas which broadly correspond with its purposes as an educational and as an administrative unit. In taking information as a theme one can use it as a means of breaking down subject barriers in the educational sense, or as a way of building up ideas about information systems in the administrative sense. Either or both of these approaches may be employed to enable children to

¹ The Computer in Secondary Education (British Computer Society, 1974)

make sense of the environment in which they spend much of their time, of which they are themselves information elements and around whom an information system has been moulded, however badly. Subsystems such as the dinner register, the timetable, the attendance register, can all be studied in the light of this larger system. If, however, we are purely concerned with the concepts of the information taught to children and the reasons for it then we have to make doubly sure that they do not become confused between information, knowledge, data, facts and all the other words which might, but don't, convey the same message.

But the way we would like it to be done using an 'information' approach must take into account the reality of the situation in schools. Rapid changes in modern society have caused some schools to re-examine their syllabuses so that they are more in keeping with the needs of tomorrow's adults. But the difficulties of teachers in keeping up with trends in technology, combined with a shortage of adequate teaching material, have tended to mute the response of schools to curriculum development in this way.

And this is not the only barrier to progress. The career structure of the teaching profession is historically based on the teaching of subjects within well-defined compartments. Thus the Head of Geography Department creates the syllabus for Geography within the school and directs its teaching by himself and others to children who come specifically to learn about maps, and man's adaptation to his environment, and climate, and all those other topics which traditionally lie inside the parcel of knowledge labelled Geography. The same applies to other departments in the school, and since it is in the teacher's own economic interest to specialise in this way in order to gain promotion, who can blame him for doing so? Nor has the recent movement, particularly in comprehensive schools, toward a dual career structure based on subject specialisation as above and a pastoral care function by which some teachers accept responsibility for the personal well-being of groups of children, usually of like age, helped curriculum development. Rather has it served to strengthen the system by setting up a more humane method of allowing children to cope with it.

Naturally, these are generalisations. Attempts have been made in some schools to liberalise the curriculum, sometimes by combining History and Geography into a more rational 'Social Studies', sometimes by using teams of teachers to teach aspects of subjects with which they are most familiar, and occasionally, especially at sixth form level, exposing young people to a variety of subjects not normally covered in the standard school curriculum.

1.4.2 The child and the system

It is doubtful whether, from the child's point of view, curriculum development of this sort is either understood or appreciated. They are developments of the existing system over which children have no control and into which they are still expected to fit. In very few schools is any attempt made to explain to children, for whom after all the schools exist, why they study a particular subject, what they can expect to learn from it, what its boundaries are, where it fits into the general scheme of knowledge or how it interacts with the other subjects in the curriculum. Often the only justification offered is that there are examinations in these subjects, yet another unexplained system set up by others for the unexplained benefit of the child. And, of course the obtaining of the necessary examination passes within these parcels of knowledge timetabled into inflexible parcels of minutes during every school day, enables the child to enter into yet another unexplained system, that of Higher Education.

This is not an attempt to knock down the whole educational edifice. The systems and subsystems we have been talking about may be good, bad or indifferent. But the child sees the edifice with a different eye from the systems designer, if he sees it at all. To him, here are a series of systems into which he is expected to fit and which he is expected to accept without criticism and with no right of appeal. No attempt is made to present them to him as a reasonable scheme of things and often little attempt is made to gain his enthusiastic cooperation. Of course, not all children can conceptualise in this way: few will see the educational service as a system at all: but perhaps this is a stronger argument for teaching them and for making at least an attempt to justify it in terms of his own interests, and for obtaining his point of view. It is difficult to understand the answer if one doesn't know what the question is: similarly it is difficult to understand or modify or accept a system if one doesn't know what the system is. Therefore, one objective of an 'Information' course is to help children make sense of the system in which they find themselves, the relationship between subjects, the reasons for being at school at all and the needs of every child for such information as he needs to fulfil himself in as many ways as possible.

1.4.3 Pressures

Another barrier to curriculum reform is the pressure on teachers in carrying out their functions within the time they are allotted. The teaching of a new subject demands much preparation time if it is to be done properly, and the time spent on

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this has to be weighed against that spent on marking examination papers, teaching external examination classes, running out-of-school activities, preparing other new topics and a host of other possible priorities. One typical example concerns the member of a Geography department in a school known to the author. In the one teaching year he was responsible for four CSE examination classes in Geography, for which the syllabus had recently changed, two GCE 'O' level classes, a GCE 'A' level class in Geography and one in Economics, a new venture, several classes of low ability children for a mixture of English, Religious Education and Geography and in addition was pastorally responsible for a tutor group of difficult fifth years in the non-examination stream. On top of this load it is difficult to imagine him, even if he displays an initial enthusiasm for the concept, researching, advising upon, teaching and giving feedback for an 'Information' course. This is by no means an isolated case. All teachers have pressures to bear at most times in the school day, and some have them in the evenings too. Such conditions are not conducive to forward thinking and planning of the sort demanded by those of us concerned with curriculum reform but who are not engaged in the front line of contact with children, for most of the day.

Teachers too have varying degrees of confidence with new material, especially when the material is generated by others, has connotations outside their personal image of what they know, or is apparently about such a vague topic as 'information'. This may be particularly apparent in the pilot testing of a course when certain teachers come across the word 'computer' in discussing the importance of information. It tends immediately to set up a blockage. Persuasion that what is really meant is that the computer enables one to order information logically and that they personally, in whatever they teach, would not ask a child to organise their thoughts illogically tends to fall upon stony ground, so that the parts of the course which concerned the working of the computer might be left out by them. This is not necessarily a bad thing, since one of the flexibilities of the course is to enable teachers to select that which they wish to teach, but it illustrates the general point about lack of familiarity breeding doubt and conflict.

Thus a formidable number of barriers to curriculum development which are especially relevant to the type of course envisaged under the heading of 'Information' have been identified.

How the design of the 'Information' course attempts to take most of these into consideration will be discussed in the next chapter.

CHAPTER 2

The 'Information' Course

2.1 Design Considerations

2.1.1 Introduction to the Chapter

The previous chapter has outlined the background to the 'Information' project by discussing the role of Computer Education in historical terms, and by defining how the real need in the present and the future might be satisfied by a change of emphasis and priority in the presentation of teaching material. It has pointed out some of the barriers to this under present educational conditions and systems within schools. It has hinted that one way of promoting the desired change is to write a course whose subject matter takes into account the required new emphasis and whose approach and method attempts to overcome those constraints which have been identified. Such a course was written by the author during the period of the research and is presented in its entirety in volume 2. This chapter describes this 'Information' course and outlines the main features of its design, content, and methods of approach. A key consideration has been to make the course as flexible as possible, so that teachers and children receive the help they most need in the way that they need it. The following are some of the design considerations which have been taken into account in the writing of the 'Information' course.

2.1.2 Presentation of the course to the teacher

The 'Information' course contains three main constituents, teaching notes, pupil worksheets and visual aids such as films, slides and pamphlets. The teaching notes are copious. This is to offer a helping hand to the teacher who may be new to the school or to the class, or who is nervous about teaching something which he imagines to be difficult. For example, notes on how to start the discussion sessions, alternatives to the recommended methods of putting points over, and detailed descriptions of slides or forms to be filled in are given. This tends to exacerbate the perennial teaching problem of preparation time, but it does try to address the much more serious problem of lack of confidence with the teaching material and hopefully encourages teachers of non-mathematical disciplines to make an attempt to teach the course.

2.1.3 Giving information to the children

In order to overcome the problem of the lack of knowledge of the teacher in this particular subject, pupil worksheets are used whenever there is a piece or block of information to be discovered. Thus the teacher is not didactically engaged in

passing on information to the child, but sometimes acting as a generator of curiosity and enthusiasm or sometimes as a discussion leader. That having been done, the children have well-defined tasks to do using their worksheets, perhaps in finding out new information, perhaps in summarising what has gone before or in answering questions about films, slides, booklets or whatever medium has been used. In some cases the children are using worksheets to devise creative work of their own, such as designing questionnaires, or speculating about the future apropos the present. Examples of worksheets abound in the 'Information' course and the reader is referred to those sheets at the end of each module and whose second prefix letter is 'P' (e.g. x/P/xx). These worksheets can in fact be used in several ways as the teacher requires. The questions may be answered one by one with the teacher discussing each one in turn, or they may be set as exercises after a block of teaching or discursive activity. They need not even be given out to the child at all, acting as a memento mori for the teacher in an oral lesson.

If completed, however, they also offer to both child and teacher the convenience of forming a complete summary of what has been learned to date and may be stapled together with a title page at the front in the form of a book.

2.1.4 Modularity

The course is presented in nine modules, although with the addition of teachers' personal modules, this could be many more. Each module is divided into a series of lessons of approximately one hour's duration, and the total number of hours work in the course at present is approximately a hundred. Each module deals with a different aspect of information, and within each module there are different approaches to achieve a similar end - ie that of understanding the place of information in the modern world. Thus the module entitled 'Information on (Gas) Tap' (module 7), in presenting, among other things, various aspects of information flow, uses systems flowcharts to exemplify this, and also helps children to understand the concepts of flowcharting by incorporating an introductory lesson on the topic, (see volume 2, pages G/T/10 to G/T/13 and pages G/P/16 to G/P/18). Similarly, module two, 'A Headmaster Information System', teaches the problems in setting up an information system by presenting a series of case studies which outline the need for the logical organisation of data. These are followed by worksheet exercises which define the elements of the proposed system in the school which the children attend. Examples of these are seen on pages H/P/1 to H/P/5 in the course.

A key element of the flexibility offered by a modular course is selection by the teacher of those aspects of the course which he wants to teach and feels happy in teaching. Not all modules, or lessons within modules need be taught. At the beginning of the course, in the teachers' introduction (module O), the organiser is given a planning sheet (figure 2.1) which enables him to plan week by week lessons which he will teach, which visual aids and worksheets he will need, and the films he will need to order in advance. Such flexibility is necessary for many teachers who may feel unhappy with some of the subject matter or some of the material in individual lessons, but whose commitment to the general tenets of the course as a whole is sound.

Other advantages of modularity are the ability to incorporate single modules and/or lessons into an existing syllabus, an easing of time constraints, so that the course need not be taught as a consecutive entity, the possibility of amending the order in which concepts are presented, perhaps to fit into some external event happening at a particular time during the year, and the ease of operation in a team teaching situation. This latter aspect is dealt with more fully in the next section.

2.1.5 Team Teaching

The copiousness of the teaching notes are design considerations of the 'Information' Course which take into account the probable lack of familiarity of teachers with the subject matter. Team teaching is another way of doing this and also of incorporating other desirable elements. A course which, for example in module four, puts over some elementary concepts in electronics using bits and pieces from scrap computers, in module five commences with a geographical introduction to the Transport and Road Research Laboratory using atlases and mapographs, and in module three studies television plays as a medium for introducing the place of information in the work of the policeman, has sufficiently wide terms of reference to enable teachers with special subject or hobby interests to take part. Who better to teach the 'Headmaster Information System' module than the Headmaster himself, and if the child really is father to the man, the module, like all good lessons, could be a two-way learning and communicating experience.

Similarly, the HAIKU exercise in module six (see figure 1.1) may provoke much interest in the English Department, while the suggested follow-up exercises outlined in the module in the use of packages for many different school departments may strike similar chords elsewhere.

Team teaching need not involve only staff members of the school. There is also

the possibility of encouraging visiting speakers or even educationists from the organisations studied to take part. Module seven which deals with information on Gas, is an obvious opportunity for this, perhaps stimulating a response from departments of the local regional authority. Another possibility occurs in module eight, which affects sources of information, particularly in the library. In this the purpose and functioning of the library may be better dealt with by a librarian, whose personal involvement with the work may offer greater insights. The last part of module six, which gives advice on computer installation visits, provides useful notes for people in an installation itself, as well as for the teacher in the school. It is unlikely that the external manpower for teaching whole modules will be available, but the impetus for inviting someone along with specialised knowledge for one lesson is provided by the module material.

2.1.6 The 'Information' Course and the timetable

Team teaching is a relatively new and rare phenomenon in today's schools, and the flexibility of the course, paradoxically, takes into account the inflexibility of the average school timetable. Often the most convenient way of dealing with the classic space-time problem of schools, in which children, teachers, and rooms are the variables, is to timetable one teacher for one class in one room. One suspects that, if the 'Information' course is taught in schools, this will happen in the majority of cases. The flexibility still left under these conditions is the flexibility of 'labels'. The course may be timetabled under an entirely separate heading, say 'Information', or labelled as a common subject heading, say 'English', with the course incorporated into the syllabus for that subject. Both these expedients have been used in the pilot testing of the course in Hampshire schools. Even under these constraints, the timetabler, if given warning and a knowledge of the requirements of the course, may be able to make decisions in the previous year about the length and distribution of time to be allowed for the course in each week, so that there is the possibility of being more flexible by teaching more of the course in some weeks than others.

2.1.7 The 'Information' Course and the future

In a changing world, from which education is partly but by no means fully cushioned, predictions about the future course of events in any field are a precarious business. One can extrapolate from the changes that have taken place over the past ten years or so, but this exercise often leaves more questions than

answers. The explosion in Programmed Learning Techniques in the early 1960s seems to have faded away without producing any lasting benefits in individualised learning. Similarly the Educational Technology revolution in the latter half of the decade, while it may have left schools better equipped in the physical sense, seems to have produced a situation in which, as in the case of Babbage's difference engine, the consumer was less interested, or less sophisticated, or less capable, than the designers of the equipment. There are many cases of schools with highly sophisticated equipment, such as CCTV cameras and studios, either not or underusing the capability they offer. In many cases there are very good reasons for this; some of them, such as the pressure on teachers in the classroom situation, have been mentioned earlier in a different context.

In general, however, the educational situation is reflecting the changes in the outside world, and any course produced under present-day conditions must take changes in educational techniques and organisation into account if it is not to be obsolescent in a very short space of time. In some ways this is the most difficult flexibility of all; it forces on the designer of the course a degree of generalisation to which he may not wish to adhere, and adds to the burden of the teacher in constructing local exercises which refer to a specific situation. In the 'Information' course there are many examples of this. The installation visited in module six will, as a general rule, change its equipment radically once every five years and make minor alterations continuously. Thus the work-sheet which deals with this must be sufficiently generalised to allow for any changes made. Reference to page C/P/16 will show how generalisations have been catered for in this one respect. Factual data about an organisation like the Transport and Road Research Laboratory (module five), rapidly becomes obsolete, so that the examples chosen from the material available are constrained to deal with only the less volatile information, and the worksheets are designed so that they may be completed with new data as it becomes available. This of course binds the conscientious teacher to obtaining the up to date facts from the source. Then again, procedures may change; for example, the Gas Board may change its method of billing customers or the library may change its classification methods, so that the technique taught is a mixture of the real, the method employed by a particular organisation when the course was devised, and the generalised, the emphasis on the fact that, while the information remains the same, the means of processing of the information may differ.

One can make educated guesses about education in the future. Sometimes they may be based on the more cost-effective exercises carried out in the high-

technology industries where there is a constant demand for retraining of personnel - the distinction between education and training, while it is a real and important one, is becoming more blurred. Sometimes one may get a feel for the future by observing the new equipment which becomes available year by year and the way in which it is used. In this field the computer is an obvious indicator, both in the fields in which it is now used and in the realisation of its potential in the one other panacea of educational liberationists, that of individualised learning. In some parts, the 'Information' course attempts to lead opinion, for example in introducing computer packages into the schools. But one can foresee a time when such an introduction may not be necessary since package programs might be commonplace in a school. This is not likely to be happening for many years yet.

The possibilities of a computer managed learning systems are also studied in the course, partly in module four as part of the computer applications lesson, (see pages M/T/32 to M/T/34 and page M/P/17), and more thoroughly in module eight, in which the scenario is a school of 1985 (and this date is somewhat optimistic) in which children select their own timetable and use the machine as a learning tool or as a source of information for those things they have a need to know. The story is written on pages L/P/19 to L/P/22. These are just aspects of a many-faceted course and the general rule in course design to cope with the rapid obsolescence of factual and procedural information has been to isolate these from the unchanging principles and procedures and to afford different treatments to them.

2.1.8 Target Population

The age of the child to which the 'Information' course should be taught takes into account many points, some of which are already contentious in educational debate.

First of all, in talking about age one has to accept the fact that chronological age is a poor criterion on which to judge childrens' receptiveness to, or capability of coping with, new ideas, and their ability to understand concepts. One has also to take into account the different levels of ability, the experiential backgrounds, the level of understanding which the course designer or teacher wants to inculcate, whether it be an intuitive understanding learned by completing an exercise or an explicitly stated logical relationship to a previously understood concept. These are just some of the variables which may serve to distort teaching material written for a specific age group, so that, in saying that the course has been written with second year children at secondary school in mind, this statement

must immediately be qualified in many different ways. In effect, the pilot testing of the course has been done predominantly, but not exclusively, with second year children of all ability levels, but, as we shall see in later chapters, successful results and unsuccessful attempts have been achieved with children at third and fourth year levels as well as with college students. Further, a hundred hours of course material offers a variety of response, concept difficulty, badly designed and badly taught lessons, which may be quite bewildering in its potential for complexity.

The factors which led to second year children being involved in the pilot test had in fact very little to do with the subject matter or with any educational justification. One of the main arguments used in discussion by the schools concerned was the absence of examination pressures in the second year as opposed to later years, and while such constraints tend to devalue the currency of a course in terms of its intrinsic importance, they are nevertheless unavoidably uppermost in the administrative consciousness. More will be written later about the organisation and administration of the pilot test and the factors which led to various decisions being taken but this point has been made here to explain a general aspect of the course in its initial conception.

Thus it would be wrong to say that the course has been written for second year children. Rather would it be more accurate to state that it has been written with second year children in mind. The material offered in the course can be modified by the teacher to suit the children he is teaching, the method used to teach it and the treatment afforded to it. This is another aspect of flexibility which relies on the initiative, perspicacity and motivation of individual teachers. This is so whether the modifications are made to cope with a potential lack of understanding in lower ability, lower motivation, children, or to take advantage of the greater maturity and experience of older children.

2.2 An example of content and approach

2.2.1 Introduction

Flexibility has been quoted as being the keyword in the design of the 'Information' course, and this is principally a function of the methods and approaches used in presenting the material to teachers and children. But another essential ingredient in the presentation of a successful course is the choice of subject matter and the way by which it is possible to involve children, as actively as possible, in learning the important concepts and facts. The best way to illustrate this is by example, and while there are no absolutely definitive rules for writing modules in a course as wide-ranging as the 'Information' course, module three, which deals with 'Information in Police work and the Law, has some interesting elements and approaches. References to worksheets are made by the page number in volume 2.

2.2.2 Information in Police work and the Law - an example

The Police National Computer at Hendon has been in use now for just over one year (the first application - stolen cars - was operative from January 1974). In the United States, Police Departments have been using computers for many years. The Alert 1 system in Kansas¹, the Washington State Legislative System¹, the Honolulu Police System¹ and the Santa Clara County Justice System¹ are but four examples of well-documented police applications in the United States, and each offers a wide variety of uses for the computer in both helping to keep the peace and administering the law. Figure 2.2 shows in diagrammatic form the various components of the Kansas Alert System, and it is interesting to note that the social implications of the police use of computers in this way is taken into consideration. In the case of the British version few details are being released so that it is difficult to know how far the Police Authorities are aware of the implications. Certainly, the Communications Officer of the Hampshire County Police Department, from whom most of the information was derived, did not demonstrate a noticeable awareness that computers may also be misused in police work, or that the general public might be interested in knowing how the Police National Computer is used. If this is so it is a sad commentary on the level of awareness of both sides which the 'Information' course hopes to be

1 All Application Briefs (Case Studies) published by IBM Corporation, Armonk in 1971 and available from IBM United Kingdom Limited Schools and Colleges Computer Information Service, PO Box 4, Lymington, Hants.

able to do something about, at least in the younger generation.

The police module of the course begins, as do all modules, by trying to define the problem in terms which the children can understand and identify with from their own personal experience. The information problems of the individual policeman are discussed, especially the selection mechanism he uses when identifying people and the training he must receive to be able to differentiate between normal and abnormal situations he is expected to meet. In particular the problem of the difference between knowing a person and having information about a person is emphasised, since it is at the second level that the policeman's relationship with the general public takes place. To illustrate this point, and to offer the children some insight into an information exercise which they probably do not overtly recognise but implicitly understand, they are given the sheet shown on page P/P/1 entitled 'How much do you know about your friend?', and asked to complete it with reference to someone they know well. In this way the point is made that, whereas a policeman could answer the first set of questions because he has been trained to observe, he would not necessarily know that person unless he has had cause to meet him in an informal situation in which attitudes and beliefs were discussed, as in the second set of questions. The opposite is true when the children complete the exercise. In many cases they will not know the answers to the first set of questions - this sort of information is not knowledge in their eyes, although the second set may be. Thus the children gain some insight into the nature of information and hopefully are able to understand one of the problems of the policeman. An extension of the discussion succeeding this is to point out the difference between information and knowledge to a computer. The first set of questions and their answers can all be stored in the computer - the computer, like the policeman, now has information in the form of data. It has not, and can never have, knowledge. For the less able children, the same concept may be more easily taught by asking them to make up a 'WANTED' poster, without benefit of a photograph, describing someone they know.

Children are frequently subjected to interminable television series of imaginary policemen whose exploits they are asked to accept in a spirit of uncritical half-comprehension. This, too, is an information problem in two senses; that of discriminating between what is feasible and logical, and what is the result of coincidence or improbable characterisation; and that of dissecting those information elements in the plot which enable the crime to be solved. An extra spin-

off of the second is the ability to recognise the gratuitous elements of the story-line, perhaps the violence, perhaps the addition of extra characters as make-weight. The second lesson in the Police Module discusses the police on television and makes available to the teacher a script of a Z-Cars plot (reputably one of the more realistic of television police series) and a question sheet which summarises the lesson. The script is shown on pages P/P/3 and P/P/4 and the question sheet on page P/P/2. This may seem a long way from the sort of information relevant to computer processing, but is nevertheless a type of information exercise well within the experience of the children, and if desired one aspect of the discussion might be the possibility of computer-generated plays, bearing in mind the similarity of many of the plots in television police series. Certainly, children completing the 'Police on Television' sheet are led to realise how much information there is, and a good follow-up could also be in the using of the Radio and TV Times as sources of information and in studying layout, presentation and discussing the problems of planning programmes. How far this topic is taken is, of course, left to the teacher, as is the decision whether it is treated at all.

One of the favourite detectives in the experience of children is Sherlock Holmes, who forms the subject of the next information lesson in the Police module. His treatment of crime in terms of observation, deduction, knowledge and action adds an extra dimension to the information story as it affects police work, and this is presented to the children in the form of a story (shown on pages P/P/5 to P/P/8) and/or a tape on which the story is read by two characters representing Sherlock Holmes and Doctor Watson. There are various follow-up exercises suggested, mainly centring on the theme of deduction from information given, and children may use familiar classroom or personal objects to re-live the story they have studied. A subsidiary theme which is a valuable lesson for children to learn is how a shortage of information can lead to false assumptions, and the children are shown by examples how this is more common than is supposed in daily life. In this way, hopefully, the value of information is brought home.

Lesson 4 comprises a simulation of the policeman's beat and is meant to illuminate the problem of information collection. Several methods of approach are recommended but the most common is to send out children round the school in pairs, some with specific things to look for, others with no specific instructions except to follow the map provided. On return the children are asked a series of questions (these may be provided by one group for the next).

The exercise illustrates two points about information. The first is that people tend to observe and remember better when they know what to look for and are able to select what to notice; the second is the obverse, that unstructured information collection sessions are difficult - there is so much information in the smallest of environments that we cannot possibly remember all of it. This exercise is also meant to reinforce the childrens' identification with the job of the policeman.

Lessons 5 and 6 present Case Studies typical of police work, each of which can be solved with the help of the right information. The first one is discussed at some length and the informational elements extracted from it in terms of the questions who?, where?, what?, why?, and how?. The children are given a series of clues throughout the exercise which enable them to identify the questions to be asked and the sources of information where the answers might be found. The Case Studies are shown on page P/P/9, and in some cases they may be role-played. Clearly, we are now moving on to the identification of the possibility of a machine which could store the information required, and of a means of accessing that information. This is not necessarily made explicit at this stage. Some of the follow-up exercises to these Case Studies involve testing the reliability of people's perceptions and hence the worth of evidence and information. Typical of this is to ask the children to close their eyes and put up their hands after they think one minute has passed; this is followed by an exercise in which they are asked to estimate distances, for example, of the room or of the playing field. The childrens' perception of time and space is not always accurate and since, for example, the speed of a car is a function of these, the reliability of evidence in a traffic case may be suspect. In some cases, teachers have started this lesson by acting a little 'scene' in front of the children and then asking questions about what happened later in the lesson. Again the point at issue is the reliability of information, and the children learn something of value about information and memory by taking part in a practical way.

In lessons 7, 8 and 9 the children have arrived at the point where they are ready to learn about the computer in police work, although at first it is presented only as a machine which can hold the information which the police can use to carry out their jobs more efficiently. In the first part the children are given a story to read. ('Is this the way it could happen?' - pages P/P/10 and P/P/11). This is a story set only a few years into the future in which the computer is used to help catch a thief. It postulates a world in which the linking of computers and the

files of information they contain is a reality, and the ways by which this can be exploited are spelled out for the children to understand. Having read the story and completed the follow-up work on it, the children are shown how near we are to this situation by learning about the Police National Computer, and by speculating about all the things a computer can be used for in police work. For this exercise they are given the sheet 'How the computer might be used in police work' shown on page P/P/12. The master sheet which is available to the teacher is shown on page P/T/20. The children are encouraged, with suitable prompting from the teacher, to think of the applications for themselves. To reinforce the ideas, the teacher might set up an exercise similar to the Case Studies (page P/P/9) and ask how the action would go in real life, a sort of verbal playlet.

Lastly, the children are shown some pamphlets showing pictures of the actual hardware which may be used, mainly Visual Display Units and teletypewriters (figures 2.3 and 2.4) and asked questions about these. The worksheet used for this is shown on page P/P/13 ('Some questions on the Display Screen and Teleprinter').

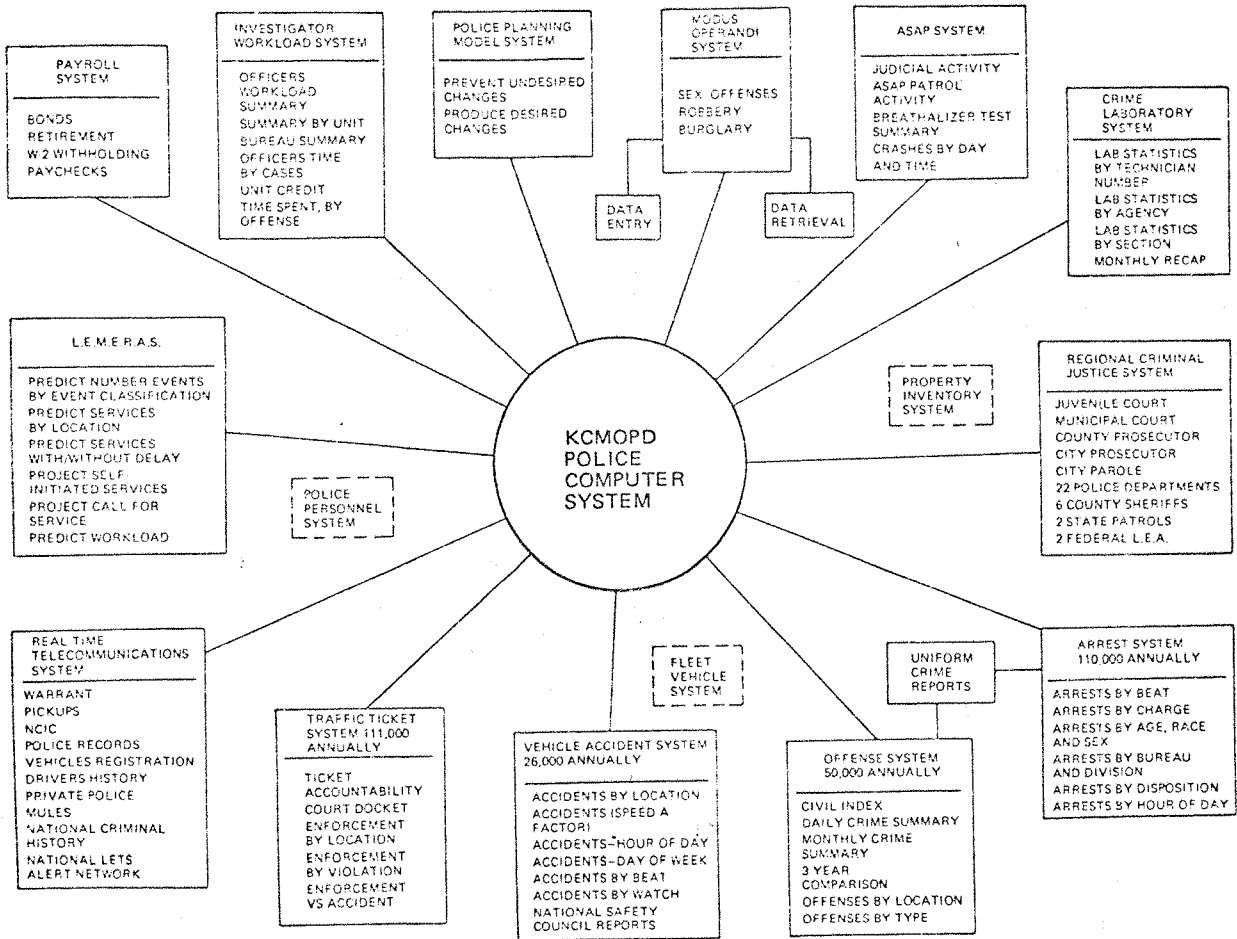
So far the computer has been shown to be a powerful tool which will be of great help to the policeman. What has not been yet discussed are its possible areas of misuse. To introduce this idea, lesson 10 uses a tape-slide story entitled 'Computers Don't Argue' (the story is given on pages P/P/14 to P/P/21). In this story by Gordon R. Dickson and set in the United States, the computer is misused in that it acts as a diagnostic tool in its own right and the people who misuse it seem to place far too much reliance on the machine to answer all questions and problems. Thus children learn that one of the implications of using a powerful information handling machine like the computer is that vigilance must always be observed if it is to serve the purpose for which it was intended. The sheet of questions about this tape/slide story shown on page P/P/22 brings out the salient points and rams home the message.

The last lesson in module three brings to light another implication of the use of the computer. This time it is not the police who are making use of the machine, but the 'other side'. The sheet of three Case Studies on 'Computer Fraud and Embezzlement' (page P/P/23) shows how the computer can be used to create, rather than solve, crime, and how the type of crime it helps to foster is a totally new phenomenon. It illustrates that the modern police must themselves be kept up to date on the advancing technology if they are to perform their

duty of protecting society from those who break its rules.

Thus, in module three, the children have learned something about many different facets of the information story, from the insights they have gained about their own relationship to information and its importance to them, through the uses of information in the environments which are familiar to them such as television and Sherlock Holmes stories, to the applications and implications of the use of the computer as an information storage machine in police work. In this setting, the computer has been given its proper place as an extension of man's capability. It has not been glorified as the answer to all the policeman's problems, it has not been trivialised as a solver of small mathematical problems; and it has not been desensitised as something remote from our everyday experience. What the children will have hopefully learned from completing module three is something about themselves, something about other people, particularly the problems of the policeman, something about the world outside of the school, something about the place of the computer in this world and something about the dangers and pitfalls of relying too much on a nonetheless powerful machine. Other modules present different approaches and different ideas on the information theme, but in essence these are the main themes which a course on 'Information' should introduce and reinforce in order to present insights into those aspects of the subject which the children have a need and a right to know.

Figure 2.2



Automated Police Reporting System

Figure 2.3



IBM 3270 Information
Display System



Figure 2.3

Introduction



You have a computer. For many reasons you need to communicate with it. You need to extract information and update files, for instance. And you need to do it easily and quickly. With efficiency and economy. How can you do it? With the new IBM display system – that more than meets all of these demands with its outstanding functional capability.

The IBM 3270 Information Display System is a versatile family of keyboard display stations, fast printers, and control units, for handling a wide range of local or remote on-line information processing jobs. Large clusters – of up to 32 devices – can contain any mix of displays and printers to suit your exact requirements.

Among the display station highlights are:

Large capacity – 1920 characters

Light Pen selection of data (even for remote version)

Extensive screen editing facilities

Economical use of communication lines

Program Function Keyboard

Fast-action, easy-to-use keyboard

Excellent clarity of displayed characters.

Two fast printers within the 3270 system give you a choice of speeds:

66 characters per second

40 characters per second.

Figure 2.3

Applications

The 3270 lets you rapidly look up information stored on the computer's files. You can then 'focus' on the items you want, and modify them if necessary to update the file. Or you can scan through the stored data page by page, just like flicking through a reference book. If you are updating variable data that is displayed among fixed data, the program-controlled formatting allows the fixed data to be skipped automatically, making the operation simpler and faster. And the CPU can display a system message even while the operator is keying in data.

Systems that run under OS (IBM's *Operating System*) can benefit from using the 3270 display as an operator control station – that is, as a man-machine interface. Here the light pen is especially useful. A display of system status tells the operator what he wants to know in a most convenient form – and if a decision is required from him, he informs the system with the light pen for instant response. Many systems would use several 3270s, located in key positions such as main control console, tape library, disk library, and in the DP Manager's office.

Where multiple key punches are used for data entry, the use of 3270s can substantially increase the key entry productivity; this results from buffered keying and the advantages of on-line editing. The keyboard design ensures that it responds accurately to keying from the fastest operators.

Versatility

The modularity of the 3270 system and its capacity for large clusters of units combine to provide great flexibility in configuration. From single stand-alone displays to networks of hundreds of displays and printers, the 3270 can fulfil your present and future information needs.

One control unit accommodates as many as 32 devices – which may all be displays, or displays and printers in any combination. They can be attached locally to the CPU, or remotely through communication lines operating at 1200, 2400, or 4800 bits per second. The 3270 uses Binary Synchronous Communications (BSC) with the advantage that other BSC terminals can operate on the same communication line.

An unusual feature that makes the 3270 display a truly general-purpose device is the choice of three keyboards. Different key layouts (and functions) have been designed so that the three areas of file enquiry, operator console, and data entry are each handled with optimum efficiency. The pluggable and interchangeable keyboards may be moved up to 30 inches from the display to a position that suits the operator.

Printers

Rated speeds:
40 characters per second
(IBM 3284)
66 characters per second
(IBM 3286)

Matrix printing.

132 print positions.

Cluster size per control unit
32 displays, or 32 displays and
printers in any combination.

BSC line speeds
1200, 2400 or 4800 bits per
second.

BSC line compatibility with
IBM 2715 Transmission Control
Unit
IBM 2770 Data Communication
System
IBM 2780 Data Transmission
Terminal
IBM 3735 Programmable
Buffered Terminal
and other BSC devices.

Keyboard versatility
Three different keyboards are
available for the areas of en-
quiry, system control, and key
entry. Keyboards are pluggable
and can be changed in a
moment.

Data security

A key-operated security lock
can be fitted on each display
station.

A Non-Display feature allows
the operator to key in a security
number without its being dis-
played. The CPU will check the
code and open appropriate jobs
and files.

Program support

BTAM – Basic Telecommuni-
cations Access Method, for
users of both Operating System
and Disk Operating System.

OS/DIDOCs – Device Inde-
pendent Display Operator
Console Support, for users of
Operating System.

Physical characteristics

Small control unit – no air-
conditioning required.

Connection from control unit
to display and printer by single
co-axial cable, up to 2000 feet
long.

Keyboard movable to 30 inches
from the screen.

Easy access for maintenance.

Figure 2.3

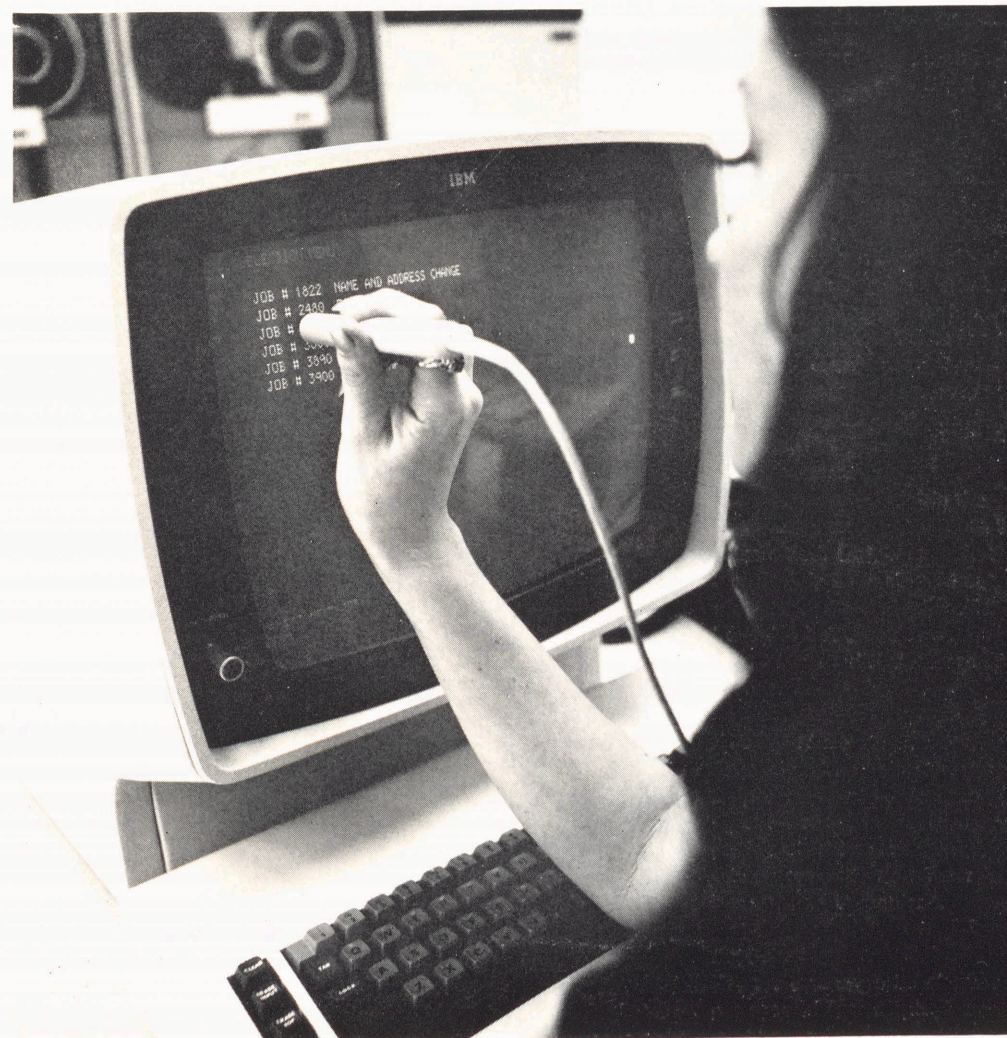


Figure 2.3

Reliability

For systems that operate on-line, the highest possible reliability is essential. Computer technology is used in all the 3270 units. This in itself gives high reliability – but, in line with reliability, availability and serviceability (RAS) features included in all IBM System/370 equipment, the 3270 has built-in retry and error recovery procedures.

The control unit will retry any incorrect data transfer operations that occur between it and its attached displays and printers. The CPU will only be informed of an error condition if these recovery attempts fail. The physical design of the units allows easy access for maintenance and repair. This serviceability complements the reliability features to ensure high availability.

Wide Range of Functions

The 3270 displays are available with either 1920- or 480-character capacity. Excellent clarity is provided by the flicker-free characters displayed on the high-contrast screen.

Extensive screen-editing facilities enable the operator to change, insert and delete displayed data very easily. Changes may affect a single character, an entire line, all the variable data, or the complete screen. Typamatic keys permit fast movement of the cursor (position marker) and certain other editing functions. The increased sophistication of the display means that the operator does less work – and so achieves maximum performance for minimum effort.

Data is formatted on the screen by program control. This helps the operator to work faster because one type of data appears at the same screen location for every transaction. The displayed data is classified as *protected* or *variable*, the operator being able to change variable data only. The operator can obtain new formats from the CPU by depressing a pre-determined function key, or may key in the request from the

keyboard. Protected data can be automatically skipped so that the operator's keying rhythm is uninterrupted.

The Selector Light Pen can speed the man-to-machine communication by permitting the operator to select information merely by pointing to a specific item in a displayed list.

The operations initiated by *program function* keys are determined at the programming stage. The function keys allow the operator to perform quite complex operations at the touch of a button, and obtain rapid results from the CPU.

IBM 2741 Communication Terminal

The IBM 2741 Communication Terminal can be connected to all models of IBM System/370, to IBM System/360 Models 22 to 85 and Model 195, and to the IBM 3790 Communication System, using Start/Stop line control. Attachment to System/370 is via IBM 3704 or 3705 Communications Controllers, or Integrated Communication Adapters, or via an IBM 2701 Data Adapter Unit or an IBM 2703 Transmission Control Unit. The 2741 is connected in a point-to-point configuration, and operates at 15 characters per second.

It provides remote input to and output from the computer — for example to process enquiries, to transmit messages, or to enter programs or data at the point of origination.

The typing mechanism is similar to that of the IBM Selectric typewriter. It includes typamatic keys for repeat action of characters such as hyphen, underline and space.

Transmission facilities

The 2741 operates in half-duplex mode over leased lines or over the Post Office switched telephone network. The speed of transmission is 134.5 bits per second (14.8 characters per second).

Optional features

Receive Interrupt — to interrupt transmission from the processor at the operator's convenience.

Transmit Interrupt — allows the processor to interrupt transmission from the 2741.

Print Inhibit — allows the processor to prevent the 2741 from printing data transmitted or received.

Communication Efficiency

The operator efficiencies of the 3270 are complemented by its potential for reducing communication line costs. The number of characters transmitted between display and CPU is reduced to the minimum. For instance, formats used more than once will be made *protected* data, and will not be transmitted. Only the 'exception' or new data is sent down the line to the CPU. For these reasons the 3270 system minimises the number of lines necessary for a communications network as many terminals can be attached to each line and still give a fast response.

The 3270 has new powerful commands that further reduce line transmission time. For example, the whole screen can be restored to blanks by transmitting only one data character with appropriate control characters.

Through the use of Binary Synchronous Communications (BSC), the 3270 can share a single line control with other IBM BSC remote communication devices. Even if a wide variety of functions are required in a location that is remote from the central processor, those that use BSC transmission can be handled by one common line.

For the Technical

Display capacities

1920 characters – 24 rows of 80 characters.
480 characters – 12 rows of 40 characters.

Screen editing facilities

Cursor (position marker) can be rapidly positioned up, down, left or right.

SKIP, *BACK TAB* and *NEW LINE* are also 'typamatic' keys – automatically repeat on full key depression.

Erase keys can clear a field, the screen, or all unprotected data.

INSERT and *DELETE* operate by individual characters on the assigned field. Existing data automatically shifts to allow for the insertion or deletion.

Selector Light Pen

Allows simple and fast selection of single or multiple fields.

Available on remote as well as on local displays.

'Field orientation'

Data will be arranged on the screen as discrete fields. The characteristics of the data in each field will be recognised by the system as:

- protected or unprotected
- alphanumeric, or numeric only

IBM 3270 Information Display System

- light pen detectable or not
- brightness normal, high intensity, or off (*No-Display* feature)
- whether the data has been modified or not.

Protected data

Information can be classified as *protected* and then cannot be altered or destroyed by the operator. Protected data is not transmitted unnecessarily when only the variable data needs to use line time.

Data compacting

Extra commands enable the minimum amount of data to be transmitted. Only a field that has already been singled out as *unprotected* and *modified* is 'ready' – but only the data up to the last modified character is sent.

Audible alarm

An optional audible alarm can be programmed to alert the operator when the last screen position but one is reached, or when some other operator intervention is required.

Keyboard

Key rates of up to 25 characters per second (per display) are readily accepted.

Figure 2.3

IBM 2741 Communication Terminal



This typewriter terminal is designed for use wherever information has to be passed between a remote location and a central computer (whether the distance is measured in yards or miles). Information entered on the keyboard is transmitted to the computer, and received information is printed out.

The communication controls are designed for simple operation by the experienced or inexperienced user. For example, managers

can use the terminal for enquiry, clerks for routine administration, and engineers for problem solving.

When not in use as a terminal, it can be used for normal typing purposes, with all the advantages of speed and ease of use associated with the IBM Selectric typewriter.



2.3 Course Content

A brief look at the content of the nine modules in the 'Information' course.

2.3.1 Introduction - why brief?

This section is labelled 'a brief look' since a detailed account of lesson content and its impact on the teachers and children in the schools carrying out the pilot test of the course will be given in chapter four. The purpose of this section is to explain in general terms how the material for the nine modules was chosen and obtained and to put this into the context of the 'Information' course as a complete entity. In some cases the material has been modified or altered as a result of experiences in the schools; these modifications will also be described in chapter four. Some references to pages in the module are made during the following descriptions. The reader may wish to refer to the specific teaching notes and worksheets for each module in volume 2. However, the main lesson-by-lesson descriptions which require this to be done are contained in chapter 4, and it is not considered necessary to make specific reference to pages in the course in this more basic treatment.

2.3.2 Module 1 - An Introduction to Information

The reasoning behind and need for this module was discussed closely with Raymond Cackett, a teacher who first taught the course at Yateley School. It is thus an amalgam of ideas and suggestions thrown up over some hours of discussion, taking into account his knowledge of the local area, the author's knowledge of helpful visual aids and a joint expedition to the locations to be visited by the children. In broad terms, it was felt that, to give children an impression of what is meant by information, we should first of all find out in discussion with them what they understand about it before they embark on the course. Then the attempt should be made to give them new insights into the subject by taking them out into the local environment, followed by a consolidation lesson on the knowledge they have gained from completing this exercise. A further requirement of this first module was to create an impact, both in the sense of making the course live from the beginning and in order to set the scene for future studies in the field. How this was to be achieved or what the exact content of the module would be was, at the time of conception a very vague series of unco-ordinated ideas, but the experience which both of us had had with Geographical field studies no doubt coloured what transpired to a high

degree, and in a sense it is broadly true that these aspects of the module evolved rather than were thought through from the outset. In the construction of this module it must also be stated that we ourselves gained some unexpected insights into the nature of information in the environment, and were able to pass these on to the children who later completed the exercises.

Page Intro/12 (module 0) shows a broad outline of the initial content of module one. From it one can see that the module does in fact reflect the nature of our earlier discussions, and that the methods used in teaching children were a natural concomitant of these. What the children think information is can only be found out by discussing the concept with them; practical exercises in finding information can be carried out in a location near to the school, for which follow-up exercises have been prepared; what the children have learned from the exercise can be found out again by discussing it with them. The purpose of the films was, first of all, to add impact to the first module, and secondly, especially in the case of 'The Information Machine', to revise in visual form some of the concepts which the children may have discovered for themselves. At first it would have been considered satisfactory if the children could have demonstrated an intuitive feeling for the ubiquitousness of information; this requirement was later modified, more for the benefit of the teacher than for the children. Lastly, since it was considered that continuity is essential between each module or lesson taught, various means of ensuring this were discussed and included in the modules. Enlargements, modifications and additions to the original material were suggested, the use of camera and slide being an example of this.

2.3.3 Module 2 - A Headmaster Information System

There is no significance in the fact that this module is numbered 2, since the concept of modularity demands that order is unimportant. However, it follows on quite naturally from the first and was in practise the second one to be taught. The school as an object of study may be an unfamiliar concept to children, partly perhaps because they take much that happens there for granted. It is however a place very familiar to the children and offers the opportunity to study the role and flow of information in an environment they know well. Because of this many of the exercises are able to work from the known to the unknown and to offer extra insights into the meaning of things which children often just have to accept. In information terms the school is

a rich source of material. It has a wide variety of people working both for and in it, all of them in need of information of differing sorts; it holds information about a great number of people and things, about resources and buildings, about equipment and children; unless it is a very exceptional school its information system for recording, processing and retrieving these things vital to its existence is often in what may euphemistically be called a confused state (the Headmaster of a Hampshire Secondary school keeps most of his records in eight tea-chests in a cupboard). The records it does keep can be routine or highly sensitive, the information it has to communicate each day is a huge administrative load. The information problems of the school are many and varied. Thus the school has a natural wealth of material for study in the 'Information' course and also has the advantage of being a familiar environment.

Page Intro/13 (module 0) shows a resume of module 2. Whereas in module 1 the concern was to show how information is everywhere about us in enormous quantities, in module 2 we are trying to show that some of this information can be organised into files, processed and made available for retrieval. Thus parts 3 and 4 contain the essence of the objective, to show how a generalised information system is set up and to provide some practice by way of an example in the use of one means of doing this, an edge-punched card system. In order to arrive at this point, lesson 1 is a Case Study illustrating the need for a quick means of information retrieval (the exact Case Study is shown on page /H/P/1 in volume 2), and lesson two takes the children carefully through the variables in the school which would form the elements of that information system. An offshoot of the latter exercise is to discuss how personal information is collected, how (if?) it is verified, what it might be used for, to whom it might be disclosed and other questions concerned with the 'Databanks and Privacy' issue. Again, the opportunity for encouraging debate, discussion and written work into the implications of systematic information collection, processing and retrieval is written into the module, and the topics can be treated at a variety of levels to suit the maturity of the class being taught.

2.3.4 Module 3 - Information in Police Work and the Law

This module has already been used as an example of the approach used in the 'Information' course (see chapter 2 part 2), and only the background to the module is to be described here. As has been said, the opening of the Police National Computer Service at Hendon in North London has prompted

the feeling that the subject of the use of computers by the police has offered a variety of topics and implications suitable for inclusion in an 'Information' course of this kind. Some of the raw material for the module came from various Application Briefs published by IBM about police use of computers in the United States of America, from newspaper articles in the British press on the topic, from some books about the social implications of computing, particularly 'The Computerised Society' by James Martin and Adrian Norman¹, and from conversations between Raymond Cackett, Chief Inspector George Baker, Communications Officer of the Hampshire County Police Department, and the author. Further information, it was hoped would be obtained from the Information Department at Police National Computer Headquarters, but two letters to them evinced only the polite reply that there was a security risk in providing information about this, and referred to the press release at the time of inauguration and published in 'Computer Weekly'. This gave the barest detail about the type of computer used and indicated that the first application concerned the registration of ownership of cars in the United Kingdom. In view of the detailed descriptions available from the United States and the evidence in them that some of the implications for personal privacy and freedom had at least been considered and thought through, there is perhaps some cause for concern about the secrecy involved in this operation, the more so since attempts to elicit information through contacts closer to the source and to explain in this way the relatively innocuous nature of the project in terms of any security breach met with a similar blank refusal to discuss any aspect of the applications of the new machine. A further indicator of the potential of police work and the law as source material for an 'Information' module, was the frequency in which, in module 1, the children had police-related topics on their lists of information items during the preliminary discussion session; perhaps more cynically, teachers, too, expressed the view that police work is a topic dear to children's hearts. Cynical or not, events have proved this to be so in teaching of this particular module.

Chief Inspector Baker was far more helpful in that he was prepared to discuss applications within a time scale, and to indicate that the machine will be used to do more than store car numbers. He expressed some misgivings about 'knowledge of the system leading to the beating of the system', but expressed an interesting operational knowledge of how the computer can be used in police

1 J. Martin and A. Norman op.cit.

work both at national and at local level, mainly in facilitating the more efficient conclusion of routine tasks. He expressed little interest in the design characteristics or architecture of the machine itself, but this was not important in the context of this course. His major analogy was a comparison of times for which knowledge of stolen car numbers became available to the local policeman under the old manual system (eight weeks, for example, for a car stolen in Scotland to become knowledge in Hampshire) and by the new computerised system (in theory eight seconds, in practice a little longer). Thus the raw material for police computer applications (lessons seven, eight and nine in the module) came direct from this source combined with a reading knowledge of American experiences in Kansas City and Honolulu. The misuse and abuse of computers in police work, exemplified by lessons ten and eleven, were researched from newspaper cuttings and published plays and papers on the subject, Chief Inspector Baker professing to have little appreciation of these aspects of police computer work.

Thus the approach to module 3, in which preliminary exercises on the nature of police work and information in the policeman's role are followed by a survey of police computer applications both present and potential, succeeded by comments on social implications of the misuse of computers, follows the pattern of working from the known to the unknown in the light of the children's own experiences.

2.3.5 Module 4 - The Computer - An Information Machine

The 'Information' course is not a course about the computer as a machine, but about the information which the computer processes. So why is there a module which appears to fly in the face of this precept?

Firstly, as can be seen from page Intro/16 (module 0), the résumé of module 4, only lessons one and three actually concern the hardware and mode of operation of the machine; the others are concerned with computer applications, computer people and the future uses of computers. Thus, in this module, the children are approaching the information aspect, the applications, via a different route from that taken in other modules; they are trying to understand them by way of a knowledge of the way in which the machine works.

Secondly, the 'Information' course is a complete course, although there are naturally opportunities for omitting those aspects which are not required, and for still maintaining completeness. Many teachers prefer to approach applications

and implications through the knowledge of the machine and they are given the opportunity to do so using this module as a base. The important parts of the module concern applications and implications and these are intended to be made clear and easy to implement.

Thirdly, the lessons on hardware and logic are presented in a different way from most lessons on the subjects. They use scrap bits and pieces from old machines to illustrate the input-processing-output concept and the development of computer technology over the past twenty years, thus putting the machine into its context as a processor of information. The scrap pieces are also used as a historical record of the progress of technology, from which wide excursions into the implications of rapid change may be made.

Fourthly, the hardware lessons may be omitted if the teacher does not feel happy with them and the essential meaning of the module is still preserved provided that different links between topics are made. There again, the module need not be taught as a complete entity lesson by lesson. If desired, individual topics from the module can be incorporated into other modules as necessary. For example, the lesson(s) on 'computer people' can be easily incorporated into the last part of module 7 where systems flowcharts are discussed and studied, or into module 5, where the role of the computer in processing Transport and Road Research Laboratory information is dealt with.

Lastly, the resources of the IBM Schools and Colleges Computer Information Service, an office of the Southern Science and Technology Forum which operates from the University of Southampton, were easily available, and these form much of the basis for practical work and worksheets in the module. Given the general shortage of good developed visual material in this field, the pamphlets and scrap computer bits have proved invaluable in brightening up the presentation of the course to the children.

Apart from the pamphlets and other material from this source, material for this module was obtained from a background knowledge of the author as a computer professional, from lecturing to schools and colleges on all these topics, from reading newsletters and advisory pamphlets mainly distributed by local Computer Education groups, such as the Hertfordshire Advisory Centre for Computer Based Education, the Solent Computer Education Group News and the Merseyside Regional Computing Service, and from conversational intercourse with groups concerned with the development of Computer Education, such as the Chelsea College 'Computers in the Curriculum' group and the

'Centre for Science Education' based on Sheffield Polytechnic. In the matter of pupils' reference material, efforts were made to enlarge the manufacturer base by writing to other computer manufacturers as a potential source of pamphlets, without any success.

Special efforts have been made in the module to overcome possible computer-phobia in non-mathematicians by carefully numbering the bits and pieces in a scheme whereby the numbers refer both to the piece concerned and its representation in a diagram completed in the course of the lesson. Indeed, this is one of the few parts in the course where the teacher is passing on original information during the course of the lesson. The diagram on page M/P/1 shows the uncompleted version filled in by the child during the course of the lesson; page M/T/17 shows this diagram in its completed form and page M/T/6 is the page in the teaching notes which explains how the numbering system works. In addition it is intended to make available a series of slides which would supplement the bits and pieces, make identification easier and also fit into the same numbering system. Nevertheless it is recognised that, for the uninitiated teacher, lessons one and three may need a much longer preparation time than most. The lessons on computer people, computer applications and future uses of computers are more straightforward. The last lesson on statements about the computer (page M/P/20) may be a little advanced for the second year child, but options have been left open on how it can be treated in the classroom situation.

2.3.6 Module 5 - The Transport and Road Research Laboratory

Module 5 is perhaps the archetypal 'organisation' module of the 'Information' course, in that it takes a specific organisation and studies it in terms of the information it collects, processes and communicates. Teachers constructing their own modules would perhaps take this treatment as an example. The Laboratory was chosen as a subject for the 'Information' course for several reasons.

Firstly, it is close to one of the schools carrying out the pilot study, so that contacts through parents and friends were on hand, and the possibility of a visit to the organisation was real. Secondly, the Laboratory has a well-developed Public Relations Department which dispenses written material, visual aids and films to enquirers and is therefore accessible, in information terms, to schools all over the country. The publications also provide source material for the construction of worksheets and visual lessons, and relieve the teacher of having

to learn much new factual information in order to teach the concepts. Thirdly, in its data collection activities the Laboratory has a Research Track with skid-pans, banked bends etc., which catch the imagination of schoolchildren. Its other sources of information are from police forms and other external sources, which fact provides a neat relationship with the content of other modules. Fourthly, the results of the work carried out there are visible in the environment in the form of traffic signs, crash barriers etc., so that there is a constant point of reference within the experience of the child. Fifthly, the analysis of traffic accidents which is a department of the Laboratory and forms the basis for several lessons in the module, has an obvious relevance in the general and social education of children. Lastly, most children are in some way connected with the topic of traffic in many ways, as a pedestrian going home from school, as a passenger in their parent's car or as users of the public transport system. These again are familiar points of reference from which many lessons of interest can be constructed.

After initial enquiries made through the husband of one of the Yateley school teachers, the author was advised to write to the Director of the Laboratory, Mr. A. Silverleaf, to describe the project and to ask for his help. This was done and it was encouraging to receive a prompt reply and an invitation to a meeting with Mr. Grimmer, Head of Computing Services, Miss. B. Sabey, Head of Road Accident and Analysis Department and Miss P. Mongor, the Librarian. At this meeting, or as it turned out, series of meetings, the project was explained and an outline of a plan of action from which teaching material about the work of the Laboratory could emerge was drawn up. The possibilities for this were many and varied; one interesting aspect of the Laboratory's work which would have fitted well into the 'Information' approach was the organisation of the Library, in which material for the research scientists working there was organised on a personal profile basis, so that each man or woman was referred to new publications in the area in which he or she was interested, a development made necessary by the tremendous, computer-generated explosion of information during the last ten years. Regrettably, this had to be shelved in this instance, although the idea is described in a different form in module 8. The documented sources of information studied ranged from the abstruse and esoteric papers written by Laboratory staff to descriptive pamphlets written for the casual visitor. These were supplemented by well illustrated booklets on various aspects of the Laboratory and

traffic problems in the United Kingdom, tables and charts showing the results of surveys, and films of all levels of content.

Thus the potential of all these for the creation of meaningful teaching material far outweighed the likely time available in schools for teaching the topic and drastic cuts had to be made. Pages 17 and 18 (module 0) show a resume of the teaching material produced about this establishment and the work it performs. It can be seen from this that the module starts by working from the experience of children in observing road signs, and proceeds by introducing lessons on the location of the Laboratory so that children, especially those who live far away, may see it as a real place with a real purpose. Films and leaflets are used to establish why the Laboratory exists and some aspects of its organisation; the research track figures prominently in this since it is an important source of information for the Laboratory and an interesting aspect of data collection not met in other modules. While the Laboratory specialises in many different aspects of the transport problem, road accidents are focussed upon, both because they are apposite in a school context and because it is possible to present some interesting examples of data collection, processing and retrieval.

Of course, the computer has a function in the analysis of such data and this is dealt with in general terms as a processor of information (thus emphasising the concepts learned in module 4) and in particular terms in the way it uses 'RATTLE', a specialised tabulation language developed at the Laboratory. This latter aspect may be more suitable for maturer students. Lastly, the problems of communicating information, not emphasised in other modules, are discussed and a summary of the work of the Laboratory as shown in this module is presented in the form of a work sheet.

In this way children see the organisation as a collector, processor and communicator of essential information, and perhaps the more perceptive will see the analogy of the Laboratory as a large information processing machine whose function is to perform much the same tasks as a computer, but on an organisation-sized scale.

2.3.7 Module 6 - Computer Contact

This module contains three distinctive parts, none of which is contiguous in 'Information' course teaching. It is so called because, in a course in which the computer plays such a large part in the 'Information' story, it is felt that the children should have contact with a computer at least once per term. Three

ways by which this may be achieved are suggested. One of them is to bring a terminal into the school, the second is to take the children on a visit to a computer installation, to see what is at the other end of the telephone wire, and the third is to enable them to complete an exercise involving the use of the computer as a processor of the data they supply. Each part may lead to other things. For example, the 'INFO' program used in part 1 explains what a computer can do in practical terms and how it performs its task. This may lead into a short programming course or into the use of a terminal for other exercises. Part 2, the 'HAIKU' exercise, illustrates the use of one of many computer packages, and may encourage other departments to examine the role of the computer as a teaching tool. Page Intro/19 (module 0) shows a resume of module 6. The program for the terminal session 'INFO' was written in the BASIC programming language by the author to illustrate three aspects of the machine's function; its ability to store and make available information as requested; its ability to do arithmetic quickly and efficiently; and its power to look at a set of information items, in this case whether the children have had various inoculations and illnesses, and come to a simple logical conclusion based on the content of those items. The BASIC language was chosen because of its relative simplicity. (BASIC is in use in many schools which teach programming), and because the syntax of the program is easily read and understood if the reader is given certain clues and hints. Foremost among these is the facility to write into the program words which describe what each part of the program is meant to do. Page C/P/10 shows a printout of the program 'INFO' and the REM statements in it are these explanations, written as can be seen, in the English language. Another aspect of this series of lessons is to enable children to distinguish between data and instructions, between the information entered into the machine in the form of personal details and the program which tells the computer what to do with that information. This is a basic distinction, and the fact that the children themselves are supplying the information on mark-sense cards in the week before the terminal sessions reinforces it. Of course, there are other ways of achieving the same purpose, perhaps with a different program, perhaps with a different method of input; the constraints in this exercise are related normally to the type of equipment available and the existence of someone in the school or among contacts to set up the computer file from the data supplied by the children. The last part of this series of lessons is devised to take away the sense of magic from the computer, to illustrate that what happened during

the terminal session was the result of how the program was written, and was a perfectly logical process. It was felt at first that to dry-run a computer program in this way with children who had no previous knowledge would be too difficult an exercise. In fact this has not been the case as will be seen in Chapter 4.

The 'HAIKU' program was chosen as a computer package example mainly because the teachers taking the 'Information' course were predominantly English specialists. A fuller description of how this program works is shown in figure 1.1. Arrangements have been made with Imperial College, which operates a national programming service for schools, to make the 'HAIKU' program available for other schools in the country should they so desire. At the same time the college will be able to send out details of those other programs available, with which teachers in schools may wish to experiment. Here again the lesson ideally takes more than one week, and preferably at least three attempts should be allowed to the children so that the full benefits of the exercise may be obtained.

Visits to a computer installation are often a disappointment to both children and to the staff who conduct them. On the one hand, there is nothing particularly exciting to see, the computer and its peripherals being little more than boxes in which the children are assured something is happening; on the other hand, computer staff often find it difficult to talk at the level of the children or to know what will be of interest to them. Often, too, the children come to the installation 'cold', without any knowledge of the organisation they are visiting or its work, and without knowing what sort of questions to ask. The last part of module three is an attempt to remedy this situation by making a form available, which they are expected to complete during the visit, and which asks for details about the computer and its applications, the people they are likely to see and the organisation they have come to visit. It is therefore designed to set up a two-way communication channel between children and their hosts. If given to the organisation staff before the visit, it gives them some idea of what to talk about and the sort of questions they will be asked.

Children should, during their 'Information' course, at least see a computer, if only because the machine crops up so frequently in the course as a storer and processor of the information they are studying. This lesson is important but may involve the teacher in some extra administrative work, in ordering a coach, in collecting money or in identifying a suitable installation. To be

successful, the teacher should also learn something about the organisation beforehand and prepare the children for the visit, so that it becomes part of a logical progression of lessons rather than a one-off excursion to get out of the classroom. Effective follow-up is also needed so that children may feel that they have really benefited from their visit.

2.3.8 Module 7 - Information on (Gas) Tap

The initial impetus for this module, which, despite its whimsy title, approaches the Gas Industry and its needs for information from several different directions, came from a visit made by the Solent Area Computer Education Group during the spring of 1973. Contacts were made with members of the Management Services Department of the Southern Regional Gas Board which were later to prove fruitful in the obtaining of information for the module. Also, specimen documents which would be useful in the classroom situation, in particular a Gas Bill for 'Mr. Bloggins' (page G/P/1) were used and evaluated. Six months later, when the need for a module on the topic became pressing, Mr. R. Gifford, Data Processing Manager, again proved very helpful and Mr. Keith Guard of the Management Services Department gave up his time at a series of meetings during which he went with the author through the system used in the Southern area in a great deal of detail and with a great deal of committed enthusiasm. The fact that much of this material was not used reflects some of the difficulties of the researcher in this field, in that permission to develop teaching material needed to be obtained from the Financial Director, and while this was not specifically refused neither was it specifically granted, pressure of essential work being given as the reason. Had the initial contact been made from the top, perhaps the result would have been different, but although several letters were written, examples sent and offers made to explain the project personally, these were not fruitful. Alternative approaches were made to the Education Officer of the Gas Council in London, and while he was helpful in supplying a great quantity of already developed literature about the work of the Gas Industry, he was unable to offer help with the development of material in the field of 'Information', which is where it was required. Lastly, the Regional Education Officers, who deal mainly with the Home Economics departments of schools, were able to provide class sets of literature, this again was too generalised for the specific purpose of a course on 'Information'. Fortunately, other Gas Regional Boards were more co-operative with other people and a Gas game, a manual simulation of the work of the

meter reader and the production of a Gas bill was worked out between members of the British Computer Society Schools Committee and the Eastern Gas Board which fits well into the Gas module.

Thus, in the development of this module, the main sources of information for the creation of teaching material were a whole host of pamphlets and leaflets on general aspects of the Gas Industry, the use of a film library of about fifteen films on various aspects of Gas, a false gas bill with notes on how to interpret the numbers thereon, some information from the Management Services Department which was not classified, and a gas game from other sources. Pages Intro/20 and 21 (module 0) show how this was put together. In the event, all this material has proved useful in one way or another, and the ethos of the 'Information' course still comes through, although the material is a little more generalised than was initially considered desirable. The order of the lessons is interesting, working from the particular to the general to the particular again. The first lesson on the impact of numbers on the Gas Bill was controversial in that some of the teachers might doubt that the children are interested in such a level of detail. The use of two films also involves the teacher in some administrative work in ordering and making the projector available and the middle part of the module has a distinct geographical bias. The presentation of the work of the computer occurs at several different points, in lesson one where the computer is mentioned as being responsible for the impact of numbers, in lesson 5 where the computer acts as a store and processor of information for all aspects of the Gas Industry's activities, in lesson 7 where a simulation of the production of a gas bill by computer is roleplayed, and in the next lesson where it is seen as a generator of form letters and reminders according to circumstance. Since this latter lesson presents the information in flowchart form, lesson 6 is an introduction to flowcharting which serves also as a method of explaining how our own thoughts may be consciously or subconsciously organised.

2.3.9 Module 8 - From Ignorance to Knowledge - and back again

The original title of this module was 'Information in the Library', but it was considered that this did not convey the real message of allowing children to appreciate the effects of the information explosion and its effect on the habits and procedures of human beings. The library is our main source of information in the sense that it is a storer of knowledge which can be looked up as and when required, but this ignores the fact that much of our information comes from other

sources, from television and the press, from other people, from teachers and textbooks, from observations in the environment; this takes us back to our thesis in the first module that information is all around us and that we may subconsciously be employing several levels of classification process in our attempts to make sense of it all. Thus, while the library is a focus within the module which enables children to understand the need for classification and crossreferencing, it is not the whole module, and the main burden of the idea contained in the title is that we never in fact achieve a transition from ignorance to knowledge since there is always more knowledge to be learned. This may be better expressed by the North Country saying 'The more you know, the more you know you don't know'.

In researching material for the module, fruitful conversations were made with the teachers involved in the project at Henry Beaufort School, Winchester, particularly Mr. Harry Wright and Mrs. Jenny Leigh, and with the Headmaster of Sandhurst Comprehensive school, Mr. C. W. Dally, a Computer Educationist himself and with a particular interest in keeping records of non-book resources at his school. Mrs. J. Marder, of the Southampton University School of Education Library was also very helpful, both in supplying school textbooks on library practise and in suggesting further sources. A large stock of updates to the British National Bibliography were also useful as were some IBM manuals on the computerisation of library records.

Page L/T/3 shows a breakdown of the module. In a sense, and largely because of time constraints (this was the last module to be written), the ideas expressed in the first paragraph of this section have received scant justice. The module works from the unstructured to the structured, so that children will get a feeling for the need to classify first of all, and attempts to add a topical flavour to what is studied. For example, in using the author's own set of long-playing records as an exercise in classification and crossreferencing it is hoped that the theme is familiar, and in using the school library for the lesson on booking out systems it is intended to perform a service which can be used by the school. The last lesson, a story set in 1985 which takes schools and libraries of the future as its twin themes, should cause a lot of discussion in the classroom and point the way to an appreciation of one answer to information problems which the children have studied throughout the course, both at a personal and at an institutional level. In this module there is no specific computer content; by now children should be conversant with the computer as an

answer to this sort of problem.

2.3.10 Module 9 - Individual/Group/Class Assignments in information

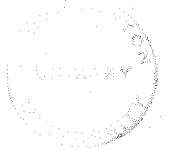
In some ways this is the self-test of what has been learned in the 'Information' course, although the assignments can be only a smaller version of the procedures presented in the other modules.

Page Intro/23 (module 0) shows a resume of module 9. Basically what the children are expected to achieve is the collection and storage of information, and by using edgepunched cards, a demonstration of a method of retrieval to others. They may also wish to process the information and set it out in the form of tables. If the school has its own terminal or if there is a computer nearby to which the children have access and the children have also learned how to program, there is obviously scope for a more sophisticated treatment of the information collected. In the vast majority of cases however this is not expected to be the case.

In the teachers' notes a variety of topics for personal or group surveys is suggested from television viewing habits to constructing a display of the bits and pieces presented in module 4. The choice of topic must obviously be dependent on the number of children doing it and the time set aside for completion of this module. For example, a whole class survey of leisure time activities can take in a survey population comprising the whole school, whereas two children completing the same task may take in only the rest of the class members. Nevertheless this is a module which can be completed at a variety of levels, which may require varying amounts of teachers' time and which draws together the threads of the whole course into a personal project incorporating elements of form design, data recording, and information handling techniques exemplified earlier only by reference to other organisations and examples.

CHAPTER 3

The 'Information' Course and its testing in the schools



3.1 The physical setup. Schools, teachers, children involved in the testing of the course.

3.1.1 Introduction

Two schools, both in Hampshire, have been involved in the testing of the information course, one of them over a period of six terms, two school years, the other for two and a half terms, almost one school year. This section deals with the schools, at first individually, and later highlighting those differences which may have contributed to the reactions to the course by teachers.

3.1.2 Yateley Comprehensive School

Yateley school is large; large in the numbers of children attending the school (over 2000), the number of teachers employed there (over 100), the organisational problems created by size and the administrative hierarchy created to solve them, and the area from which it draws its population.

There is a great diversity in the background of the children at Yateley school. Children at the school may have a rural background in the many small villages within the catchment area, or may come from one of the two council estates in the Yateley area, much of the population of which is London overspill. Since the Yateley area has recently attracted developers of houses built for London commuters, there is also an increasing number of the children of professional and clerical workers attending the school. No specific study has been made of the background of parents or children at the school. There are inherent dangers in making value judgements based on parental background, and this information is given here only to make a general observation.

On arrival at the school at the age of eleven, children are divided up into three bands corresponding to average and above average ability levels, average and below average, and a small remedial band for children with special difficulties. The criteria for assessing ability are based on Junior School Headmasters' reports and a series of school-generated tests in Mathematics and English. In the fourth and fifth years, approximately seventy percent of children take an external examination course, mainly CSE or GCE 'O' Level, and approximately fifteen percent stay into the sixth form to resit 'O' level examinations or to take 'A' level courses. In general, facilities at the school are adequate but there is no terminal link to a computer or extra-ordinary facilities for other subjects. The public library is contained in the school complex and attempts to serve the

needs of both the public and the children. This however is a facility which did not become available until October 1974 and the 'Information' course was not able to take advantage of it until very late in the pilot testing. Teaching methods are on the whole very traditional; one obtains the distinct impression, after talking to many members of staff, of a deep-seated suspicion of experimentation and an extremely conservative, sometimes cynical, outlook. Staff turnover is high; in 1974 about twenty-five percent; in 1975, a period of recession in the education field, about twenty percent. The number of probationary teachers on the staff at any one time is also high. The administrative superstructure is large and unwieldy and it seems to take up a large proportion of the time of senior staff who could otherwise be teaching. It is believed by most of the junior staff that the Headmaster, two Deputy Headmasters, a Senior Mistress and three Faculty Heads are engaged full-time in school administration duties, except when acting as supply teachers for absentees. Since they do not appear on the displayed timetable in the staff room this belief would appear to be well-founded. In addition, there are ten subject heads, who operate a reduced teaching load, and, as a consequence, junior teachers and probationers are often over-exposed to difficult teaching situations.

Yateley school's involvement with the testing of this particular course arose from the concern of the Headmaster, Mr. K. Cottam, that children in modern schools were not being sufficiently stretched in the processes of logical thought and the orderly organisation of facts and principles. Initial contact was made through Mr. M. D. Meredith, Tutor in Informatics at University of Southampton, who was visiting a student on teaching practice there. After this, a meeting was set up between the author, Mr. Cottam, Mr. Meredith and the Deputy Headmaster, Mr. T. Jones, to investigate the possibility of inaugurating a course for second year boys in the 'house' (high ability) band, the principles of which conformed to a general philosophy of teaching about information previously discussed at the university between Mr. Meredith and the author. Not only was the course to satisfy the Headmaster's concern, but also the Deputy Headmaster's timetabling problem with that group of boys. Girls within that year were engaged in Home Economics and Needlework while there were insufficient facilities in Woodwork and Metalwork to occupy all the boys. At that meeting the outline aims and subject matter of a course on 'Information' were discussed and the likely teaching characteristics required to cope with

the demands of the subject were described. This would need to be someone whose relationship with the children enabled discursive activity to take place side by side with structured worksheet activity and whose background, while not necessarily connected with computers, nevertheless would have stimulated an interest in the promotion of logical thought. A third requirement was imagination and creativity to enable possibilities to be seen, action to be initiated and ideas put into practise. At the third meeting, Mr. Raymond Cackett, who had a background in accountancy, little knowledge of computing but an awareness that computers were important in the world, and an extremely good relationship with the children was present. He was asked if he would be prepared to take on this task, and after finding out more about what was involved, agreed to teach one form about 'Information' for one hour a week (a double lesson) during the session 1973/1974. His involvement with the development of the course, his reactions to the course and the way he thought the children received it occur in many parts of chapter four, and further details are given later in this chapter.

As the scope of the course grew and, in the summer term, a demand to teach it to 'house band' third years as part of their English syllabus, other teachers became involved. By the end of the first year of pilot testing at Yateley five classes had been exposed to some part of the course, and it was planned, during the 1974/1975 session to extend this to a wider spectrum of children, including those in the 'colour' bands (lower ability groups).

3.1.3 Henry Beaufort School, Winchester

Winchester, Cathedral city and County Town of Hampshire has a high proportion of administrative and clerical workers. Harestock, the district in which Henry Beaufort school is situated, is a pleasant, recently developed, area with a high proportion of owner-occupied houses in neatly planned and spacious estates. Although the school catchment area extends into the villages beyond, the vast bulk of children live in the semi-detached and detached houses of the nearby estates. Parental involvement with the school is high; a number of parents come into the school regularly to help voluntarily with such tasks as looking after the library, sorting out resources etc. and they are encouraged to take part in school activities, even learning activities if they so wish. The school buildings are relatively new, having been erected and first occupied in 1972, and the school population is building itself up

through the years. There was, in the 1974/5 school year, a complete first, second and third year, and a few fourth years who had been transferred from other schools in Winchester. Staff turnover is low, less than ten percent in the two years the school has been running, and almost hand-picked by an astute headmaster, who then gives them the freedom to teach as they best think suits the situation. The school administration is done by the Headmaster, his two secretaries and the Deputy Headmaster, who also teaches approximately half the week. Naturally there are not the same administration problems as at the much larger, much more cosmopolitan, Yateley school, and neither is the proportion of staff to non-teaching time remotely so high.

In the first two years at Henry Beaufort school, children are taught in mixed ability classes. All the staff I have spoken to regard this as the best and fairest method of teaching children of this age regardless of the organisational difficulties it might create, and some would like to see the system extended into the older years. There is an atmosphere of concern in the school, concern for all the children regardless of ability or behaviour, and concern for the dignity of what might, at the risk of sounding pompous, be called the human state. The willingness to experiment is directly related to the benefit expected from the experimentation. The degree to which other members of staff are interested in what a particular subject teacher is doing, so that there might be some cooperation in the curriculum, is surprisingly high. This is exemplified by the way in which the information course was introduced to the school, and in the number of people interested in teaching it or part of it as aspects of their own subject. Also, apart from the good-natured banter which takes place in any staff-room, there was genuine interest on the part of other members of staff about the progress of the course.

Henry Beaufort School's involvement with the course began in 1974. The Head of Mathematics, Mr. G. Mahon, was interested in computer programming and attended an in-service course on Fortran organised by the Hampshire County Local Education Authority. The last day of the course was devoted to topics of a more general nature, and the author spoke to the members of the course for an hour about the 'Information' approach to Computer Education. Mr. Mahon was interested and spoke to a number of his colleagues at school about the ideas expressed, with the result that the author went to the school for a personal chat to the Head of English, Mr. H. Wright, the Head of Social Sciences, Miss D. Rees, Mr. Mahon and the remedial teacher, Mrs. A. Wiggle.

Mr. Wright thought that some of the concepts contained in the course would fit nicely into his thematic approach to English in the second year, (the two themes being 'Survival' and 'Beyond the Real'), and the author set up a further meeting between Mr. M. D. Meredith and himself, and Mr. Wright, Mr. S. Ward, second in the English Department, Mrs. J. Leigh, the Librarian/Teacher and members of the Social Science Department. The Headmaster of the school, Mr. W. Hubert, was also invited, but because of his unavoidable absence from the school the Deputy Headmaster and timetabler, Mr. R. Bower, attended. Two things were discussed; the possibility of incorporating aspects of the 'Information' course into the English syllabus, and, as at Yateley, the filling of a second year 'hole', in that there were a number of non-German pupils (ie pupils who were not learning the German language) with little in the way of an alternative syllabus. Unfortunately, at this stage (July 1974), the timetable was completed, to alter it would have required considerable effort and caused a major explosion in the mind of the Deputy Headmaster, the second year non-German pupils were mixed up so that some also corresponded with the second year English Groups, and the exercise quickly became an either/or situation. In the end it was decided to operate the 'Information' course in the English lessons; Mr. Ward would teach it for two single lessons per week (forty minutes each), Mr. Wright would devote the whole of his three periods to the course and Mrs. Leigh would teach the course to her fourth year group at a later date. Their reactions to the modules they have taught and the way by which they have modified the material to suit their own situations are described in chapter 4.

3.1.4 The teachers involved

The success or otherwise of any course is the product of many factors including the physical conditions under which it is taught, the approaches used and their familiarity with the children, the subject matter it contains and the ability of the children it is taught to. But, in the final analysis, it is the people in front of the children, their motivations, attitudes and relationships, which determines how well a course is received by those for whom it was written. It is not the intention in this section to give unnecessary historical and personal details about the teachers who have been involved with the pilot testing of the 'Information' course. It is however instructive to try to gauge the relationship which each one wished to set up with the children and to comment

how far, in the author's opinion, they were able to establish this.

Ray Cackett, for example, who had specialised in Geography at Bognor Regis College of Education after a short period in industry as a trainee accountant, was in his third year of teaching at Yateley, his first teaching appointment. As a geographer he had established himself as an able member of the department and indeed, in spite of his lack of experience, was regarded as second in the Geography Department in the school. The relationship he tried to establish with the classes of children he taught might be described as 'firm but fair'. If he was talking, he expected children to listen, and was inclined to use those punitive sanctions which were open to him when verbal exhortations had failed. He had a basic mistrust of the open-ended lesson, and performed better in the teaching situation when he had specific things to teach and the children had specific things to do. This did not preclude the discussion-type lesson so long as it was geared to some future action or to some well-signposted teaching point. In general, it is fair to say that he was more at home when teaching the brighter, more motivated, pupils, partly because the feedback he obtained from them was more positive, partly because they were less inclined to be unruly, and partly because of a personal attitude which considered that children who responded to him deserved more effort to be given to them. They were more worthwhile children. In his accountancy work in the past he had come across the need for computers and was, for the first few months, enthusiastic about the possibilities of a course on 'Information', although he was later less enamoured with the methods used to express the concepts.

Sheila Oviatt-Ham (née Scullard, and married in August 1974) became involved with the course for the first time during the summer term of 1974. Reports of a successful course had been made by Ray Cackett and it was desired, from the author's point of view, to test it with third year children within the English syllabus. Sheila specialised in English, her strength at University having been Linguistics, and one of her functions at Yateley was to oversee the sixth form General Studies syllabus. In the previous year the author had delivered a well-received couple of lectures on computing to the sixth form, and the experience had stimulated Sheila's interest too. She has been teaching for five years after completing a three-year English Degree followed by a one-year post-graduate teaching course.

On meeting Sheila for the first time one gets the impression of 'busy enthusiasm'. Certainly her enthusiasm is a commodity which is communicated

to the children she teaches, as long as she, too, is convinced of the worthwhileness of the topic. Her teaching strengths lie with the higher ability classes; one feels that she is academic or intellectual by nature and has some difficulty in coming down to the level of the 'colour' band children. She tries, successfully for the most part, to overcome potential indiscipline by transmitting her own enthusiasms and is well liked by the majority of children of all ages. She also has a highly creative turn of mind as befits an English teacher, and is happiest with the more discursive, open-ended type of classroom work. Her 'progressive' outlook on education together with her rapid ascent to favour has tended to create some mistrust of her among some of the older, more cynical, staff members. She has made many intelligent and pointed suggestions and modifications to the course during her teaching of it.

Rosemary Trew. Rosemary was a probationary teacher, having come to Yateley straight from college. Although she had had some experience of children in Junior school her lack of experience with children of secondary age and the discipline problems they created made life in the classroom very difficult for her. Rosemary is a shy, gentle and placid girl who found it difficult to establish control, a fact which children soon took advantage of. This problem was compounded by her being given some of the more difficult 'colour' band classes and by receipt of little support from other teachers. Her involvement with the 'Information' course was an imposed one; indeed, she was unaware until the previous week that she was required to teach it at all. She was given two 'colour' band classes to teach 'Information' to, one of which had a reputation for being difficult to discipline. She had little idea of what the subject was about, no attempt having been made to inform her by the senior staff, and even after an hour with the course author, she was very unsure of her ability to teach it. She was unable, because of her probationary status, to carry out some of the more motivational early lessons outside the classroom, and had little aptitude for, or interest in, the logical disciplines demanded by the course philosophy. Discursive and open-ended lessons she found unrewarding, partly because she had no time to develop any feeling for the techniques involved, and partly because of her discipline problems. Her specialisation at college was Geography. She tended in the 'Information' course to cling desperately to the worksheets as a method of making contact with the children and putting the concepts over, sometimes with success.

Jackie Lord. As someone who had returned to the classroom as a part-time

teacher after having her children, Jackie was older than the other teachers of the 'Information' course at Yateley. She had noticed and commented upon the differences in teaching children even within the short time she had been away from the classroom environment, and she tended to be a little unsure of herself at first. Her specialisation was English and she was one of the few teachers at Yateley who considered herself equally at home with 'house' and 'colour' band children. Jackie inherited Rosemary Trew's two 'colour' band classes during the second term of the 1974/5 school year. This in itself was a formidable obstacle, and when added to Jackie's own unfamiliarity with the subject, her recent long absence from the classroom, the potential ill-behaviour of the classes, and the arbitrary way in which the teaching of it was sprung upon her in the week before Christmas, the portents were not promising. Jackie, however, is an extremely conscientious teacher with definite ideas on how to teach 'colour' band children. If a particular approach or teaching method does not accord with her views she is prepared to spend several hours in modifying it until it does fit. If subject matter is unfamiliar, she is, like many people, uneasy about teaching it, but will make the attempt to master it. During the whole of the two terms in which she taught the course she was always sceptical in her mind about the importance, uneasy about the approach and unsure about the content, but she would not betray this to the children and would always attempt to make every lesson worth while. In her relationships with children she tries to be firm and formal, but not without humour. She tends to avoid open-endedness and discussion, often because her view of the capability of the 'colour' band child tends to preclude this as a way of teaching, and sometimes because of the possibility of a conflict with the establishment of good discipline.

Harry Wright. Harry was by far the most experienced of the teachers involved in the 'Information' course. After Teacher Training at Goldsmith's College and taking an external degree at Birkbeck College in his early teaching days, Harry had come to Henry Beaufort school as Head of English having spent ten years with the Inner London Education Authority. Beneath his jocular exterior he has a serious and thinking approach to the teaching of English and a personal commitment to the mixed-ability philosophy of the school. The syllabus he had drawn up for first and second year English lessons is thematic in approach, and it is because of this and a chance conversation with the Head of Mathematics Department at the school that he

became interested in the 'Information' course. Unusually for an English teacher he has an interest in things logical and in the communication of messages by code and cipher, as well as by words. This interest does not stretch to the study of computing per se, and Harry has spent much time wrestling with the problem of whether, and then how, to teach the more technical aspects of the module on computers. In his relationships with the children Harry is able, because of experience and personality, to go further than most teachers without seeing a breakdown of control. He believes firmly that children should have opinions and be given the opportunity to express them. He has a sympathetic toleration for the problems of the lower ability children but, like many teachers, is probably more at home when teaching the brighter groups. He presents the same relaxed, mock-humorous face to children as he does to adults and hopes, with justification, that they react favourably to this catharsis. As may be expected in a creative person, the discursive and open-ended lessons are the more successfully taught and the ones he enjoys most.

Steve Ward. An English teacher of two years standing, Steve trained at the nearby King Alfred's College and also took a B.Ed degree there. His main specialisation was in Drama and he has been noted at Henry Beaufort school for using this in English teaching situations. His first consideration of the 'Information' course came in the second meeting at Henry Beaufort school during which the philosophy of the course and methods of implementation were discussed, and the possibility of incorporating it into the second year English syllabus was mooted. Steve's interest in the possibilities of the course led him to offer to teach it for two lessons a week to his second year English group. He also had a more personal interest in educational research and innovation and wished to help in this aspect of the course for its own sake. Steve is a creative person who believes himself to have no aptitude whatsoever in things technical, and because of this attitude he approached the more technical lessons with some considerable trepidation, taking every opportunity to avoid them. And yet, when he did bring himself to master the technical details in an area, he became an enthusiastic teacher of that point. However, it was in the more creative field of drama that he made his biggest contributions, using his own instincts and authority to extract insights in the children from the teaching material at hand. His relationship with the children owes much to the influence of Harry Wright in the mock-humorous and often witty way of speaking

to them. He finds however that the point at which he has to re-assert control occurs much sooner and this gives the impression of a much more formal relationship which might appear to depend upon a changing mood. The open-ended lesson and the discussion are his forte and the foundation of his drama work is the discovery method of 'I do and I understand'.

Jenny Leigh. Jenny is the teacher at Henry Beaufort in charge of the library and as such she was important in the development of the 'Information' course and the library module in particular. This, too, was the source of her interest in the course, since she had a number of weekly lessons with a fourth year class based on project activities, for which the library was the focal point. Jenny's teaching experience spans about seven years, although she has been away from the classroom at intervals since first starting to teach in Portsmouth. She is less happy than either Harry or Steve in the more discursive parts of a lesson, preferring to have some definite goal to teach to. She is particularly sensitive to boredom among the children and appears to have a view on classroom democracy that responds to the wishes of the children she is teaching. Perhaps however this was more noticeable because of the greater age of the children she was teaching. Her relationship with the children she teaches varies according to the age group and ability level but with older children she tries to identify with their problems without always sympathising with them. Occasionally nervous and unsure she is nevertheless responsive to the needs of her classes and willing to spend some considerable time in acquiring technical knowledge so that she is equipped to answer their questions.

3.1.5 Comparisons

Although the two schools used in the pilot testing of the 'Information' course qualify for the label 'comprehensive', since it has been the policy of the Hampshire County Education Authority to make all schools non-selective, there are inevitably differences between them, as there are between any two schools in the country. The purpose of this section is to highlight these differences so that the way in which the course was taught and received, which is the main interest of chapters four and five, may be better understood.

The difference between the catchment areas of the schools has already been mentioned. The much more cosmopolitan Yateley school contrasts with Henry Beaufort not only in the variety of physical environments experienced

by the children and in the occupational and social backgrounds of their parents, but also in the size of the area it draws from. Ten school buses arrive at Yateley school each morning and disperse their clientele each evening into the villages, estates and highways of north-east Hampshire. At Henry Beaufort school, the one school bus used reflects not only the smaller physical size of the school but also the more compact nature of its catchment area. Distance from home and the need to hurry away each evening in order to catch the school bus after lessons could often have a deleterious effect on the commitment of a child to the school, an effect increased by the preclusion of attendance at out-of-school meetings, functions and, quite often, participation in sports teams. Also, what is often associated with a wider range of parental occupation is a greater spread of ability in the children. While no study of this has been included in this project, it would seem to be true from observation. Certainly the general motivation and behaviour of the children appears to be much better at Henry Beaufort, although it is acknowledged that many factors combine to produce such a situation. Indeed, the special circumstances which make the evolution of Henry Beaufort school incomplete as an educational unit are probably much more important in this respect.

However, catchment area is not only function of size affecting the contrast between the two schools. The physical size of the campus at Yateley catering, as it must, for over 2000 children, creates problems of communication, administration and movement. Classes dismissed by one teacher could take as long as ten minutes to arrive at their next lesson if it is on the other side of the site, and this often results in a loss of concentration and urgency in children. In addition, children, notorious procrastinators, have the opportunity of indulging in this luxury with some impunity. The 1974/75 school population of about 350 at Henry Beaufort and the disposition of the majority of classrooms in a 5-storey tower block reduces wasted time between lessons and the opportunity for misbehaviour. But it is in the deployment of the staff in order to cope with the problems of size that the differences between the two schools are most noticeable. Mention has already been made of the great administrative superstructure set up at Yateley, which tends to keep the most experienced staff away from the classroom environment and to expose junior staff to difficult teaching situations. At Henry Beaufort the headmaster has been luckier. He has had the opportunity to hand-pick his staff so that they fit into his general philosophy of running a school and the gradual climb to a

full school complement has enabled problems to be overcome as they arose. The school is still able to look outwards at the community and accept the challenge of new ideas without disruption or mistrust. Schools with many problems tend to look inwards on themselves and to see change as the creator of yet more problems.

Another important factor in assessing that which might affect the reception of a new course in a school is the method of organisation employed. At Yateley, the children are immediately divided into three bands corresponding to ability level within age groups. The 'house' band comprises those children of above average ability according to the methods of selection used in any one year, while the 'colour' band and the 'remedial' band children comprise the rest. At Henry Beaufort the first three years are completely non-selective, although children with special literacy or numeracy difficulties are extracted from their mixed-ability classes and given special English and Mathematics lessons from time to time. Again it has not been a part of this project to study or comment on the merits and deficiencies of mixed-ability teaching or 'banding' - it is nevertheless believed that the type of organisation adopted by a school does have an effect on the way in which some children, especially those of lower ability, respond to some lessons and courses.

In a similar way the method by which information is communicated between the staff and the administrators, and the formal and informal relationships which exist between them, are indicative of attitudes. The headmaster of Yateley school did not have as much time to spend with staff members as he would have liked - very few headmasters do - although he would frequently visit the main staff room at break times for an informal chat with whoever wished to take advantage of his presence. Here again, however, the size of the campus worked against the system, since many members of staff, Ray Cackett amongst them, remained in their own buildings at break times. Longer, more formal, conversations were difficult to arrange. Once, Ray had to wait ten days before he was able to discuss a matter with the Headmaster, and frequently he was unable to make contact on the same day, by which time the urgency had gone. This would have been an unthinkable situation at Henry Beaufort school. The headmaster, besides making himself available at break times and lunch, would expect to fulfil any request to see him on the same day if he were present at the school. Indeed one of the few grumbles he had about the course was the way it seemed to attract distinguished

visitors from outside the school, thus leaving him with less time to chat to his staff.

Perhaps the way in which the teachers themselves became involved with the course is an indication of the relationship existing between administrator and administered. It is believed to have affected deeply the way in which the course was both taught and received. Some description has already been given of how the actual involvement of the teachers actually occurred. The essential difference is that, at Yateley, the teaching of the course has been affected either by headmasterly selection and persuasion, as in the case of Ray Cackett and Sheila Oviatt-Ham, or by timetable edict, as for Rosemary Trew and Jackie Lord. While Ray and Sheila had, theoretically, some choice in the matter (the Headmaster's exact words before discussing it with them were 'I'll be able to sell it to them'), Rosemary and Sheila had not. In contrast to this the impetus at Henry Beaufort came from the staff concerned, who actually wanted to teach the course. There was no cajoling or subtle persuasion from above; indeed 'above' was consulted only after the desire had been expressed and the decision made by those involved in the teaching. In the context of the testing of the course itself, this is a very important point. It affected, too, the presentation of the course to the children. In the majority of cases at Yateley, the children came to a lesson called 'Information', a subject about which they had no prior information and which they were unable to relate to anything within their experience. No doubt this had a certain novelty and curiosity value in its initial stages. All lessons at Henry Beaufort school, and one series of lessons taught by Sheila at Yateley, were taught under the label of English. Thus there were few adjustment problems facing the children, and the subject matter was taught as if it were part of the English syllabus. Less importantly, the course was taught by two Geography specialists and two English specialists at Yateley, while at Henry Beaufort it was taught by two English specialists and the Librarian. It is perhaps relevant to point out that most of the interest outside of the two testing schools has in fact come from mathematicians, but the special reasons why this should be so have been discussed in the previous chapters.

It has been the object of this section to highlight the differences between the two testing schools so that the results of the tests may be discussed more knowledgeably in future chapters. No doubt there are other differences which

had some bearing on the results but it is considered that those mentioned above comprise the most important factors in understanding how and why the 'Information' course has been so differently taught and received at Yateley and Henry Beaufort schools.

- 3.2 Communication between researcher and teacher. Organising the course, briefing, obtaining feedback.

3.2.1 Communications problems

The problems of the researcher in writing a course which meets the demands of a school have already been described (section 2.1). The further problems of organising the course and the communication of facts, ideas and impressions between the researcher and those carrying out his research are often concurrent activities both with each other and with the writing phase. This part deals with the three main communication aspects of organising the timetable, briefing the teachers and obtaining feedback. Each one presents a different type of problem from the others, and needs to take into account the teachers concerned as individuals. For example organising a course schedule for one teacher might be a relatively simple matter of explaining the various lessons in one module of the course, gauging the time to be taken and drawing up the timetable; for another it might involve selecting from several modules lessons which allow the teacher concerned to draw upon known teaching strengths. Also, in the briefing sessions some teachers need to be constantly reminded of the course philosophy and the reasons for teaching a particular point, while others, who have absorbed the ambience of the course and have made it their own, might want to discuss alternative ways of putting across the ideas. There is no prescribed way of meeting all requirements, and the point of this section is to explain the work which had to be done in overcoming the communication problem.

3.2.2 Organising the course

If this were just a matter of setting out the term's timetable for each teacher this would be a lengthy but fairly straightforward task. However, in a course such as the 'Information' course, involving the selection of topics from many alternatives, teachers from different disciplines and with varying strengths and attitudes, the provision of visual aids and class stocks of worksheets, and the arrangement of special facilities such as terminals, visits and computer time (themselves involving further communication with external agencies), the exercise is as much one of good logistics as of good timetabling. The first year of testing at Yateley school was the easiest to arrange. The teaching material was discussed and written week by week,

Ray Cackett, who was teaching it, had a specified time to get through the subject matter provided, and if he did not complete this, he would ignore what he had not done and commence the following week with the new material. It was crude, it was moderately unsatisfactory for both teacher and child in leaving good work undone, but as a means of getting through the material it was effective. But as the choice became wider, Ray's appreciation of the subject matter better, and the details more copious, when in fact we were in a position to offer the flexibility of the fuller course, the scheduling problem became more acute. Figure 3.1 shows how the demand for the course in the two schools broadened out considerably and also how the mix of ability levels, age groups, lesson times and teacher experience changed. This document was necessary as written confirmation of the arrangements which had been made, and as a source document from which briefing times and course requirements could be worked out. But the more complete individual teacher timetable took longer to work out. Figures 3.2 to 3.5 show three examples of the 1974/5 school year Autumn, Spring and Summer term timetables which had to be agreed with all teachers beforehand and which had to take into account

- the ability level of the class concerned
- the mix of topics and modules which would give enough feedback to the researcher
- the time taken to teach a particular topic
- the availability of visual aids and artifacts
- the subject and teaching strengths of each teacher
- the number of lessons devoted to the subject each week by the teacher

Taking figures 3.2 and 3.3 as a prime example of the problem of timetable design

- (a) Harry Wright was to devote three lessons per week to the course with his English class while Steve Ward devoted only two. Harry could expect therefore to move faster through the modules and cover more ground.
- (b) Harry's special interest lay in codes and ciphers so that he would be more interested in teaching module 4 than Steve Ward who tried to eschew technical content.
- (c) But the terminal session (week commencing 18, 25 Nov. and 2

Dec.) relied on the availability of the terminal in a specific week (25 Nov.)

- (d) The estimated times for each module and topic were unknown. These teachers had varying degrees of experience, both in teaching and in teaching the course. Thus for module 1 it was estimated that Ray, because of his experience in teaching it before, would take four weeks, Sheila Oviatt-Ham, because of her penchant for discussion and lack of familiarity with the module would take five weeks, while Rosemary Trew, because of her inexperience, would not make as much of the possibilities and perhaps take four weeks. These of course were guesses.
- (e) From module 3, taught by Ray Cackett and Sheila Oviatt-Ham, those lessons which were English-oriented and would appeal to the lover of the open-ended type of lesson were chosen for the latter, while the more factual lessons, which might have appealed more to Ray's teaching style and the 'colour' band class he was teaching, were selected from the module.
- (f) The terminal was available at Yateley during the week ending 9 Dec., so that the schedule for all teachers there had to be geared to this event.
- (g) Mrs. Leigh, as the librarian who was to help with the writing of module 8, was obviously best suited to give this an initial testing.

These are just a few of the factors taken into account during the design of the timetable for one term of the 'Information' course. One further complication which could, and did, throw the whole problem into further confusion, was the built-in flexibility of the course itself. All teachers were at liberty to pursue their own lines and to modify the course to suit the insights they themselves, or the children they were teaching, had had. At least four of the seven teachers on the schedule took full advantage of this facility, following up lines of enquiry from previous weeks and often making a nonsense of the timetable. This of course is no criticism of them, the course, or the timetable, and the more teachers became confident with the material the more they deviated from the chosen path.

The timetable for the term though was only the first step. The next was to arrange the supply of support material and aids. Since films needed to be

ordered at least a month in advance, visits arranged, visual aids scheduled between the two schools, worksheets duplicated and supplied in class quantities in good time for the lesson, this was no easy task. Figure 3.6 shows one page of the worksheet/aid schedule drawn up for the autumn term of 1974. There were in fact eight completed sheets for this term. A blank version is supplied for teachers in the course -(see volume 2, module 0, page Intro/24). As may be seen from the schedule, large quantities of paper were needed and these had to be duplicated from the originals, sometimes by the University Service and sometimes by the researcher himself. The drawing up of these schedules, particularly in later weeks when the variety of modules taught in any one week was greater, was a time-consuming task, but a necessary one in view of the complications which could arise if things were forgotten.

The administration tasks did not end here. Mention has already been made of the terminal sessions held at each school for each class. Quite apart from the problems of obtaining the terminal at the required time, and physically transporting it to and from the schools, there was the problem of dealing with the data supplied by the children for the session. Module 6, pages C/T/12 to C/T/14 outline the nature of the exercise, which involves the handling of large amounts of information supplied by the children, and the next chapter will relate how the unfamiliarity of the children with the method made the task more difficult. Nevertheless it was the job of the researcher during these sessions to ensure that the data was entered into the computer in a form which could be dealt with both by the computer's file-handling system and the researcher's own information retrieval program.

Figure 3.1

3.2.

Information Course - Teaching Schedule 1974/75

School	Teacher	Class	Class Type	Duration	Time	Other
Henry Beaufort Harestock Winchester	Mr. H. Wright Head of English	2H	2nd Year - Mixed Ability - boys and girls (30)	3 lessons per week (1 x 40 mins, 1 x 80 mins)	Wed. 2.10 - 2.50 Fri. 1.30-2.50	
"	Mr. S. Ward	20	2nd Year - Mixed Ability - boys and girls (30)	2 lessons per week (2 x 40 mins)	Thur. 1.30 - 2.10 " 3.00 - 3.40	
"	Mr. G. Lucas (Cancelled)	2nd yr non-german	2nd Year - Mixed ability - boys and girls (30)	1 lesson per week (1 x 40 mins)	Wed	
"	Mrs. J. Leigh	4th yr	4th year - mixed ability - boys and girls (35)	2 lessons per week (2 x 40 mins)		From 1 Oc
Yateley School Yateley Hants	Mr. R. Cackett	2 Yellow	2nd Year - Average and below average ability - mixed (35)	1 lesson per week (1 x 55 mins)	Wed. 2.40-3.35	
"	Mrs S Oviatt-Ham	2 Lister//	2nd Year - Above average ability boys (32)	1 lesson per week (1 x 55 mins)	Wed. 9.30 - 10.25	
"	" "	2 Lister	2nd Year - above average ability - boys (30)	1 lesson per week (1 x 55 mins)	Tues. 9.30 - 10.25	
"	Miss R Trew (later Mrs J Lord	2	2nd Year - average and below average ability - mixed (30)	1 lesson per week (1 x 55 mins)	Tues. 9.30 - 10.25	Probationa teacher
"	" "	2	2nd Year - average and below average ability - mixed (35)	1 lesson per week (1 x 55 mins)	Wed. 9.30 - 10.25	"

	Mr. R. Cackett	Mrs S. Ham	Mrs S. Ham	Miss R.Trew	Miss R.Trew	Mr. H. Wright	Mr. S. Ward	Mrs J. Le
9/9/74	Module 1 Intro- film The Question Tree, discuss information	_____			_____→	Module 1 Intro - film The Info McInne discuss info.	_____→	
16/9/74	Module 1 - walk to find info	_____			_____→	Module 1 - walk to find info.	_____→	
23/9/74	Module 1 - follow-up to walk	_____			_____→	Module 1 follow- up to walk. Film Question Tree	Module 1 follow-up to walk	
30/9/74	Module 1 - Film - The Info machine + discussion	_____			_____→	Module 1 - cmpt questions on film	Module 1 - Film The Question Tree	Module Intro - Film Te discuss
7/10/74	Police 1 - Module 3 Intro Info v Knowledge	_____	_____→	H/M Info System. Intro to Module 2 - Case Study discussion School questions		Module 2 - H.I.S. Case Study-school questions. Personal Info.	Module 2 - H.I.S. Case Studies and schl. qstns.	Module walk to find info
14/10/74	Module 3 - Case Studies on police work	Module 3 - Z-Cars script police on TV - discussion and written work		Module 2 H.I.S. - personal info in school system - notes on designing an info system		Module 2 - H.I.S. design and edge punched card.ex.	Module 2 - H.I.S. prsnl. info and sys. design.	Module follow- to walk
21/10/74	Half Term							
28/10/74	Module 3 - Computer in Police work	Module 3 - Sherlock Holmes Story and filmstrip		Module 2 H.I.S. - info system design and edge-punched card exercise		Module 4 - Bits and pieces - intro to the computer as an info storer	Module 2 - system design and epc exccse	Module Library general question
C	Story							

Information Course - Autumn 1974 cont'd

4/11/74	Module 3 - Computers in Police work examples	Module 3 - Computers Don't Argue - misuse of computers in legal work. Tape + slide	Module 7 - Gas Board intro Gas Account exercises	Module 4 - bits and pieces - the changing technology and its impact.	Module 8 - Library - gnr1 questions	Module Library codes and ciphers
11/11/74	Module 8 - Library gnr1 questions	Module 5 - TRRL - geographical introduction	Module 7 - Gas Board film plus questions	Module 4 - bits and pieces display	Module 8 - codes and ciphers	Module Computa in Libr
18/11/74	Module 8 - Library - codes and ciphers	Module 5 - TRRL. Film on the Module 7 - further work of the establishment + on activities of Gas Board questions		Module 6 - Data preparation for a terminal session to be held next week. Completion of mark-sense cards.		
25/11/74	Module 8 - Computers in Library Work	Module 5 - TRRL collection of information - use of stats 19	Module 7 - Gas Game which illustrates flow of info to and from machine	Module 6 - Terminal Session using data completed by children in previous week		
2/12/74	Data preparation for terminal session to be held in following week. Completion of mark sense cards and/or perforated port-a-punch cards			Module 6 - follow up to the terminal session showing what exactly happened and how.		
9/12/74	Module 6 - terminal session using data prepared by children in previous week			Module 6 - further work on the terminal session		
16/12/74	Module 6 - Follow up to the terminal session showing what happened and how it was done			No lessons - end of term		

Information Course - Spring Term 1975

Week Comm.	Yateley			Henry Beaufort		
	Mr Cackett	Mrs Oviatt-Ham	Mrs Lord	Mr Wright	Mr Ward	Mrs Leigh
5.1.75	Follow-up to the terminal session held in Autumn Term			Module 3 - Introduction to the work of the policeman. Information v knowledge.		Module 1 - Intro to Information. Film 'The Question Tree'.
12.1.75	Module 3 - Computers Don't Argue. Tape /Slide presentation about the misuse of Computers.		Module 3 - Intro to the work of the policeman. Info v knowledge.	Module 3 - The law on television how it is treated - example of a Z-Cars script.		Module 1 - Visit to film information in school environment.
19.1.75	Transport and Road Research Laboratory - Module 5. Traffic Signs and homing in on the Lab - a geographical introduction.		Module 3 - The TV police - fantasy v reality. Z-Cars.	Module 3 - Deduction and Info. A Sherlock Holmes Story. Right and wrong deductions.		Module 1 - Follow-up to the visit to the corner
26.1.75	Module 5 TRRL. Film 'Safely on the Move'. Why the Laboratory is there.		Module 3 - Deduction and Information. A Sherlock Holmes Story.	Module 3 - Some police Case Studies. The distortion of information.		Module 1 - Follow-up an film 'The information machine'.
2.2.75	Module 5 TRRL. Facilities at TRRL. Follow-up from film and using Laboratory reports.		Module 3 - Police Case Studies.	Module 3 - A Crime Story which illustrates the use of computers.		Module 6 - Preparing information for a
9.2.75	Module 5 TRRL. Film 'Accidents and Car Safety' Accidents and how they may be prevented - the collection of info.		Module 3 - A Crime Story - the use of computers.	Module 3 - Computers in Police Work. The Police National Computer and what it does.		computer. Using mark-se cards. Exercises and coding for a terminal session.
16.2.75	Half-term					
23.2.75	Module 5 TRRL. Follow-up to film. The use of forms to record information. The Stats 19. Drawing maps and pictures from forms.		Module 3 - The Police National Computer and What it does.	Module 3 - The misuse of computers - Computers Don't Argue - a tape/slide presentation.		Module 6 - A terminal session with the info provided in the previous
2.3.75	Module 5 TRRL. Computers at TRRL. How they prepare and process the information. The communication of information.		Preparation for a visit to a computer installation.(*)	Preparation for a visit to a Computer Installation.(=)		Module 6 - Follow-up to the terminal session - how it was done.
9.3.75	Preparation for a visit to a Computer Installation.(*)		Visit to a Computer Installation.(*)	Visit to a Computer Installation (=).		Module 6 - Follow-up to the terminal session.
16.3.75	Visit to a Computer Installation.(*)		Follow-up to the Computer Visit.	Follow-up to the visit to the Computer. Visit.		Summary of term's work.
* Either TRRL or Farnborough College of Technology.				= Either Hampshire County Council or Southampton College of Technology or IBM Hursley.		

Information Course - Teaching Schedule Summer Term 1975

W/C	Yateley			Henry Beaufort		
	Ray Cackett	Sheila Ham	Jackie Lord	Harry Wright	Steve Ward	Jennie Leigh
14.4.75	Module 5 - Completion and revision.	Module 5 - Completion and revision	Module 5 - Intro to TRRL.	Revision of visit to HCC Computer.	Revision of visit to HCC Computer.	Module 8 - Sources of Information.
21.4.75	Module 8 - Sources of Information.	Module 4 - Computer bits and pieces	Module 5 - Geographical position	Module 4 - Lesson 2 - Computer people	Module 4 - Lesson 2 - Computer people	Module 8 - Finding out. Classifying
28.4.75	Module 8 - Finding out.	Module 4 - Computer people.	Module 5 - TRRL Film showing work.	Module 4 - Computer Applications.	Module 4 - Computer Applications.	Module 8 - Classifying and X ref.
4.5.75	Module 8 - Classifying and X refing	Module 4 - Computer Applications.	Module 5 - TRRL - people and buildings	Module 4 - Computer in the future.	Module 4 - Computer in future.	Module 8 - Dewey Decimal System.
11.5.75	Module 8 - Dewey Decimal System.	Module 4 - Computers in future.	Module 5 - Traffic Accidents - Film.	Module 6 - Haiku.	Module 6 - Haiku.	Module 8 - Using the Index.
18.5.75	Module 8 - Using the Index.	Module 6 - Haiku.	Module 5 - Reading Tables.	Module 6 Haiku (Visit to C of T?)	Module 6 - Haiku (Visit to C of T?)	Module 8 - Reference books.
25.5.75		Half Term				
2.6.75	Module 8 - Reference Books.	Module 6 - Haiku (Visit to C of T?)	Module 5 - Traffic Survey.	Module 6 - Haiku	Module 6 - Haiku.	Module 8 - Library School of Future.
9.6.75	Module 8 - Libraries and school of future.	Module 6 - Haiku.	Module 5 - Stats 19 - recording info.	Module 8 - Sources of Information.	Module 8 - Sources of Information.	Module 8 - Haiku - Module 6
16.6.75	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 5 - Transfer of info.	Module 8 - Library /school of Future	Module 8 - Library /School of Future.	Haiku - Module 6 (Visit to C of T)
23.6.75	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 5 - Computer at TRRL.	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 6 - Haiku
30.6.75	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 9 - Personal Surveys	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 4 - Computer Bits and Pieces.
7.7.75	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 9 - Personal Surveys	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 4 - Computer People.
14.7.75	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Module 9 - Personal Surveys.	Revision of Course	Revision of Course	Module 4 - Social Imps of Computer.

The form below helps you to plan the lessons you will be teaching throughout the school year. It makes provision for listing the lessons and for obtaining the visual aids you will need. Also the 'Action' column enables you to make the advance preparations needed in good time eg ordering films etc.

To be done before the course starts.				Action/Vis Aid needed.	Tick when done.
				9/8 Order films 'The Info Machine'	✓
				for w/c 9/9 'The Question Tree'	✓
				2/9 Provide 175 folders for Yateley	
				70 folders for H/B	
Week Comm.	Module Teacher	Lesson	Topic		
9/9/74	R/C	1	Intro to Info	Film 'Question Tree' Sheets I/P/1 & 6 (x30)	✓
	S/H	1	— " —	— " — (x70)	✓
	R/T	1	— " —	— " — (x70)	✓
			Return Film		✓
	H/W	1	— " —	Film 'Info m/c' Sheets I/P/14 & 17 (x35)	✓
	S/W	1	— " —	— " — (x35)	✓
			Return Film		✓
			Recorder Films for 3/9 & 23/9		✓
16/9/74	R/C	1	Week	Yateley Map (x35)	✓
	S/H	2	— " —	— " — (x70)	✓
	R/T	2	— " —	— " — (x70)	✓
	H/W	1	2 & 3 — " — Follow-up	Recorder Map (x30)	✓
				Sheet I/P/7 (x35)	✓
				Sheet I/P/5 (x30)	✓
	S/W	1	Week	Sheet I/P/7 (x35)	✓
23/9/74	R/C	1	3 Follow-up to week	Sheet I/P/11 (x35)	✓
				I/P/12 (x35)	✓
	R/T	1	— " —	E/P/11 (x70)	✓
				I/P/12 (x70)	✓
	S/H	1	— " —	E/P/11 (x70)	✓
				E/P/12 (x70)	✓
	H/W	2	3/4 Follow-up & Film	Sheet I/P/9 (x35)	✓
				I/P/10 (x30)	✓
				Film 'Question Tree'	✓
				Sheet I/P/11 & 6 (x30)	✓
	S/W	1	3 Follow-up & week	Sheet I/P/5 (x30)	✓
				I/P/9 (x35)	✓
				E/P/10 (x30)	✓
30/9/74	R/C	1	4 Follow-up & week	Sheet I/P/13 (x35)	✓
	S/H	1	4 Follow-up & Film	Sheet I/P/13 (x70)	✓
				Film 'The Info Machine'	✓
				Sheet I/P/14 & 17 (x70)	✓
	R/T	1	— " —	Sheet I/P/13 (x70)	✓
				Film 'The Info m/c'	✓
				Sheet I/P/14 & 17 (x70)	✓
				Return Film	✓
				Order 'Bus Industry' Film for 11/11	✓
	H/W	1	4/5 Conclusion	Film 'Question Tree'	✓
	S/W	1	4	Sheet I/P/11 & 6 (x30)	✓

3.2.3 Briefing the teachers

The main objective in briefing teachers is to communicate the ideas of a particular lesson to the person who must then communicate them to the child and to put this into the broader perspective of the course philosophy and objective.

For the most part briefing of the teachers at Yateley and Henry Beaufort schools took place the week before the lesson was taught. Steeped in the tradition of phrases such as 'Computer Education' and 'information handling', well known to those, predominantly mathematicians, who have been the main sources of contact in the past, the researcher had to be careful to present the new concepts not as an extension of past computer courses but as a new and important part of the school curriculum. The teachers concerned, not surprisingly, tended to shy away from what they considered to be computer jargon; thus data collection, verification and integrity needed to be expressed in terms which also conveyed the concepts of gathering together information, putting it into some sort of logical order, and checking that information so gathered was accurate and meaningful. So, too, the reasons behind performing these tasks needed to be explained to teachers whose experience had been mainly as recipients of statistics rather than as progenitors of statistical analyses. This was not a problem which cropped up frequently since the information course is designed to present these ideas to the children in the form of worksheets and the children are expected to learn from their own experience without need to learn the jargon which expresses the ideas more succinctly.

In effect, briefing was a relatively simple exercise involving the teachers' interpretation of the notes provided for them and the decision whether or not to use the worksheets with the children. The main problem was to encourage them to find ways of linking the subject matter for one week with that of the previous week so that the course made sense as a whole. Since all the teachers concerned were adequately supplied with imaginative ideas of their own, this aspect was soon sorted out, and the problem became one of relating the week's activity to the philosophy of the course in general. Quite frequently teachers would want to approach a topic differently from that recommended in the teacher's notes. In these cases the new approach was discussed enthusiastically, and indeed encouragement was given throughout to teachers to modify the content and approach according to the need which they felt

existed. Some of these new approaches have since been incorporated into the final version of the course. An example of this occurred in module 3 in which the difference between information and knowledge was being discussed. The worksheet to go with this was entitled 'How much do you know about your friend?', and had been used successfully in previous lessons at Yateley (Page P/P/1 in volume 2). The teachers at Henry Beaufort were concerned that children had been overexposed to worksheets and that perhaps the method suggested was too formal for the less able children in their classes. They suggested a police 'Wanted' notice designed by the children which would incorporate the same idea and be circulated among the class for identification. This was an excellent idea, later written into the notes and used at Yateley with less able children there. Several ideas like this have been added to the material, mainly concerning the need to add more creative material to the original course content.

There were physical difficulties to the briefing sessions at Yateley. Whereas at Henry Beaufort all the three teachers were free during the last lesson on a Friday morning thus making the briefing and feedback sessions a matter of the researcher turning up at that time, at Yateley the three teachers were free on different days at different times and the frequent staff absences, for which they had to cover, made the setting of a common time a hazardous task. Added to this the journey to Yateley for the researcher entailed a four hour round trip of about 150 miles and there was no way of getting there conveniently by public transport. With a car which seemed to enjoy spending more time in the garage than on the road there were indeed difficulties. These were partly overcome by alternating visits to Yateley on Tuesdays and Wednesdays and by briefing for several weeks ahead; in cases when it was impossible to get there on the appointed date the telephone was a possibility open to the teacher if he or she encountered difficulties. In the event this channel of communication was rarely used. On the one hand this was an unsatisfactory way of briefing teachers in a new subject, and may have some bearing on the greater teacher dissatisfaction with the course at Yateley; on the other hand it would bear more resemblance to the real world after the pilot tests, when teachers may be asked to carry on with the course without benefit of weekly or even termly briefing sessions. However, at both the schools there was little evidence of communications difficulties in the sense of the teacher not knowing what to teach or how to teach it (the teachers notes are very explicit

on these details), although there was some occasional evidence that at Yateley some important emphases on aspects of the teaching material were not fully dealt with. To take the same example from the police module (3), on two occasions the important point that the type of factual information which can be observed and recorded on the sheet (P/P/1) is the type of information which can act as data to the computer, and does not therefore qualify for the label 'knowledge', was not emphasised to the children, largely because during the weeks when that would have been made clear to the teacher that this was an important facet of the exercise the researcher's car was having one of its periodic visits to the repairer.

Little more need be said about the briefing sessions. Examples of two of them were recorded and are to be heard on the accompanying tape

3.2.4 Obtaining feedback

The obtaining of feedback from the teachers was a major problem. In an exercise such as this, in which the teacher is given material to teach, teaches it, and is then charged with giving an impression of how the lesson went, the resultant data must inevitably be subjective and open to criticism on the grounds of the lack of objectivity. Even in the cases where lessons were observed and children interviewed, there is a large element of subjective interpretation. The criteria one adopts in judging the efficiency of teaching material cannot all be factual; one is looking for such intangibles as interest, enjoyment and teachability. Further the feedback obtained at any one time can be coloured by a bout of dyspepsia, a recently difficult class, a hot and humid day, a lost free period and a hundred other variables.

Thus one has to accept the subjectivity of the information one receives, and interpret the findings accordingly. As to methods of obtaining feedback, the following were all tried:

a) The researcher drew up a comments sheet for the teacher to complete after the lesson was finished. In fact two were drawn, the first attempt (figure 3.7) asking fairly detailed questions, the second (figure 3.8) asking for more general impressions more quickly completed. The second was drawn up after the failure of the first to provide results. In effect, three of these were returned complete and the method was abandoned during the first year of testing the course. Teachers are busy people with a need to transfer their concentration from one class and one subject to the next class

and possibly an entirely different subject more or less immediately; in addition they have forms to complete about many subjects, work to mark and inventories to take; one cannot also ask them to do a lot of paperwork recording impressions of a course which they teach for two periods out of a thirty-five period week.

b) A video-tape was made of the first lesson of the course during the second time it was taught (by Ray Cackett in the Spring Term of 1974). Two cameras were sited, one looking through the glass window above the doorway at the children, the other at the side of the room pointing at the teacher. The teacher had a radio-microphone around his neck and two other microphones were suspended from the ceiling above the children to pick up their responses. The cameras were as unobtrusive as possible to avoid the possibility that the children would become camera shy or camera conscious. The objective of the exercise was to produce a neutral look at a lesson, and to make an edited videotape from the two tapes, one from each camera. The audio-visual department of the University of Southampton helped with the exercise.

This was a failure for many reasons, both technical and artistic.

- i) The children were all too conscious of the hardware around them, and far from being camera-shy they played up to the situation like actors at a christmas party.
- ii) The cameraman facing the children, albeit on the other side of the door, seemed to be more intent on making a British art nouveau version of Blackboard Jungle. Thus he panned in on the misbehaviour at the back of the classroom with Houston-like panache, faded out and faded in, closed up and closed down the lens, and generally deneutralised the scene beyond all recognition. This, of course, was a failure in communication before the session, although he was told what the object of the exercise was.
- iii) The contrast in light in the room was far too high for the cameras to cope with. The lenses could not shut down far enough and the resultant pictures were dark, the subjects almost indiscernible.
- iv) The microphones above the children failed to catch what they were saying. A few inaudible mumbles resulted.

The videotape recording has been destroyed.

c) Another videotape, this time using the Rover backpack owned by the Audio-Visual Media Department of the University, was made of the

children's visit to a crossroads (lesson 2, module 1). This time the researcher himself took on the responsibility of shooting the film with a hand-held camera in one hand, a radio microphone receiver in the other, and what seemed like half a ton of portable video-recorder on his back. Here again the objective was to record the events of the lesson and to give some idea of the lesson content and purpose while the children were actually taking part. This time there was no playing to the camera on the part of the children and very few attempts to create a new art form, since holding the camera at all was the major problem, pointing it in the right direction a strength-sapping effort and panning or fading an impossibility. The lesson went well, and the researcher was thankful, an hour later, bowed but unbloodied, to relieve himself of the equipment which by this time seemed to be heavier by a factor of ten. Two hours later, on return to the university to view his efforts, the researcher discovered that the spools on the recorder had stuck; not a second had been recorded.

The experiment was not repeated.

If these were the unsuccessful aspects of obtaining feedback some success was achieved in the following ways.

d) Tape recorded conversations were frequently held with the participating teachers, usually as a preliminary introduction to the briefing sessions. Many of these conversations were lengthy, covering the modifications made by the teacher to the content of each week's material, the teacher's assessment of the value of the lesson in terms both of the context of the course and its general educational value, the receptiveness of the children to the lesson and the special objectives of the lesson as it applied to that week. None of the teachers objected to being recorded in this way and the value of this method is that it encapsulates the feeling of the time and can be referred back to when necessary; for example when writing a thesis. The transcripts of these conversations are presented as appendices to the various sections of chapter 4. Some difficulty was experienced in obtaining cassette tape recorders on the days when they were required, but a total of eight complete cassettes was obtained amounting to twenty hours of feedback. Naturally, more information is available on those topics which were more frequently taught; modules one and three are particularly rich in this respect, but modules seven, eight and nine are sparsely covered, mainly because they were the last to be written and have been only partly taught.

e) In some of the lessons, the researcher sat in during the teaching. Notes were made and these were used as additional source material. Also, in three cases, tape recordings were made of the lessons as they were taking place, and one teacher, Mrs. J. Lord of Yateley made some valuable written notes of lessons in module three which are also included on pages 4.4.A9 to 4.4.A15

f) Further feedback has been obtained from independent sources not connected with the pilot test schools. In particular there are two main sources:

- i) The researcher has been concerned with lecturing about the information course to teachers groups on courses in London and Birmingham (twice). These comprised mainly teachers who have been concerned with Computer Studies courses in schools, mainly mathematicians and sometimes those who wish to expand the boundaries of the Computer Studies course in their respective schools. Also, he has spoken individually to many people, teachers, members of the British Computer Society Schools Committee, Advisors and administrators about the concepts embodied in the course and the future direction of the subject in the schools. Articles on the 'Information' approach have been submitted to magazines concerned with the promotion of computer education. These will be described later.
- ii) A more thorough independent evaluation of the information course has been made on behalf of the National Computing Centre, to whom the copyright of the course has passed, by Mr. Maurice Hart, Senior Lecturer in Mathematics at Clifton College of Education, Nottingham. The secondary purpose of this evaluation revolves around the Nottinghamshire Education Committee's decision to encourage Computer Education at second year level throughout its schools, the course to comprise approximately half programming in Basic language and half the sort of general concepts embodied in the 'Information' course. Mr. Hart's evaluation and recommendations are presented on pages 4.10.A1 to 4.10.A9. As part of his study, Mr. Hart came down to Southampton for two days discussion about the course with the researcher and the teachers at Henry Beaufort school, during which time he sat in on a lesson given by Harry Wright and spoke with the children in his class about the course.

Because of the interest shown by H.M.I.'s in the course, Harry has, too, been responsible for presenting his own evaluation and this was sent as a memo to Mr. Gillings of the Department of Education and Science.

g) Lastly, the most obvious supply of feedback material comes from the children themselves, since it is for them that the course was written, and it is on their judgement that the success or otherwise of the material rests. Some of their impressions are tape-recorded in conversations with the teacher and these have been transcribed. The results are discussed in chapter 4.

Thus the strengths and weaknesses of the information course have been evaluated in several ways. Taking into account the many variables which affect evaluation of this type of material, the subjectiveness of the report, the pressures from many directions on the class teacher, the level of the children taught, the imaginativeness of the teacher in modifying the material to suit the child, the physical environment in the classroom, the responsiveness of the children, and many others, one has to accept in the final analysis that all ways are limited in their scope, and that the obtaining of a purely objective analysis is impracticable. One must beware of the experimenter bias implicit in the experiments of Rosenthal and Rosenthal in 1964.

The next chapter, which is the most important part of this thesis, outlines what happened in the teaching of the 'Information' course and is written with reference to all the methods of obtaining feedback discussed here.

INFORMATION COURSELESSON EVALUATION

Lesson No.

Week No.

Topic:-

Date taught:-

Taught by:-

Class:-

a) Was the lesson given strictly according to the Teachers Notes?

b) If not, how did you modify it?

c) General Comments on how the lesson was received.

d) Particular examples, or unexpected results.

e) What difficulties did you experience?(If any)

f) How helpful did you find the Lesson Notes and/or Teachers Notes?

g) Suggestions for improvement.

h) On the remainder of this page and continuing on the back of the sheet, please write down, or ask one of the children to do so, any lists which were put on the blackboard as a result of discussion with the children. If you can, please also hand back this assessment with a copy of the work of one of the children. Alternatively, indicate what work the children did and how they approached it on the back of this sheet.

'Information' Course - Feedback Sheet

Please comment if comment is necessary - the headings are for your convenience.

Teaching Notes:

Use of Worksheets:

Teachability:

Preparation:

Childrens Enjoyment:

Learning Value:

Method of Approach:

Any Other Comment:

CHAPTER 4

. Evaluation of the 'Information' Course

4.1 General Introduction

This chapter approaches the task of describing how the various modules in the 'Information' course were taught and received in the schools, in a structured way. With some exceptions which will be described when they occur, each section of the chapter deals with a different module. But not only does section 4 deal with module 3 for example, but each section treats the module in the same way. After a short introduction to the module outlining its place in the course as a whole and the reasons for including a module on such a topic, the individual lessons are described in some detail under the heading 'lessons and methods'. In this description it is hoped to give the reader an idea of the insights which the course author wished to pass on to the children through the medium of the teacher and how this might have been achieved. In this sense we are thinking in terms of what was expected to happen in the classroom situation, whereas in the following part, headed 'reactions', the emphasis is on what may actually have happened according to the interpretation placed on the feedback obtained. To some extent this interpretation must be coloured by the researcher's own assessment of the teacher's attitudes and relationships. The whole chapter in fact must be read bearing in mind the stated intention of the thesis expressed in the first paragraph (page 1.1.2), and the constraints on gathering and interpreting information mentioned in the previous chapter.

Particularly when describing the lessons, references will be made to pages in the course notes presented as volume 2. Each module has a prefix letter. Figure 4.1, taken from page 3 of Module 0, shows the prefix letter for each module, and this occurs as the first letter in each page number in the course. The second letter in the page number is 'T', 'P', or 'V' denoting whether it is intended for the Teacher, the Ppupil or whether it is a Visual Aid. The digits are in straight numerical sequence. Thus page 1/T/12 is the twelfth page of the Teaching notes in module 1.

Figure 4.1

CODE LETTER	MODULE	TITLE	TIME (WEEKS)
I	1	An Introduction to Information	4-7 weeks
H	2	Designing a Headmaster Info System	4-7 weeks
P	3	Information in Police Work and the Law	8-12 weeks
M	4	The computer - an Information Machine	5-8 weeks
R	5	Information in the Transport and Road Research Laboratory	9-13 weeks
C	6	Computer Contact	5-8 weeks
G	7	Information on (Gas) Tap	6-9 weeks
L	8	From Ignorance to Knowledge - and back again	4-7 weeks
A	9	Individual Info Assignments	4-7 weeks

A recommended way of treating the frequent interactions between thesis and course and between thesis and transcribed feedback is to read in the following order:- General Introduction in this text, Module in volume 2, 'Lessons and Methods' in this text, the transcripts recording feedback for the module (prefixed by the letter A (for Appendix) before the number and situated at the back of each section of the chapter), 'Reactions' in this text.

4.2 Module 1 - An Introduction to Information

4.2.1 Introduction to Module 1 In a way, module 1 is the most crucial part of the course in that it is meant to stimulate enquiry into the nature of information and to make a number of important points about the subject which are taken up in more detail in later modules. The methods recommended to achieve these ends require the teacher to take the children outside the school environment and to prepare worksheets for the activities they undertake there. In one sense this is an unorthodox way of going about the task, betraying perhaps the geographical field study background of the course designer, but in another sense it is the best way by which important points about information in our everyday lives can be made. It must be remembered that the 'Information' course is not only a course about the influence of the computer, but an attempt to give children insights into the nature of the topic and to show them how it is an ever-present aspect of their daily lives. In taking them out of the classroom into an environment with which they may be only partly familiar, the teacher is first of all encouraging the children to observe, and then to extrapolate from their observations those points which he, and they, consider important; extracting unfamiliar concepts from familiar and desirable activities. From the childrens' point of view they are expected to search and find, and, having found, to examine and then, perhaps in discussion among themselves and with the teacher, to understand, even if this is only an intuitive awareness of what they have been doing and why they have been doing it.

At a superficial level, module 1 is a long way from the computer and from information in its organised form. Looked at more deeply, and teachers are encouraged to make this point among others given, the computer may have a part to play in this apparently unstructured format. The manhole covers, on which are inscribed the names of the maker, and the public utility they represent, are evidences of a design which may or may not have been originated in a computer, but which, nevertheless, is arrived at through a logical decision-making process. The superimposition of human needs such as gas, electricity, sewerage, lighting, telephones etc. onto the natural landscape is an organised process requiring planning, purchasing and installation, all of which are activities performed by computer in the modern day. And while this observation is not followed up to any great extent in the module it is one aspect or point of reference for later work, for example in the 'Gas Module' (7). But this is just

one insight into information out of many to be obtained from the activities embedded in it. At the personal level, children may learn much about their own relationships with the things about them. For example the concept of information as a ubiquitous commodity with which we come into contact through every moment of the waking day is important to an understanding of our perceptions. What we see and consciously remember is but a small proportion of what we see; this must inevitably be so if only for the maintenance of sanity. How we discriminate between that which we need to remember, that which we are motivated to remember, and that which it is safe or convenient to ignore or forget is an important lesson with which most of us are never taught in conscious terms to cope. In completing sheets of questions and in formulating items of information about a familiar environment which they thought they knew, the children are brought face to face with this knowledge about themselves. At the same time they learn much about the enormous quantity of information in every environment, how there are different levels of detail, how information changes at varying rates and the difficulties there are in attempting to give a structure to a random set of information items. Insights such as these are the product of the practical activity combined with general discussion. The degree to which a child's introspection allows them to be drawn will vary from individual to individual but the intuitive awareness of the nature of information is an appreciation which is uniquely individual anyway, especially if it concerns one's personal relationships with one's environment. One of the objectives of this module is to render this relationship more real, to bring to the surface those aspects of information of which we have subconscious awareness but little real understanding, and through activity and discussion make a little more sense of the world we live in.

4.2.2 Lessons and methods Module 1 has been taught many more times than any other module in the course during the pilot tests. As a result of the criticisms and suggestions of the teachers involved over the months, it bears some resemblance to its original form but has endured many alterations also. The next section deals with reactions to the module by teachers and children; it is the purpose of this section to outline the methods by which the general objectives might be achieved, and to explain the module as it is set out in volume 2. It is recommended that the reader should read quickly through the material in module 1 in volume 2 before proceeding to the rest of this

section.

Firstly in lesson 1 there are three objectives to be achieved. Since this is a new subject to most children (unless it is taught under the aegis of an established school subject), one needs to explain to the children just what it is they are going to study over the next few months, why it is considered important, and to give some idea of the sorts of topic which will be covered. An evolutionary alternative whereby the children gradually come to an understanding of the subject without benefit of prior explanation has been tried at Yateley and found wanting, although the evidence on which this approach has failed is opinionative and indecisive. Secondly, as a new course, it must have some initial impact on the children; something to distinguish it from other subjects but making the important point that in effect it has a relationship to all subjects. Lastly, the term 'information' needs to be defined more closely, but only after the ideas about the word which the children already have have been discussed. Thus the first week breaks naturally into three distinct parts, not necessarily of equal length or of equal emphasis. It need for example take no longer than five minutes of talk or discussion to outline the contents of the course. This is best done by a question and answer approach in which the children are invited to suggest what they would want to do in the future and guided along in this way to appreciate the formats and boundaries of the topic. Secondly, the impact is given by the introduction of a film about information. There is of course no film which adequately expresses the concepts we wish to get over in unequivocal terms, but of the many viewed by the course author, three contain sequences from which further related work may be extracted. These are 'The Information Machine' and the 'Question Tree' made by IBM and distributed free by the Random Film Library, and 'GIGO', made by Barclays Bank and distributed free by the Central Film Library. The difficulties with films are that they are often made for an adult audience and are unsuitable for children, or that they attempt to go into too much detail, containing parts which are not relevant to the matter under discussion. All these films suffer in both ways, as will be seen later, but at least they offer to the child a few insights into the topic and give some initial impact to the beginning of a course. The film can then be followed up by a general discussion between teacher and the children about their interpretation of the word 'information' and the contexts in which they would use it. Lists may be made on the blackboard and/or on paper and ideas invited from the children. The aim is to arrive at the end of the lesson

at a temporary definition of 'information' as that which can be given in answer to a question. The children are encouraged to formulate questions about anything and everything they see about them and in this way they appreciate the greater ramifications of information as a ubiquitous feature of every environment. The exact format of the recommended first lesson is set out in greater detail in the teaching notes pages I/T/4 to I/T/8 inclusive. However, it should be emphasised that each teacher is of course free to introduce the topic as he or she sees fit. There is no suggestion that the teaching notes are the right way, and everything else is wrong; the notes outline an approach which has been, in general, found to be successful when used by those teachers who have taken part in the pilot test, in the particular context in which they have taught the course. In other contexts and used by other teachers the methods suggested may be entirely out of place, and indeed, as will be seen in the next section, experienced teachers have altered what has been in the teachers' notes to suit their own classes and environments. Nevertheless the notes referred to give a good impression of what it is expected to achieve in this lesson.

Lesson 2 is a visit to a location near to, but preferably outside, the school. If desired, several locations may be chosen, offering a wider variety of environment and information. Reference has already been made to the reasons why such a visit might be necessary in the inculcation of attitudes to information. Pages I/T/9 and I/T/10 offer a fuller justification, and perhaps again betray the geographical background of the course designer. It is in this lesson, an enjoyable experience in itself, that the real red meat of the information problem is first encountered; where the children first grapple with the subject and find questions rather than answers, for what use are the latter without the former? The exercise first of all requires some preparation by the teacher. The preparation of two worksheets, mainly for the follow-up lesson, the checking of teacher-children ratios for a visit outside the school, the drawing of a simple map to show the route taken, these all take time, but are worth the extra effort involved. For the actual lesson itself, little instruction is required. The children are given a blank sheet of paper, a pencil and preferably a hard backing board. They are told to write down on the paper any items of information they observe. Observation, of course, covers not only what can be seen, but also involves the use of other senses such as touch, smell, hearing, although the vast majority of the information they collect will be visible to the eyes. In the recommended form of the lesson teachers are

advised to give as little help as possible; it is of course at their discretion to ignore this, but the thinking behind the recommendation is to allow the children to find for themselves some of the difficulties of information collection in a completely unstructured way. A more structured method of information collection is completed in the following week and hence the children can then make comparisons. Some children will of course see the problem more or less immediately and take steps to overcome it in the first visit. Others will be somewhat confused, and herein lies a danger of switching them off the course for the future. The teacher is treading a thin line in deciding the amount of information to be given to the children, but in general, if we wish the children to experience the problems of information collection and perception, it is intuitively desirable to give them as little help as possible in this first exercise. The following lesson can be used to sort out the problems and to revise the experiences.

Lesson 3 will probably involve two sessions but it can be curtailed, and has been so treated at Yateley. The whole objective of this lesson is to make sense of the exercise carried out in the previous week and to consolidate the insights which have not yet been made explicit. In effect the lesson divides into three sections, beginning with a short discussion on why (or if) the children had problems last week. Sheets I/T/12 to I/T/16, the teaching notes for this exercise, outline some of the answers expected and describe the activities involved in the rest of the lesson. In particular, sheets I/T/14 to I/T/16 make points for discussion between teacher and class in the final session of this lesson. Before this occurs however there are two more visits to the study location, the first to complete a structured information finding exercise using question sheets and the second to examine one item of information in that place. The point of the first exercise is to reinforce the activity of the previous lesson and to add the new dimension of structure to its implementation; this makes more explicit some of the concepts learned but not consolidated previously. The second exercise enlarges the concept of detail and helps lead into a discussion on sources of information which gives more purpose to the practical exercises in the module. The first draft of the teaching notes did not enumerate the specific points which could be made. Experience has however shown that teachers require a memento mori of this kind to help them in their discussion work.

The last lesson in module 1 is another film. For this, the 'Information

Machine' or the 'Question Tree' is recommended and several sheets of questions have been drawn up as teacher support material. Pages I/P/14 to I/P/17 in volume 2 deal with the former film while I/P/18 to I/P/23 deal with the latter. The questions are not exclusively about details shown in the films; some ask what the childrens' opinions are about questions raised in the films and others require surveys and exercises to be carried out in the classroom. The main purposes of this lesson are to round up the concepts learned in the module and provide an introduction to, and link with, the next module to be taught. If the teacher feels satisfied that all points have been made adequately and is confident that he can provide an alternative link this lesson can be omitted.

Thus, to summarise module 1, the overall objectives are to introduce children to the concept of information as a ubiquitous commodity, to develop attitudes to information which reflect its nature as a personal requirement and as an integral part of life in all its aspects, and to show how organisations, in particular the public utilities, use information to design living patterns without which our standard of living would be much lower. In the course of doing these, children will hopefully gain some new insights into what information is and how it affects them in their own personal environments. The methods employed involve the use of films and visits out to a location near to the school with which the children may be familiar. The results are consolidated in discussions with the teacher and by the use of worksheets designed for the purpose.

4.2.3 Reactions At the back of this narrative are found the transcripts of tape-recorded conversations with the teachers who have been involved in the teaching of module 1. Because they are appendices they have the prefix 'A' before the page sequence number and are easily identified by this. The reader is recommended to study these before proceeding further, since what follows refers mainly to their content and recommendations. Other methods of obtaining feedback were used and these may also be found in the appendix to this part. In particular pages 4.2.A24 and 4.2.A25 are Ray's first notes on the course, and pages 4.2.A1 to 4.2.A4 are transcripts of interviews and lessons given by Steve Ward. These are particularly interesting in that they show the interface between some children and their view of education quite clearly, including the preconditioned ideas of children about what they learn

and what they ought to learn, what is a subject and what is not; the importance of the teacher in motivation and guidance, the formation of attitudes; the need to justify, in tangible and rewarding terms, the learning experience.

The desire, even at the age of 12, to learn 'for a job' is explicitly expressed by Julie, Paul and Sheila in page 4.2.A3. Indeed Sheila, and implicitly others in the class, seems to equate the curriculum with the prospect of employment in the future. However, the context in which the children are struggling to make sense of what they are learning is that of a strange and unidentified subject which has been called 'Information'. It is this which they are trying to identify, to classify and to fit into their experience in the right slot. David is the most articulate and, at the same time, confused about this. He wants to know why what seemed to him to be trivial in the past has suddenly become important. The inn sign, the telephone box, the name of the owner of the public house are not vital pieces of information, he knows that; witness his protestations about 'what you need to know' at the top of page 4.2.A4, in spite of the skilfully manoeuvred enthusiasm and hostility of the rest of the class to him. In fact, at the end of this sequence, it is David and only David who expresses the real reason behind the exercise, whereas the others are rationalising and trivialising the need for information according to their desire to understand the concept, to please the teacher, or to conform with the class opinion. 'If you can sort out the information you need to know you've been taught to learn things better' is as adequate a way of expressing the philosophy of module 1 as any, and these words of David contrast strongly with the more naive, but no less valuable to the individual, comments of Mark ('if you're a cop and you're after him, you'd need to know his name') or Jane ('if something's wrong and you're disappointed in it, you can contact him and he'll pay you or something') earlier. In the event, perhaps this point should have ideally been expanded for a few minutes before passing on to the next point and exercise.

Another aspect which comes from pages 4.2.A1 and 4.2.A2 is the variability of the motivations, or lack of them, of the children in performing these exercises in module 1. Again David, while he is still concerned about the usefulness of the whole thing, is willing to concede that one of the objectives might be to teach him how to think, while Ian has closed his mind to the possibility of any benefit at all accruing from the activity. One suspects, and later enquiry and talk with Ian confirmed this, that this was the mood of the moment for him. Paul's motivation is a personal one. The exploration in

detail of strange territory is interesting to him, but he has not introspected any further about the purpose of the exercise and is unable to articulate about these things. Vicky is of a more romantic nature, willing to participate and enjoy. The enthusiasm of her voice does not come through well onto plain paper, but it was certainly there - she was enjoying herself because 'it was different than what they normally did'. During the course of the interview however she had a flash of insight about the purpose of some of the questions which might have caused her to revise her opinion about their stupidity.

It is on these flashes of insight that much of the module depends. This is why much of the work revolves around personal practical sessions using personal worksheets and consolidates by discussion between teacher and children. It is often proposed too that insights do not come very often to children who are not actively enjoying themselves in learning, whatever their motivation for doing so. The catharsis of pleasure is a powerful learning tool. Thus one question, which occurred frequently in discussion with the teachers, concerned the enjoyment of the children taking part, and, as can be seen from the transcripts, the reply was encouraging.

'Well, they certainly enjoyed their walk round to the March Hare. In some ways they enjoyed last week more than the previous week because they enjoyed having the enormous worksheet ' (Harry Wright, page 4.2.A14)

'They're quite happy with what they're doing and they think they know the reason behind it.' (Jenny Leigh, page 4.2.A23.)

'They enjoyed very much going out and were very much more forthcoming on discussion about how much better it was to actually do something than to sit around and say what the concepts are'. (Sheila Oviatt-Ham, page 4.2.A21).

'Well, it's different to what we usually do. Some things I find uninteresting but I like some of what we're doing.' (Vicky, page 4.2.A1).

The motivations for enjoying module 1 varied. Harry Wright postulates that 'they're doing it because it's nice to get out for a stroll and because 'Sir' is a nice guy anyway' (page 4.2.A14); Steve Ward added the possibility of a 'fantastic game' (page 4.2.A14); and Sheila Oviatt-Ham extolled the virtues of practical methods rather than 'sitting around to say what the concepts are'. (page 4.2.A21). However these are irrelevant when measured against the

practical value of actually completing the exercises. Harry Wright was impressed to the extent that he wanted the slow readers, who normally had remedial tuition at that time, to take part in the information course instead. (page 4.2.A15). Rosemary Trew's less able class at Yateley responded to the worksheets by uncharacteristically wanting to complete them at home (page 4.2.A17) and a similar phenomenon was observed at Henry Beaufort in the length of the lists produced by both Steven Ward's and Harry Wright's classes when asked to note down items of information (page 4.2.A14). Even Ray Cackett's classes, although the point does not come through in the transcript, reacted positively at first to the worksheets and exercises.

The variety of methods employed and the changes in the course made by them is a valuable testimony to the enthusiasm of the teachers involved, and also their initiative. Thus Rosemary Trew, because of the difficulty of taking her classes outside was able to use as a perfectly valid alternative a tree which could be seen from the classroom window (page 4.2.A18), Harry Wright and Steven Ward were both willing to modify the discussion sessions to suit the needs of the children, as in Harry's discussion about the issue of clothes (page 4.2.A15), and Steve's class deliberations about the amount of information given by the curtains (page 4.2.A12). Sheila Oviatt-Ham's class at Yateley improved on the recommended methods by running their own survey on the information of the people who passed the location of the visit; this was spontaneous breakthrough in the carrying out of the recommended exercises.

But what did the children get out of the module for all the enthusiasm they put into it? What did they learn about information explicitly which they did not already know intuitively? As has been stated in the introduction to this chapter there are many points to be made, and six of these are enumerated in the teaching notes on pages I/T/14 to I/T/16. However, these are a comparatively recent addition to the notes and of the thirteen times which this module has been taught, twelve of them were without benefit of a memento mori such as this. Ray Cackett of Yateley was concerned in the first year in getting over two points; the realisation of their untrained powers of observation and the amount of information in the environment (page 4.2.A7). He thought that both were made but was concerned about the length of time it took to make them, and the possibility that this might lead to boredom. There are of course many further points raised by other classes. Apart from Harry's agonies about the amount of information given away by clothes, he introduced

some interesting points about the organisation of information by flowcharts (page 4.2.A12), while Steve was able to make several additional points about the relationship between observation and familiarity (page 4.2.A15), the changes in information as it affected the lollipop lady (page 4.2.A12) and the concept of 'misinformation' (page 4.2.A13). Rosemary Trew seems to have had an interesting discussion on sources of information (page 4.2.A18), which was informative for the children at the same time. It was interesting in this conversation that she was unwilling to take the argument to its more logical end with the children, because 'they might decide what they want to choose'; as a probationary teacher she was very much feeling her way in the classroom situation. Sheila's class, who put more into the exercise by asking questions of passers-by (page 4.2.A21), got 'a tremendous amount out of it', and it is interesting to note that the long introductory session she had with her classes also led to references back later on in the course (page 4.2.A22). Such extra aspects as the need to organise information, the constant library analogy and the information explosion are good examples of how to make use of local conditions to modify and make course material come alive.

The two lesson evaluation sheets (pages 4.2.A24 and 4.2.A25) were comments written immediately after the lesson was completed by Ray Cackett. They provide extremely useful feedback, written as they were with the scars of the lesson still on him, but these are, in fact, the only feedback sheets of this type obtained. This was mainly because, as teachers became more involved in the activities of each term, they omitted to complete them, either because of forgetfulness or because of a lack of time. Later, it was felt to be an unfair imposition upon their time and goodwill for what was after all for them very much a minority subject. It was interesting to read about the reactions of the children to the first lesson in which the children tried to articulate what they understood by the word 'information', but it also highlights the problems of the researcher in trying to determine motivation, why a particular thing happened at a particular time, or indeed whether it is important in all situations. Why did that lesson go so well? Because the teacher was familiar with the class? Relief at having their fears unfounded? An enthusiasm for minute detail as Ray said? The transmitted enthusiasm of the teacher in a new subject situation? Perhaps it is not important to analyse why the children so obviously took to this aspect of the subject - rather to note that they did so and to make use of the knowledge in future

situations. In the second lesson (page 4.2.A25) some of this enthusiasm began to dwindle, perhaps because of the weather, perhaps because there were too many stopping points (this is taken up again much later in discussion with Ray on page 4.2.A7), or perhaps because of a shortage of things to do between the stopping points. The final point to be made about Ray's comments concerns section (e) on page 4.2.A24. Many teachers do not like the free activity type of session in which children are expected to walk around gathering information for themselves. Certainly Ray was not accustomed to allowing children so much freedom within his lessons and, since he found the situation irritating, it was probably wrong of him to teach in the way suggested in the notes - the notes are not sacred and are written to be interpreted according to the situation in which they are taught.

What were the children worried about in module 1? What, in general did they not like? Ray has several things to say about this in his three sets of sheets. Firstly, he thought the status of the course reflected badly on the extent to which the children were prepared to take it seriously. A non-standard insertion into the curriculum did not have the weight in the children's minds no matter how important it was considered by the teacher, and especially so since it did not figure on the homework timetable. This is perhaps a sad reflection on the over-systematised state of the school timetable and the pre-conditioned outlook of most children, and perhaps their parents. But it is also echoed at Henry Beaufort by Harry Wright (page 4.2.A16) whose children wanted to know whether studying information would jeopardise their chances of obtaining GCE passes, an attitude which is effectively saying that, if it isn't on the standard school timetable and is not examined at 'O' level, it isn't worth studying. Further evidence of this type of thinking was forthcoming later in the course when, in conversation with Harry Wright and Steven Ward, they happened to mention that some parents had complained about the fact that their children were learning about computers and information instead of getting on with their English. The children were not complaining - in fact they were transmitting their enthusiasm to their parents, but the parents were not convinced that 'Information' is the right thing to be learning in schools, and this perhaps could cause some worry among some children.

Another weakness in module 1 is the films. There are two aspects of this. Firstly, the content of the films themselves is too advanced for the children, and secondly, the question sheets to be used in conjunction with them (which

were in fact designed to help sense be made from the films by the children) were too long, too copious and too complex. Ray has many hard things to say about both these aspects, and he says them forthrightly enough in the latter half of page 4.2.A8, and on the whole of page 4.2.A9. Sheila is fairly non-committal about the films but seems to think that some value was obtained from them (page 4.2.A21). Her main worry concerned the question sheets and their effect on the children who, being used to the more traditional use of sheets, thought that they were tests. Harry had personal reservations about the content of the films. He considered the 'Information Machine' film to be 'a bit commercial', and said that it took him three showings before the message came over to him (page 4.2.A11). On the other hand all three of the teachers at Henry Beaufort thought that certain important aspects of the film would get through to the children and they were not willing to see them removed from the course altogether. However, this more reserved reaction might owe something to the fact that the question sheets were not used at Henry Beaufort.

Another of Ray's reservations concerned the vagueness of the concept of 'information' as opposed to the tangibility of the computer as an object for study (page 4.2.A5). In a sense this criticism is related to the place of the course in the curriculum and its status in childrens' minds, since the proliferation of Computer courses in schools over the past few years has at least given respectability to the machine as an object of study. But the problem is a little deeper than that; Ray is saying, and saying with some reason, that children need an object, a crutch, to enable them to support the new concepts in their own minds, and to enable them to place them in the right slot, or to create a schema from within their own past experiences. Adults too need this point of reference. One of the teachers who taught the course for the last two terms and was not involved with the teaching of module 1 remarked that it should be admitted that this was a computer course and not what it was pretended to be. This was taken as a serious allegation that perhaps the course was wrongly slanted; perhaps the author's picture of the course was far different from reality. It has certainly made the author very cautious about mentioning the computer when discussing the course with others who are not of the computer persuasion. The difficulty with calling this a course about the computer is that it leads children to expect information about the machine, how it works, the bits and bytes of storage, processing and input/output cycles, and the logical organisation of

the machine rather than the data it processes. It would be wrong to create such expectations and then disappoint them. The problem in calling the course 'information' is that it is a concept covering a very wide field, and as such the children have no single point of reference. This discussion will be taken further in the final chapter which discusses the course as a whole; it has been mentioned here since module 1 is concerned with first impressions and this point was important in creating these in the right way.

Many of Ray's objections have been met in the rewriting of the teacher's notes. His criticisms came at the end of the first year of pilot testing in which very sketchy notes were used, little preparation time given and there was probably an overdependence on his good will. During the following term the whole of the module was rewritten to take into account the experiences of the first year. Thus the number of stopping points on the walk was drastically reduced; at Henry Beaufort it became one location for study, at Yateley it became two at the most. In doing this, one lost the variety of information obtainable by stopping at many different types of location, but one gained immeasurably in what the children were able to cope with, and, as Ray said, the points could still be made. The question sheets which caused so much righteous anger were made optional. As has already been stated, question sheets can be used in several different modes - this has been made much more explicit in the notes so that teachers can now select the questions they want the children to answer. One particular modification is to the six sheets about the 'Question Tree' film. The numbers have been omitted, the caption 'Are there any more questions' has been added to the bottom of each sheet so that it is now something of a game which the children can play as long as they wish to. If they do not answer all the questions the point is still made that there are plenty more which could have been asked. This modification did not meet Ray's objection or with his approval, nor have they been tested in this form because of lack of time. However, further talk and contact with Ray leads to an admission that worksheets of this kind are just not his modus operandi and that there is an emotional element in his objections. We shall discuss later how the use of question sheets has affected the teaching of the course and how children have reacted both favourably and unfavourably to them. In module 1 it has not turned out to be such a problem as in later modules.

The films are still in the notes in spite of the panning they have received

at the hands of the teachers. Their importance within the module has however diminished considerably; they are now optional rather than recommended and a warning as to their unsuitability in some situations will need to be added.

4.2.4 Summary To summarise, module 1 has both strengths and weaknesses. Some of the latter have, at worst, been ameliorated by completely rewriting the module notes. The strengths lie in the amount of enjoyable practical work carried out by the children, and the insights they gain into information by carrying out this work. Both teachers and children rate this module highly in terms of the importance of the concepts they are trying to teach, and in terms of the way it is structured around the child's appreciation of the world about him. None of the teachers had any difficulty in generating discussion from the children - the nature of the exercises produced much material for discussion. In the view of the author it was felt that more might have been done to formalise specific points of interest about information, but to a large extent the fact that this was not done may have been because the written formulation in the teaching notes (pages I/T/14 to I/T/16) was not completed until after the module had been taught.

Transcript of four interviews between Stephen Ward and pupils taking part in an exercise to find out more about the Inn sign near the school.

Background: This exercise takes part in the 4th week of module 1. The children have already spent one week discussing what they mean by information, and visiting the corner near the school, at which they have collected some information in both structured and unstructured ways. The previous week they answered a sheet of very detailed questions about various aspects of the corner and the items of information it had to offer. This week, after a short discussion in the classroom they are to take the concept further by asking as many questions as possible about one item, the Inn sign. The interviews concern the childrens' impression of the course as a whole to date.

Teacher: Right, Vicky, what do you think we're doing so far?

Vicky: Well, it's different to what we usually do. Some things I find uninteresting but I like some of what we've been doing.

Teacher: Can you be specific?

Vicky: Well, we don't usually do things like this. We usually do different things.

Teacher: When you say that some of the things you find interesting and others not, can you tell me what you mean?

Vicky: Well, some of the questions are a bit stupid, really. A bit obvious really.

Teacher: For example.

Vicky: Well, what's on the manhole covers (pause) well, that's actually quite a good question really, 'cos you don't always look at them to see what the writing is.

Teacher: Aha. Good, thank you. Ian, can you tell me what you think of it so far?

Ian: Well, I don't really like it very much, 'cos I think it's boring.

Teacher: OK. So what's boring about it?

Ian: Well, I don't think I'm learning anything much.

Teacher: You don't?

Ian: No.

Teacher: Can you think of a way in which it can be made more interesting?

Ian: No, I don't really the whole subject.

Teacher: You think it is a complete wast of time?

Ian: Yes.

Teacher: Can't you see any application at all to learning?

Ian: Mm, I did think so, but I've forgotton what it is.

Teacher: You can't remember it at all?

Ian: No. Not now.

Teacher: It's not taught you anything more about information?

Ian: I don't think so.

Teacher: OK. Paul, what do you think about what you've been learning?

Paul: It's quite interesting really sceing as I live at Worthy Down and don't come to Harestock very often. I'm learning things about it.

Teacher: You've learned a lot about Harestock?

Paul: Yes.

Teacher: OK. Has it taught you anything about how to learn a lot more about other things?

Paul: Mm. Well, in some ways, yes.

Teacher: What ways?

Paul: Well, that's hard to say.

Teacher: David. What do you think of all this so far?

David: I don't mind.

Teacher: You don't mind?

David: No.

Teacher: Have you got any opinions about it?

David: Well, it won't do you much good just talking all about a sign post, does it?

Teacher: Do you think we're actually trying to teach you all about a signpost?

David: Yes.

Teacher: Why do we want you to know all about it?

David: So I can learn to think?

Teacher: Right. So it's not just about that signpost is it?

David: No, I suppose not.

Transcript of part of a lesson given by Stephen Ward at
Henry Beaufort School, September 1974

The following extract begins after five minutes of discussion during which time the teacher, Stephen Ward, has talked about what has been learned about information during the visit to the corner near the school on which the children answered a wide variety of questions.

Teacher: OK. So have we any comments about information?

Julie: Well, you don't need to learn information - not like Maths or French, for a job. It isn't needed, is it?

Teacher: Why isn't it?

Julie: Well, it's just not, is it - you don't need it?

Clive: Well, you need information to do things.

Teacher: All right . . .

Paul: Knowing about the Inn sign doesn't help you does it?

Teacher: Knowing about the Inn sign doesn't help . . .

Paul: No, not really.

David: When we learned about what the Inn sign said or about the telephone box, it didn't really help us did it?

Teacher: I don't know. You're telling me.

Paul: If I go out and get a job, I'm not going to need information am I?

Teacher: Right?

Sheila: If you're going to be a Traffic Warden you need that sort of information, 'cos you need to know you're not allowed to park and things.

Teacher: Right.

Jim: We know that already. We don't need to know (lots of voices).

Teacher: One at a time.

Sheila: Not everybody knows though.

Teacher: Not everybody does . . . but how do most people know that double yellow lines mean no parking?

David: Because if you want to drive a car you have to learn the Highway Code.

Teacher: You've got to learn the Highway Code. How do you learn the Highway Code?

David: From a book.

Teacher: So what's learning the Highway Code from a book?

Vicky: Information.

Various voices: Information

Teacher: What is it?

All: Information.

Teacher: David?

David: Oh, well, yes (laughter)

Mandy: Telephone number gives you information.

Teacher: A telephone number gives you information

Mandy: Yes, and the man at the pub, he gives you information.
(General murmurings)

David: You don't need to know. You don't need to know his name.

Teacher: Well, one of the questions was his name?

David: Yes, but you don't need to know his name. That's what I'm saying.

Teacher: Why might we need to know that gentleman's name? Let's think of as many reasons as we can for wanting to know the gentleman's name.

Ivan: Well, to go and ask him what sort of drink he sells.

Teacher: Do we need to know his name?

Ivan: Yes.

Teacher: Why?

Ivan: Well, you have to address him properly.

Teacher: Good, to address him properly.

Jane: If something's wrong and you're disappointed in it, you can contact him and he'll pay you or something.

Teacher: Right. We would want to complain to him.

Joan: I'd rather know his name than call him sir.

Teacher: Right. So would I.

John: That's be a bit rude, saying that.

Teacher: Aha?

John: And if you wanted to write him a letter, you wouldn't know what to call him.

Teacher: Right. Write a letter . . .

Mark: If you're a cop and you're after him, you'd need to know his name.

Teacher: Right. If you're a cop and you're after him you'd need to know his name.

Jenny: If you need to phone him up

Vicky: If you need to phone him up . . . If somebody wanted to phone him up someone else answered, you'd need to ask for him.

David: What's the use of knowing his name, because I wouldn't need to phone him up or write a letter or anything if he is a crook.

Teacher: Right. Now can you see any connection between answering obscure questions like who is the landlord at the March Hare, what's written on manhole covers and where do we get Luncheon Vouchers from . . . and learning?

Alan: They're all information.

Teacher: They're all giving us information.

David: If you can sort out the information you need to know, you've been taught to learn things better.

Teacher: Right. That's a fair point. Can we classify information? . . . Write down what sorts of information there are. Make labels for it.

Two minutes was spent on this exercise. The children then read out their lists - about 30 classifications in all, such as intelligence information, wrong information, bad information, misleading information, etc. The teacher then asked the children to put up their hands if before the lesson they had thought that there were so many different aspects of information. None did so.

Transcript of a conversation with Ray Cackett of
Yateley School, July 1974

Background: This recording was made at the end of the first year of pilot testing at Yateley. Ray Cackett had taught the course to three second year House Band (more able) classes, one class per term during the year. Each time he started with module 1, which this transcript covers, and went on to teach other modules as they were provided for him, in some cases on the day of teaching.

NL: At the very beginning we had a few talks about the information concept so that the first module we more or less developed jointly. You've taught that three times now and I feel that perhaps it went over better than the others. Do you?

Ray: Mm. Again I'm not sure. The first time you're unfamiliar with the material and tend to teach it strictly according to the book. The second and third time I knew what was going on and had more time to judge the reactions and what the kids felt about it. I think that some sort of introduction like you've got is essential. I think it may be a bit drawn out, that's the only point. I'm not sure that there is three week's worth of material there. I'm not saying that what's down here wouldn't take three weeks - I'm just questioning whether three weeks is necessary to get over the points being made. It seems to me that three or four major points are being made and, especially with House Band forms, there is some repetition.

NL: I'll accept that, but I don't really see how it can be done in less time, the way it's done at the moment. The first week there's the discussion which we've agreed is absolutely essential, the second week is the walk, which we've already cut down and still takes a whole lesson, and the third is the revisit to hammer home the points. Perhaps the ideal way would be to devote a whole afternoon to the first part, discussion and walk, so that you're not dragging it out over a period of weeks.

Ray: Mm. That's a problem, the resume at the beginning of each week. It is quite a long time, as opposed to other lessons which are taught two or three times a week and there's more continuity. And you really have got problems if someone's absent one week.

NL: I've got reservations about the first week. It's a long time for a discussion. I think possibly it needs a film at the very beginning.

Ray: Yes, I think both Andy and I have mentioned the problem of building up rather than taking a whole. For instance getting them immediately interested in the computer as a whole. Your approach is obviously to build up, not mentioning the computer for four or five weeks. It doesn't tend to have just one thing to draw their attention in the first two or three weeks, does it? Something to hold their interest.

NL: Yes. If we billed it as a computer course that would be false anyway. It's not a computer course; the computer is just one thing that handles information.

Ray: I know.

NL: Perhaps one of the difficulties is that the children haven't had anything like this before and they want something to grasp on to - something with a handle like Geography and History, where they know what it is.

Ray: I don't think it's just classifying it. It's just amorphous at the moment, loose, they don't know where they're going - which is intentional on your part - but

they don't like it.

NL: No they don't.

Ray: And when they don't like something they tend to lose interest very quickly. Unless they see what the objective is pretty soon then they think what's the point in going on.

NL: Do you find that when you do eventually get something specific, this feeling remains? They've already rejected the course?

Ray: Yes. I think the initial impression is very important indeed. The first lesson is probably the most important of all. If I were looking at a TV series I'd feel the same way.

NL: That's a good point. So perhaps instead of jumping straight into a discussion session we should show a film, which would focus in on the discussion which follows. And also introduce at the very beginning an introductory five-ten minute teaching session on what the course is about, mentioning that we are going to look at information in different organisations, and how the computer handles information, and that we're going to look at the computer, perhaps do some programming ourselves, perhaps bring a terminal in.

Ray: Yes, but what you're doing is telling them that they're going to enjoy themselves - they're not particularly going to respond to being told that they're going to enjoy themselves, because all you're doing is talking to them.

NL: Well, I did say a teaching session, so that you are trying to get them to tell you that this is what they would like to do. For example, if it were possible to bring in a terminal, what could we do with it?

Ray: Yes. I think that next year the circumstances will be better. It's time-tabled for a whole year and there will be homework set, and the prejudices of the kids against the subject will be overcome. At the moment, five or six in every group resent having to do it at all - they don't like being taken out maybe, or resent doing homework that isn't timetabled.

NL: It seems just a fill-in at the moment then? They could be doing nothing and enjoying it?

Ray: That's probably a good point. They're not in the right frame of mind before they start.

NL: Perhaps we should present it as being more exciting. Something new, something interesting.

Ray: The problem is how.

NL: I think possibly a film in the first week will help. I don't like the idea of mentioning computers in the first week, but if they need to fasten on to something, we could try an experiment a) in doing it and b) not doing it to compare results.

Ray: Yes. OK. I think they do need something to grasp on to - impact I suppose is what we're after in the first week.

NL: Yes, and this impact is what would have to be repeated at say monthly intervals - boosted.

Ray: Yes. Otherwise you get the law of diminishing returns operating.

NL: Well, that impact boost corresponds with the timing of the modules. We should look closely at how we teach the first lesson in each module. What

about going into the environment on the walk? We had two objectives, to improve observation and increase the appreciation of information. I think the first one is well dealt with.

Ray: I'd agree with that. That's the major point I've got from the lesson when I've been teaching it. Their untrained powers of observation were minimal, and even if they were trained it would still be bad. They took that point very well. The other point is more difficult. The amount of information in the environment. I think they get the point - perhaps because it's so obvious.

NL: Yes. Like the youngster I drove back in the car from the visit who said that he's quite content to take things for granted.

Ray: Yes. He didn't want to be taught about things he could see for himself. Which maybe leads back to the point that it should be cut down or shortened, devoting an hour to the two points that observation is bad and needs improvement or training, and that there's a lot of information around us.

NL: It may also be worth while devoting the two lessons to the one point. As a Geographer you are presumably interested in improving observation, and if the other point is made as a natural concomitant of this, well and good. Another possibility is to have these lessons later on in the course - perhaps the children object to being highly organised so early in the course.

Ray: No, I think it's in the right place.

NL: Do you think perhaps it should be followed up later on at the end of the course, or a term, with a slightly different set of objectives? For instance - trying to make sense of what they see.

Ray: I don't think there's really room for two visits.

NL: In a full year's course?

Ray: Well, there could be some sort of continuous observation task throughout the course, but it would have to take different forms. But the walk as we have it is far too long - two stopping points is enough. (There were four).

NL: In fact, one would probably be enough.

Ray: Yes that saves them repeating the same task over and over again, which they get irritated about. I'd much rather take them out for a short walk - say twenty minutes - and then an immediate follow-up. It saves the time lag of a week.

NL: Yes. I take that point. It would be better if it were that or a full afternoon.

Ray: There are practical problems to that. Yes, I think that training in observation is a valid objective throughout the course.

NL: Yes, but we're not making any point about the organisation of information which is what most of the rest of the course is about.

Ray: Yes. And that's where the link with other subjects comes in - organisation of information is what the other subject try to achieve. Where do you start with that?

NL: Well, we start really with the Headmaster Information System - module 2.

Ray: I think you start before that with the classification exercise in module 1.

NL: Oh yes. That's just a preliminary look at organisation and sources. Does the point that information can be organised get over very well? Or is it just an exercise which they go through at that time?

Ray: Well I don't think the point was made very well when I've been teaching it. I don't think they've realised that I've been trying to make a point about organising types of information into pigeon-holes, if you like, or classifying it. I don't think they really appreciated it. I think they know what classifying is, such as words relating to human beings or inanimate objects into sets - but they probably don't realise that what they are doing is organising information.

NL: Well, that's a point we're making but not very forcibly at this stage isn't it.

Ray: Yes. Now the film's at the end of that one isn't it, and I'm not sur that it need be there.

NL: The films don't relate specifically to that point, but I think they're valuable for the kids to see.

Ray: Mm. But at the moment they're being looked at in isolation. They haven't been an integral part of the module or the lesson. They just come in the last twenty minutes or so and are looked upon as a separate unit in themselves.

NL: Well. That could be of course because they haven't answered the questions.

Ray: Yes, and there are reasons for that obviously because there are too many of them.

NL: There are two points there - either there are too many questions for the kids to answer, or too many just in the time available.

Ray: I'd say there are too many questions, full stop. 48 questions on one sheet - you couldn't expect any child of any age in this school to answer so many and keep interest.

NL: Yes. You can of course treat the sheets in several ways. As questions to answer by the child all on his own after he has seen the film, or as a crib for the teacher on what was in the film - points to talk about.

Ray: Pictures are easier to talk round from the teacher's point of view. If they're all looking at a picture rather than having to read a paragraph they have it in the background all the time.

NL: Yes, I'll work on that then.

Transcript of tape-recorded conversation with Ray Cackett of
Yateley School on 16.7.74

Background: This is a part of the conversation begun on page 4.2.A5 and covers Ray's attitude to some of the methods of presentation of the course, in particular the use of question sheets and the need for more visual presentation.

NL: Of course that could be because they haven't used the question sheets.

Ray: Yes. And there are reasons for that - obviously because there are far too many of them.

NL: There are two points there. Either there are too many questions for the children to answer at all, or too many in the time available to them.

Ray: I'd say far too many, full stop. 48 questions on one sheet - you couldn't expect any child of any age in this school to answer so many and keep their interest.

NL: Yes. You can treat the sheets in several ways. Either as questions to be answered all by himself by the child after he has seen the film, or as a crib for the teacher on what was in the film - points to ask about.

Ray: Personally, I'd prefer to have four or five main points with a sixth one as the real thing, what you're trying to get through. I'd find it a lot easier to use. I prefer to have an oral question and answer session than getting them to fill in forms. There's probably too much of that in the course as a whole. I don't like the technique.

NL: Yes. I'm a bit concerned about the number of forms for the children to complete, but it is one way of getting over to people who aren't familiar with the material new information. Whereas it would have to be written out for the teacher to learn beforehand, this way the kids learn themselves. But these forms don't have to be answered word for word. There are several ways of treating them.

Ray: Yes. I see the practical problem. I just query again the interest that these arouse. I get bored filling in forms and the kids probably do as well. If you can break it up - the number of questions on a form is going to take a considerable time - into say ten minute blocks, each module or unit. These question sheets take a quarter of an hour or twenty minutes, that's too long for one exercise. And replace a lot of questions to five or so. These could then be integrated with a discussion. It would make it a lot easier and I think more interesting.

NL: Yes. Point taken. But there are other teachers who perhaps don't have the same relationship with children or don't necessarily know how to discuss things with kids. They might need the help of question sheets.

Ray: There's a danger of it becoming too much like a correspondence course and less like a lesson. Generally speaking, correspondence courses are pretty boring things It could be a personal opinion. I'd be interested to know what the others think.

NL: Perhaps what is needed is some additional discussion notes for the modules. That gives the teacher the choice of using either the discussion method or the forms.

Ray: Yes, the problem with discussion is that you don't know whether the kids have taken it in. At least with the forms you can look through them and have some check on what they have done.

NL: Yes the forms themselves are designed to act as teaching media. They're not just for answering questions, in the same way that Programmed Learning texts use a fairly logical approach.

Ray: No. I think it's a very good approach - for a correspondence course. I don't think the kids are old enough to appreciate it.

NL: They don't enjoy using them.

Ray: No.

NL: OK. That's a final a test as you'll get.

Ray: I'm not sure why. I don't want to condemn them without good reason. Whether they find them boring or too long or its just a general dislike of the whole approach I don't know. The work cards we use in Geography lessons can't be used as a record of the lesson and they last a long time. They tend to consist of a photograph or picture with four or five questions about it. They answer them on a piece of paper or in their book.

NL: Presumably they're more attractively presented.

Ray: Yes. There's quite a lot of visual presentation about them. You could do with some visuals to split it up - some little diagrams or pictures. A sixth form text book differs from a second form book, apart from the language, in the number of pictures in it.

NL: We want a few more pictures in the whole course don't we?

Ray: Yes we do. More visual presentation to make points. It puts up production costs I suppose.

NL: Well it's not only that. Sometimes it's difficult to get hold of the right pictures. For example with the Transport and Road Research Laboratory we do use pictures, diagrams and tables. But with the Headmaster Information System there's no point in showing a picture of the Headmaster's study.

Ray: You could put up a picture of the accident in module two, and other main points.

NL: Yes indeed. That could be presented as a slide sequence couldn't it? This would help them form a better mental picture of the problem.

Ray: I think the lack of visual aids so far is a result of the lack of time rather than anything else. We've discussed several ideas for pictures before but we haven't got round to it.

NL: We had one in mind for a Yateley crime as part of the Police Module. The slides of TRRL still don't exist.

Ray: Pictures are easier to talk round from the teacher's point of view. If they're all looking at a picture rather than having to read a paragraph they have it in the background all the time.

Transcript of a conversation between Norman Longworth,
Harry Wright, Steve Ward and Jenny Leigh at Henry
Beaufort School on 13.9.74.

Background: This was recorded after the first week of teaching the course at Henry Beaufort School. Harry Wright and Steve Ward were involved with the teaching. Jenny was present as an observer with comments to make about the film which had been shown, 'The Information Machine'.

NL: Well, how did it go last week?

Harry: Only just started. I showed them the film and we had a little natter about information - trying to define a few terms and that sort of thing. Am I right? I was going to start off by talking about information in the classroom and then we were going to go down to the March Hare. I'll ask them to record what information they can find, supplying them all with a piece of paper to write it on. Right?

NL: Right. The object of the film at the beginning is to set the scene and generate a bit of impact.

Harry: On Monday night we all stayed behind to look at the film just to keep a step ahead of the children.

NL: What did you think of it?

Harry: Well, I found it a bit commercial - it seemed to be largely directed at the idea of selling computers. Implicit in it was the idea that computers are God's gift to the twentieth century man.

Jenny: It was quite fast too - some of the language was difficult.

Harry: Yes. Also there were many places where it had been spliced inadequately and this broke it up.

Steve: Yes. I found it a bit difficult to follow.

Harry: By the time I saw it the third time I was beginning to catch on. I saw things I hadn't seen before.

Jenny: I found it quite amusing in spite of its faults - it would certainly keep their attention.

Steve: From a visual point of view.

Jenny: From a visual point of view, certainly.

NL: But perhaps the message of the film didn't quite get over

Harry: Well . . . I don't know.

Jenny: Little bits would have done. For example about information going in all the time.

NL: One of the interesting points in the film was immediately after that sequence - where the ideas were drawn across the screen in lines so that eventually the screen was completely filled in - indicating that there's a lot of information about.

Harry: Yes. I think that message came across pretty clearly.

NL: Well, if that message at least got over it doesn't matter whether they knew it in detail, Steve, have you done the first part of module one?

- Steve: Well. What I've done is to show the film and then had a discussion on information with the children. They made a list 'Information is . . . ' for homework they had to complete the list. Some of them have come along today with a list of 70 or 80 items. While some of the items carry on from each other, a lot of thinking has gone into it. We went on to discuss what in the classroom gives you information and we got some interesting things - including an argument among the children about whether curtains give you information or not. When we discussed whether the curtains would give the information 'red' if they weren't there, we got one or two insights into information. I'm learning as much as the kids in this exercise. Then we went on to something else for the benefit of those who were getting open-mouthed and starry eyed and then repaired to the March Hare and collected some information on the corner.
- NL: You've actually done that?
- Steve: Yes. I asked them to find as much information as they could. They all said 'What sort of information?' so I said 'As much of it as you can.' They all tackled that in their various ways according to ability, motivation, etc. Some of them found a lot about the March Hare while others wandered about in different states of intellectual and pseudo-intellectual participation. At that time too the lollipop lady arrived and they noted that down - that was a different sort of information.
- NL: Yes. In your follow-up you can use that to make the point that some information changes and some doesn't and that there are fast and slow changes - for example the arrival of a bus as opposed to the change of ownership of one of the shops. That seems to have come over fairly successfully. Did they tackle this enthusiastically without being given too much information?
- Steve: Yes. But they were perplexed by the film. One of them called it 'that silly film' and some of them were frightened to be called a dunce if they didn't understand it. But on the whole it went well.
- NL: Could it be that some of them were asked to think in unfamiliar ways? And they don't want to be asked to do that too often?
- Steve: Could well be. Yes.
- Jenny: I think this applies to anybody. When you've got to plan something the hardest task is thinking and planning what you've got to do - the actual physical preparation isn't so bad.
- Harry: Quite. The satire on the flowchart in the film reminds me that I'm doing some of this with my fourth years. In literature, suppose they have to find out something about Charles Dickens. I said 'You open the Library door - now write down a step by step account of what happens next'. They found it quite difficult to do.
- NL: Yes. Flowcharting is a thing that crops up again later in the course. Steve, in the notes for the first module it said that one of the objects is to get to a definition of information. The temporary definition is that if there is a question to be asked one or more pieces of information can be given in reply.
- Steve: No I haven't done that yet. I thought I'd keep that over until after this homework.
- NL: Yes. It's a point that can well be made in conjunction with the questions

you ask, isn't it?

Steve: Yes. The interesting thing is in teaching a mixed ability class. There are different levels of understanding. Some of them want to pursue questions like 'do curtains give us information' . . .

NL: Which ones. Higher or lower ability children - or does it not matter?

Steve: Well, I found that the higher ability children wanted to pursue that line of enquiry - the lower ability ones said 'that's daft' and rejected it, instead of accepting and advance further.

NL: Is it also a matter of personalities? - in that some of the children feel that whatever some others say is going to be daft.

Steve: That's not a question I could answer just like that. I'd have to think about it.

NL: Any improvements you can think of to date? Would you normally have tackled this topic in this way if you had been asked to achieve the same objective?

Harry: I think I would have done some of the things - but rather more dealing with written information. Signs and symbols and getting children to go out in the same way to look at traffic signs and all sorts of direction signs. I might not have seen the wider implications and certainly wouldn't have thought of manhole covers.

Steve: I wouldn't either. Something which interests me is not only 'information about' but 'misinformation about' - for example the old school sign which encouraged some children to believe they could run across the road.

NL: Yes. That's an interesting point and abuse of information does crop up later in the course

Transcript of a conversation with Harry Wright, Steve Ward
and Jenny Leigh at Henry Beaufort School on 27.9.75

- Background: This recording took place two weeks after that which starts page 4.2.A11, after the teachers concerned had taken the children out to the corner outside the school more than once. Harry Wright is teaching a second year mixed ability group for three periods a week on information, and Steve Ward is teaching a similar group for two periods a week. All lessons on information take place under the the 'English' label.
- Jenny: What's the response like from the children? Are they enjoying it? Do they look forward to the lesson?;
- Harry: Well, certainly they thoroughly enjoyed their walk round to the March Hare. In some ways last week they enjoyed more than the previous week because they enjoyed having the enormous worksheet with lots of little questions. We spent just about an hour and in that time all the class except for one or two very weak brethren who only read and write very slowly managed to fill in all the answers in the time available.
- NL: In an hour?
- Harry: Yes, in an hour. I was surprised by this group when I looked over their rough notes the week before. I don't know whether I had unconsciously given any hints but they had got a tremendous amount of information down. One of them mentioned 96 pieces of information collected. Admittedly some of them were repetitive. For example some of them had noted every card in the newsagent's window.
- NL: And that's something I had missed.
- Harry: Well, it didn't matter. Some of them tried to short-circuit things by coming to ask me where they would find the answers. They asked 'What does this mean?' and I just wafted them away or said 'Use your eyes' or 'think'. They certainly enjoyed the practical expedition. No-one has said anything but I have a feeling that some of them are a bit bemused about what it's all in aid of. They're doing it partly because it's nice to get out for a stroll and secondly because I'm a nice character and 'Sir says'.
- Jenny: Perhaps it will become clear later.
- Steve: This is true with my form too. Several of them are thinking this is some fantastic game we'll be playing in the future. They're not quite sure why Mr. Ward has concocted this enormous worksheet but we'll go along with him because it's fun to do. There are various levels of approach and therefore various levels of understanding and one point which we made last week on location which was very interesting was the various levels of information one had, in that suddenly orange, red and blue stickers appeared. And we could ask the question about what information is here this week which wasn't here last week. And all the other things we noted too in the way of changes, such as the price of washing at the launderette and prices in the shops. They were very quick on to that.
- Harry: The biggest thrill my class got on that point was that, on the bus stop when they were there, was a pair of knickers.
- NL: Yes. They're still there, and I didn't include them on the question sheet

because I didn't know how long it would be before they were retrieved - or whether they are a permanent feature of Harestock bus stops. So really now we want some follow-up talk which sorts the whole thing out for them?

- Harry: Yes. Can I make a general point here. One of the big dangers with so-called discovery methods is that children don't know what it is they're discovering, and we need some end-product in mind. You might discover other things in the process of discovering - but most discoveries are not made by accident.
- NL: Yes. That's a point to be taken up in discussion.
- Harry: While I remember, can I make another small point? We have a number of slow readers in the class who normally go for extra remedial lessons. I've decided that I'm going to keep them with the group because there's an awful lot of this work which I think they can benefit from as much as the other kids in the class. And they do seem to be getting as much out of it as the more able. They're not perhaps doing quite so much because of the physical problems - but they're interested.
- NL: Did you make this point, Steve, about what the place might have looked like before there were houses? The fact that electricity and gas signs etc. are indicators of the needs of people - the physical landscape super-imposed on the natural landscape.
- Steve: We haven't gone into it in that sort of detail but we have considered it.
- NL: One can take that concept further into the Public Utilities field by saying that the Gas, Electricity, Water Boards, etc. which leave their information on the manhole covers, will also have that information recorded on their files somewhere. Perhaps it would be better if that sort of point were made more explicit in the teacher's notes. I intend to do that. What about the Inn sign?
- Harry: I'm going to do that this afternoon. If it continues to rain we have problems.
- NL: Well. An alternative is to take something they can see through the window and do the same sort of exercise.
- Harry: Yes. OK. I might do that. Another point. We got sidetracked on the issue of clothes and the information they give about people. They got quite interested in this in looking at each other round the class. Things such as the boys' blazer badges - what did that tell you? - and the quality of the cloth and all kinds of things about personal appearance.
- NL: Certainly if it gets children to look more closely at things like that, that's what we're looking for. But obviously, this can be a little dangerous if it makes distinctions you don't think are appropriate.
- Steve: A point we made last week and reinforced this week was the number of children who habitually walk past the shops every day, and strangely enough those who didn't, observed more than those who did. Which amply justifies the point that we ignore most of what we see.
- NL: That's an interesting point to be included in discussion.
- Steve: Certainly only those who pass on occasions tend to observe more.
- Jenny: Is this just observation with the eyes?

NL: No. This is a specific point to be made. The use of aural, and other senses are also important.

Harry: A bus came by while we were there and I asked them to analyse when we got back the things which told them without looking that it was a bus. They trotted off quite a lot of reasons.

NL: Good. OK, so it seems to be going down well with the children then. Apart from the fact that they just enjoy going out, the only real drawback you see at the moment is that they don't quite see why they're doing it.

Harry: Yes. They're not quite sure what it's leading to. No-one has asked if it will make my 'O' levels better. This is an advantage of doing it lower down the school. If you start doing this with fourth years for example they're going to start saying this will mess up my chances for a degree.

Steve: And they're very receptive to new ideas.

NL: How do you think we can make it more meaningful? Or should we?

Harry: I don't know whether we should at this point.

Steve: We don't need to do this until the end.

NL: It's certainly within the spirit of the module anyway that kids may be confused, and there's a slow process of sorting things out. We're not trying to teach them anything concrete at this stage - just getting them to use their eyes and see what's about them. We could make five or six specific points about what they've seen and how it fits into their experience. But in a sense you've made those anyway, and in different ways.

Harry: Quite.

NL: And once we come to module 2 things will focus in on information systems . .

Transcript of a tape-recorded conversation with Miss Rosemary Trew of Yateley School on 17.10.74

- Background:** Miss Trew was a probationary teacher at Yateley School. Her involvement with the 'Information' course was imposed by the timetabler and she had no opportunity of examining the concepts or commenting on the course before she arrived at the school at the beginning of September 1974. She was put in charge of two colour band (less able) classes for one 55 minute block each per week. One of these classes also presented some severe discipline problems, not only to Miss Trew but also to the more experienced teachers in the school. As a probationary teacher she was not able to take the children out to the corner by herself - to arrange this would have involved a revision of the timetable and the loss of free periods on the part of other members of the staff. Thus module 1, which this conversation covers, was not taught in the recommended manner. Of the four or six visits which should have been made only one was actually completed - one of the classes had no visit at all.
- Rosemary:** I have two classes, both colour bands, but one is obviously brighter than the other. They read and answer the questions better and provide much more interesting answers. They're able to think about the questions more deeply.
- NL:** React more positively too?
- Rosemary:** Yes.
- NL:** Has there been any change over the last three weeks - for instance has the class which wasn't reacting improved?
- Rosemary:** Yes. Some of the ones who weren't reacting are getting a little more interested, and getting to know what is expected of them. They were a bit vague at the beginning of the course.
- NL:** Did you take them out to the corner?
- Rosemary:** I took one group out.
- NL:** Could you take them out for a follow-up.
- Rosemary:** No, it's taking someone's free period to do that. But they were quite attentive when they did go out. At first they couldn't think of any questions to ask, but when you prodded them they responded and afterwards they found a lot more questions for themselves, and became a lot more interested. There wasn't really time to cover everything. You could go out for three or four weeks and still find things to do.
- NL:** Yes, you can do that, but it loses its purpose if you do it too often. What about the general questions about the corner? Since you didn't go back, did they manage to answer these?
- Rosemary:** Yes. Some of them wanted to take the question sheets and answer them for homework - some of them did and brought them back completed. And this happens with the other question sheets we've been using; if they're not complete during the lesson they want to take them home and finish them off.
- NL:** That's encouraging.

- Rosemary: Yes, but that's with the more able group. The other group isn't so keen.
- NL: What about the questions on the Telegraph Pole? Did they do them?
- Rosemary: We didn't do the telegraph pole, but we did take a tree and asked quite a number of questions about it. They were quite amazed at the number of questions you could ask about it - and then they got worried because they couldn't answer a lot of them.
- NL: Did you try to put their worries at rest?
- Rosemary: Yes. We discussed it by saying where we can find out - places like libraries. They were quite interested to know that you can go to places like Post Offices, write to firms and go to museums.
- NL: Sources of information.
- Rosemary: Yes. Sources of Information.
- NL: Did you make the further point that we're not expected to know everything?
- Rosemary: Yes. And we discussed it by saying where we can find out. Places like libraries. I said that we can never know everything anyway.
- NL: Did you mention that we're perhaps in a position where we can choose what we need to know?
- Rosemary: Do. I didn't put that point over very strongly!
- NL: Because it would be dangerous?
- Rosemary: Yes. They might decide what they want to choose.
- NL: What about the 'Information Machine' film?
- Rosemary: Some of the ideas in the film weren't portrayed very clearly. It's obviously difficult to get a film structured to exactly what you want. But I think they got the idea quite well, especially the point where it showed how we take things in and assimilate them and are able to use them at a later time. They got that idea.

Transcript of a conversation with Ray Cackett of Yateley School on 17.10.74.

Background: At this time Ray Cackett was by far the most experienced of the teachers involved in the Information Course. He had taught module 1 , which is the subject of this conversation, three times in the previous year to House Band (more able) children, had had a hand in the development of the module, and helped to modify the content because of his previous experiences. This year he was trying out the material on a class of second year colour band (less able) children, and had previously expressed the opinion that he didn't expect much in the way of results.

Ray: Both the films ('The Question Tree' and 'The Information Machine') are in my opinion much too advanced for the groups they are being shown to. In both cases they were bamboozled - they watched them for the first five minutes but even the pictures didn't hold their interest. They lost complete interest because they didn't understand it - the language, the method of presentation, the visuals. They're just not usable with kids of that ability.

NL: Not even points out of the films? For example the man walking along the beach registering things?

Ray: I'd be very doubtful. You can't take a point out of context. If you take a point like that you've got to show them the bit before to get through to it. They turn off.

NL: What about the question sheets? Did they help?

Ray: I tried very hard with the question sheets, especially in the 'Question Tree'. It took the rest of the lesson to go through the first four questions. I read each one carefully and discussed what they meant and then tried to help them answer them. OK, they seemed happy enough with that, but directly I said to try the next couple on their own - not a clue! For one thing there are too many questions - its just ridiculous. Even the high ability groups lose interest with 36 questions, I lose interest, don't you? It needs four or five major points and four or five questions. They think this is too much like hard work.

NL: So do we want them to answer them all?

Ray: Whether you want to answer them all or not is irrelevant. If you give them a sheet which looks daunting, they switch off , you've lost the battle. It takes lower ability kids the rest of the lesson just to read the questions.

NL: So they need help,

Ray: It's not just a question of help. You've got just to make 5 or 6 points, they've got to be shorter, more readable and simpler. When I set an examination paper for lower ability groups I put a lot of spaces on it. The question sheets you produce are all tightly packed and even to read them is offputting.

NL: What about the question sheets on the visit? There aren't too many questions there. How did they go down?

Ray: Even these had faults. The lower ability groups didn't know what North-East and South- West meant - you need to put something on which they can orient it to like the tree or the surgery. A lot of them were doing it upside down and working in the wrong corner,

NL: So they needed help.

Ray: Well, they got help because I put them right.

NL: So it's not just a case of offering help - it's a case of whether they are capable of doing it at all.

Ray: Yes and I'm very doubtful.

NL: The lesson that I saw seemed to work - when they were asking questions about the telegraph pole on a sheet. They were asking some very good questions.

Ray: I think some of the things later on get more complicated.

NL: I would have thought that the concepts in the first module are some of the more complex ones.

Ray: The first module is OK for lower ability groups. Not the films, but the discussion groups and walk I would say were satisfactory, acceptable.

NL: The idea you want to get through to them, something completely new to them, is quite complicated and abstract. The other modules contain some things which are much more concrete and understandable.

Ray: Yes. I don't think it fair to make a general statement that the course is too high for them. It's best to get through a couple of modules and then make a judgement. But I'm beginning to have doubts. It's very hard work, let's put it that way, very hard to get any response at all. You have to do it for them and maybe occasionally for some of them a glow of understanding comes over their face but

Transcript of a tape-recorded conversation with Sheila
Oviatt-Ham of Yateley School on 6.11.74.

- Background: Mrs. Oviatt-Ham taught the Information Course to second year House Band (more able) pupils during the whole of the school year 1974/75. Previously she had taught the subject for one term to third year able pupils, and this was therefore her second attempt to teach module 1, which this conversation concerns. She has two classes, one of whom opted to do 'Information' from a choice of four subjects, most of them practical; the other one is a second year class which could not be accommodated in their first choices.
- NL: What about the first module? How did that go?
- Sheila: Yes. They enjoyed very much going out and were very much more forthcoming on discussion about how much better it was to actually do something than to sit around and say what the concepts are. One or two got a tremendous amount of information. They were running about doing surveys on everyone who walked past; on what do you know about this corner and so on - they got a tremendous amount out of it.
- NL: They actually asked some outsiders?
- Sheila: They did. They found a lot of people around who were quite helpful and willing to supply information, surprisingly enough.
- NL: What sort of response did they get?
- Sheila: They got a very good response. They found out when the first Dame School opened on the corner, and all about what used to be an old hospital down there and all sorts of things.
- NL: Which group was this?
- Sheila: Mainly the good group. But both groups enjoyed going out and made a great deal of use of that - they would both like to go out again.
- NL: But there are logistic problems to going out, aren't there?
- Sheila: Yes. Strictly I should be accompanied by a male member of staff, but we managed to get round it.
- NL: If we do have another visit, there would be no point in repeating the exercise. There are other opportunities later in the course to go out of the classroom. For example, Farnborough College of Technology would like local schools to see and use their computer and that will be fixed up next term. They can run some simulations for us and we'll see how the machine works. . . . Although we haven't made much of the computer yet, is it coming through to the children that the computer has a part to play in the information story?
- Sheila: No, not a lot yet. One group saw the 'Question Tree' film the other didn't because of a terrible muddle at the beginning of term. Both groups saw the 'Information Machine' and answered some of the questions; to do it properly would have taken one and a half weeks and there wasn't time.
- NL: It doesn't matter that all the questions weren't completed.

- Sheila: No, I don't think so either. They read all through the questions between the two showings of the film and then answered some of them.
- NL: Some of the questions asked for their personal opinion on some things.
- Sheila: Yes I know. At the beginning some of them weren't quite sure how to approach the course, there not being any homework associated with it and it being a subject they hadn't heard of before. It made them a bit - not suspicious - but wary of it.
- NL: It doesn't have the status?
- Sheila: Well, it was a cross between one or two of them thinking it didn't have the status and the vast majority having great anxiety on being presented with what they thought were tests, filling in forms, questionnaires, etc. 'Is it a test?' was the first question they asked.
- NL: Do they now realise that they aren't tests?
- Sheila: Yes, they do realise that this is just a different way of working. Particularly when the folders are there, that helps. We don't have a book for this subject, we have a folder.
- NL: Yes, and everything that's in it is a record of what we've done on the course.
- Sheila: Yes.
- NL: Do they respond to this sort of approach?
- Sheila: I think so. It's certainly a great deal more successful than it was last term.
- NL: That's good. Do they know what they are doing and why they are doing it?
- Sheila: I don't know. It has been stressed many times, but whether they appreciate what it's all about I'm not sure.
- NL: Yes. Apart from the fact that they are enjoying themselves . . . do they appreciate the significance of what they are doing?
- Sheila: Well. I think in general we had a long and good introductory session which I keep on referring back to - on the necessity to organise information. I've been drawing on the analogy between the library which has just opened, of knowledge which has to be organised, and cataloguing and filing systems, and how if you ask for a book you need to know how to find it, and how information is increasing rapidly.
- NL: This, of course, is a theme repeated later in the library module . . . but it's a good thing to present it earlier in the course if the opportunity crops up.

Transcript of a tape-recorded conversation with Mrs. Jenny Leigh of Henry Beaufort School on 15.1.75.

- Background: Mrs. Leigh has been interested in teaching the 'Information' course to her 17 fourth year pupils since the beginning of the school year. This is however her first attempt at teaching it, and the conversation covers her impression of the material in module 1 and the reaction of her class to it. In particular the visit to a local corner to find information is discussed.
- Jenny: We've been out again, you know, and answered all the questions on your sheet it was a very cold morning.
- NL: Did they object to going out on a cold morning?
- Jenny: It didn't seem to be cold except when you'd been there a long time which you have to be to cope with those questions. And they had no gloves on because they had to write - after half an hour they came back and completed the sheets in class. So the next thing they're going to do is to do the questions where they make up the questions themselves.
- NL: That's right. About the Inn sign? Did you give them the first of the two question sheets?
- Jenny: I did that the week before. We went to the corner on Thursday and they took notes. They filled them in on the following Monday and finished off the other forms on Thursday.
- NL: So you're now up to the point where you do the Inn sign - they make up the questions. That takes half an hour and then there's the 'what do you think of it so far' type of lesson, where they try to draw together the threads of what they have done so far and try to make some sense out of it. Do you think they're making sense of it at the moment?
- Jenny: Well, they're not asking me too many questions at the moment. They're quite happy with what they're doing and they think they know the reason behind it. Perhaps because of the discussion we had after the film about man always asking questions, and how children ask questions when they are young, and why do you not ask so many now, and who would you go to. I think they've automatically worked it out for themselves about why they've been asked to go down there a second time, and why they have specific questions to answer - because it's so obvious to them - the difference between the information they got and what's actually there is so tremendous.
- NL: It wasn't so obvious to the second year group was it, Harry?
- Harry: No, but some of them saw it.
- NL: Perhaps this is because this group is two years older and more mature.
- Jenny: They got a bit more out of that second visit than is actually on the forms. For example the question about what the railing was for produced a lot of ideas.
- NL: Do they think that this sort of exercise is beneath them?
- Jenny: Oh no! Mind you, they have no idea that this has been done by second years. I haven't told them.

INFORMATION COURSELESSON EVALUATION

Lesson No. 1

Week No. 1

Topic:-

what is information.

lets collect some.

Date taught:- 14/1/74 Taught by:- P. Cackett

Class:- 2 Newton.

a) Was the lesson given strictly according to the Teachers Notes?

Yes.

b) If not, how did you modify it?

c) General Comments on how the lesson was received.

I take 2 Newton for Geography so there was little difficulty in rapidly establishing a relaxed atmosphere. They had ~~some~~ little idea of what was in store for them - most of them, on being sent to A15 assumed that they were in trouble - especially as sheets of paper had already been put out on the desk tops.

Once they had got over their obvious disappointment they worked enthusiastically.

Most of the students shared N Longworth's enthusiasm for minute detail.

d) Particular examples, or unexpected results.

e.g. the first piece of information mentioned with reference to the classroom was a small metal disc on the chalkboard naming its manufacturer, something which I had barely noticed in over a years teaching in the room.

On the whole they needed little prompting, where they did need stimulating they quickly took the point and expanded it, usually well beyond its intended or necessary limits.

e) What difficulties did you experience?(If any)

I did find the noise and continual movement rather irritating during the information collection session at the end of the lesson - even in an intentionally well structured situation.

In the interests of educational progress, I smiled and thanked it.

f) How helpful did you find the Lesson Notes and/or Teachers Notes? my informal arrangement

g) Suggestions for improvement.

where movement within the classroom is necessary, as in the final part of this lesson, a rearrangement of the furniture to facilitate that movement might be advantageous.

h) On the remainder of this page and continuing on the back of the sheet, please write down, or ask one of the children to do so, any lists which were put on the blackboard as a result of discussion with the children. If you can, please also hand back this assessment with a copy of the work of one of the children. Alternatively, indicate what work the children did and how they approached it on the back of this sheet.

INFORMATION COURSELESSON EVALUATION

Lesson No. 2 Week No. 2

Topic:- In Search of Information.
A walk in the School environment

Date taught:- 28/1/74 Taught by:- R. Cockell Class:- 2-NEWTON

a) Was the lesson given strictly according to the Teachers Notes? YES.

b) If not, how did you modify it?

c) General Comments on how the lesson was received.

The children began the walk very enthusiastically, (even missing registration to start on time). They positively asked for more guidance at pt 1., which wasn't given. (Remember last term I got them to draw a plan at each stopping point), Interest did begin to dwindle as we passed on to points 2, 3 + 4. The most probable cause being the weather.

d) Particular examples, or unexpected results.

e) What difficulties did you experience?(If any)

The weather was very poor, and the children were obviously rather cold and wet ~~by the time~~ by the time that they returned. I never realised before how slowly 12 year old children walk. Needless to say we had difficulty.

f) How helpful did you find the Lesson Notes and/or Teachers Notes? in completing the work.

g) Suggestions for improvement.

I think that one of the major problems was in fact a lack of work to do between the 4 main pts. This ~~is~~ was obviously mostly my fault. It was very difficult to keep them working whilst they were walking.

h) On the remainder of this page and continuing on the back of the sheet, please write down, or ask one of the children to do so, any lists which were put on the blackboard as a result of discussion with the children. If you can, please also hand back this assessment with a copy of the work of one of the children. Alternatively, indicate what work the children did and how they approached it on the back of this sheet.

4.3 Module 2 - The Headmaster Information System

4.3.1 Introduction to module 2 Module 2, the Headmaster Information System, is an attempt to particularise some of the concepts learned in module 1, to teach children how information can be collected, classified and codified, and to illustrate, by means of an edge punched card exercise, how it can be stored and retrieved. In contrast to module 1, which takes a large and sometimes diffuse subset of the informational elements in particular environments without specifying an organisational context, module 2 is concerned with a well-defined organisation, the school, albeit one in which organisation is not often the most visible attribute. Thus one makes a transition from the chaos of the environment, with its many pathways leading into a study of information in a wide variety of contexts, into the systematisation of the school, or at least the possibility of creating an ordered system within a more closed informational set-up. The school also has the advantage of being a familiar place to all children and one in which the raw material of that which they are learning is at hand, ready to be discovered or exploited as the case may be.

Teaching notes for the module can be found in volume 2 on pages H/T/1 to H/T/17 inclusive, and the pupil worksheets which act as discussion references, exercises to be completed, or as helpful aids to the setting out of other work are on pages H/P/1 to H/P/6 inclusive. There are no visual aids supplied as work material for the teacher, although of course a teacher with time and initiative may wish to create some personal slides or construct alternative methods of making points. For example, slides of the accident which forms the first Case Study, or of the equipment actually used in the school to record information, would be of invaluable assistance, particularly with less able children. The only other items of equipment needed by the teacher are edge-punched cards together with some means of clipping the holes and sorting through them. Scissors and knitting needles are useful here although commercially available clippers and sorting needles can be obtained. In the pilot studies, these cards have been obtained from Messrs. Copeland Chatterson, of Stroud in Gloucestershire, and have been of the type with 102 holes, but a wide variety of suppliers of different card types is in business in this field. The commercially available cards tend to be expensive, and it may be more acceptable to the school with a limited purse for the children to make their own - after all they are merely cards with holes round the edges. Teachers

with access to computing equipment may prefer to reconstruct the edge-punched card exercises to make use of this. However one should beware of seeming to use an oak tree to screen a bird bath. While some of the school administrative problems are obviously computer sized ones, others exist which make the computer inappropriate and it is part of the purpose of the 'Information' course to show that there is more than one way to solve information problems. Edge-punched cards are as appropriate a way of solving some problems as is the abacus of solving others and the computer of making huge volumes of data available. Certainly, opportunities exist in later modules for the use of more sophisticated methods.

4.3.2 Lessons and Methods As may be seen in the teachers' notes, the module takes between four and seven weeks to teach. This apparently wide time span takes into account such factors as the ability of the child learning the material, the amount of time spent on any particular topic which the teacher may choose to emphasise or not and the time taken to complete the worksheets and exercises. Indeed in the pilot tests some teachers have taken a whole double lesson developing the ideas and discussion behind the Case Study, so that a real understanding of the problem is achieved, while others have concentrated on the edge-punched cards as being indicative of information storage and retrieval methods, and as a tool for getting over other concepts about number systems which would enable information to be stored in the most economical way. This outline will attempt to give each lesson equal emphasis although the rationale behind them may entail variable treatments, and there are obviously other factors, such as the impact on motivation of the first lesson in the module, at work.

Lesson 1 which is an attempt to involve the children with the subject of the module, the school, and to make them familiar with the problem of information there, is centred principally on the Case Study (volume 2 sheet H/P/1) and less dependently on the 'information problems' sheet (page H/P/2). It is not the purpose of this outline to describe the Case Study in full, since this is fully documented in the teachers' notes on pages H/T/5 to H/T/8 inclusive, and each separate lesson may be different according to the interaction between teacher and children or the time of the day.

Lesson 1 is a discussion lesson - only when the children come to look at the further information problems do they have anything to write down formally,

although of course, if the teacher requires it, he/she may set various exercises asking for written lists. In answering the question 'Who is the boy in the accident?' from Case Study 1, the children are roleplaying the part of the headmaster; they are being asked to simulate his thought processes and use his information sources. At the same time they can identify with the problem since it is one which can and does happen all too frequently, and they can see the urgency of obtaining a quick solution - after all the boy might be one of them. The Case Study was written in the form of a story because it was considered by the course author that they may more easily understand the problem in this form rather than in the more austere way that Case Studies are often presented to adults. Thus, implicit in the need to understand the problem, and in the urgency of solving it are the restraints of the information collection, processing and retrieval methods used in the school and the efficiency by which they operate. In the initial stages the teacher acts as the catalyst, pointing out the snags, the lack of information in each direction suggested by the child and the impracticality of the courses of action, and eventually helping the child through the information system such as it is, while at the same time keeping the lesson at the level of control desired. In this way the child is meant to learn that problems of this sort are solved only by a combination of personal processing of the information available and the use of records which are embedded into a 'system'. Hopefully too the child learns that the system is by no means perfect and that an essential element of using this and indeed any information system is the taking of time - the more inefficient the system the more time is taken up in using it.

An extra dimension to this problem is added by study of the problems on the follow-up sheet (H/P/2). Not only does this reinforce the concepts learned in the previous discussion but, in that all these problems are different, it shows that the headmaster is faced by a variety of situations which vary in magnitude and complexity. The spaces on the sheet are probably insufficient for the child to complete in full detail, but they are large enough to demonstrate that he knows what the problem is about. The fact that many of the problems involve the use of numerical information is meant to help towards the process in the next part of the module of defining variables in the setting up of an information system.

Part 2 of the module uses the knowledge which the children have gained in discussing the Case Study, and attempts to take them further towards the

facility of designing a system to cope with the problems which have been uncovered. It is meant to get them thinking about what an information system is and what it includes. So that, in using sheet H/P/3, the children are attempting to isolate the variables involved including books, other resources, people and buildings. Also, in doing this they are learning something about the organisation of their own school. Teachers and others often take for granted that the child, having been in a school for some years, understands the way in which it works and knows how the people he comes into contact with interact with it. This is not necessarily so. Teachers were surprised in the pilot tests to learn how many children did not know what to them was a most elementary piece of knowledge, such as the names of any of the Heads of Departments. The children were far more likely to know the names of the cleaners or the assistant secretary than this. Often the fact that rooms in the school were numbered in a logical way was not realised. This ignorance of the way that hierarchies among people are set up, or the pattern of room numbers, ostensibly for the benefit of the child, is not, on reflection, surprising and among other purposes sheet H/P/3 is designed to help them through the maze which seems to be their interpretation of the school. There is of course no logical reason why children should know these things especially if efforts have not been made to explain it to them. As has been postulated in chapter 1 (part 1.4), the school is often a system into which children fit or not. Even if they fit they may know, and may want to know, only that part of the system which affects themselves personally; they have no appreciation of the whole. If they do not fit they will probably not want to know anyway, again for personal reasons. Thus an added attraction of this may be the unexpected insights gained by the children which were not set out as deliberate objectives. In teaching how the system works, how the organisation is logically divided up into convenient orders, the children are provided with the overview of the school which they were previously lacking. Optimistically the realisation that there is some order in the process of schooling, and their new awareness of it, may help children who may otherwise switch off, to come to terms with school. This idea is inevitably expressed in oversimplistic terms and the evidence for or against such an assertion has not been gathered as part of this study.

Part 3 of the module is really an extension of part 2, but a very valuable one if the children are to appreciate anything about volumes of information,

types of information and perhaps also the problem of the use of personal information. In the same way that Module 1 asked children to collect data on a particular item after producing much information about the environment, module 2 asks them to particularise about personal information after generalising about the many different types of information in the school system.

The children are probably well aware that some information about themselves is held in some form or other in the headmaster's filing system. Certainly the Case Study which they have already discussed, will have brought this home. Nevertheless it is assumed that they will most probably not have given much thought to the details of what this information is, how it was collected, what it is used for or how it may be used for their own benefit or otherwise. Nor do they know whether it is correct in every detail, whether it includes details of their personal character or their backgrounds, or whether they may have been mistaken for another of the same name. However this exercise is not principally to point out the dangers of holding information in computer files, or to encourage them to withhold information because it might be damaging to them at some time in the future. The implications, both legal and moral, of the databanks and privacy problem are complex and demand probably more experience of the world and society than children of 12 and 13 years of age are likely to have. This is not to say that they should not be mentioned in the context of this course, but that care should be exercised in appreciating the limits of the childrens' understanding.

There are, though, other areas of the information story which the teacher may want to discuss in greater or less detail. Sheet H/P/4 raises some of these and is designed to help the teacher set up such discussions. The problem of information collection, of how the information was obtained for the system in the first place (this could happen in many ways), of ensuring the accuracy of the information, often a rudimentary exercise in schools, and the things that could happen with inaccurate information; the problems of updating and change, and of the volumes involved, can all be treated according to the teacher's reading of the childrens' need. The fact that they are dealing with their own personal information helps to provide motivation and an awareness that information in a system is important, so that perhaps the means of collecting it must be well thought out.

So far the children have studied the school's information needs by reference to a series of case studies. They have looked at the different variables

involved in an information system constructed around the school environment. They have focussed in on the particular area of personal files of information within that system and perhaps they have discussed the implications of these. The intention behind part 4 of the module is to capitalise on these experiences and to teach those aspects which are common to all information systems. The transition from particular to general in this way is always a difficult teaching problem demanding professional skill, experience and expertise. By using the particular examples it is possible to illustrate the general concept. Sheet H/P/5 is provided for the teacher's use in this respect. The concepts of information analysis, collection, checking, preparation, input, storage, processing and retrieval as the main elements of an information system may be drawn out of the children by judicious questioning. In a sense the children are learning the vocabulary of the information system so that they may make use of it in exercises in future modules and in their own personal projects.

Lastly, the material provided for part 5 of the module recommends that the children use an edge-punched card for the storage and retrieval of personal information, thus drawing together in a practical way all the threads of the module. The rationale for this exercise has been discussed on page 4.3.2. The method recommended, working from the simple to the more complex, is described on pages H/T/13 to H/T/17. A worksheet to assist with the planning of the information on the card is shown on page H/P/6.

4.3.3 Reactions Feedback from the schools is contained in the five transcripts, pages 4.3.A1 to 4.3.A9, and in personal unrecorded conversations with the teachers concerned. It is useful to read these transcripts before this section on 'Reactions'. The module has undergone little modification from its original form. The section on the use of edge-punched cards has been enlarged and made more explicit as a result of difficulties experienced by the teachers, and Sheet H/P/6 has been added to assist with planning.

At Yateley, the module has been taught twice by Ray Cackett, once by Rosemary Trew. Their reactions are transcribed on pages 4.3.A1 to 4.3.A5. At Henry Beaufort, the module has been taught by both Harry Wright and Steve Ward, and their comments are the subject of pages 4.3.A6 to 4.3.A9. The whole module is not, however, covered by each transcript although if they are taken jointly, all lessons are mentioned. During the first year Ray Cackett was working under unfavourable pressures

In the attempt to cover all aspects of the course he was asked to teach module 2 in a minimum of time, and of course, as has been indicated in the conversations, some parts of it were skimmed. His class enjoyed the Case Studies, 'especially the one of the policeman covering the accident which had them acting as Headmaster' (page 4.3.A1). This was one of the lessons which the author attended while Ray was teaching and his enthusiastic comments about the reality of the situation for the children came through clearly. I did not detect a single bored face at any time so intent were the children on making their opinion heard, an indication of the teacher making the most of the lesson material at his disposal. This reaction was also reported by both Steve Ward and Harry Wright who spoke of 'a constant forest of hands' and 'participation by all the class - an excellent lesson in the mixed ability situation'. Rosemary Trew also reported enthusiasm, although less convincingly so. Her class 'didn't seem to have much idea how to go about it' (page 4.3.A3) although she believes that some of the more important points were brought out during the lesson. However, one cannot judge the success of a lesson purely in terms of its entertainment value; one must also look at the way in which it met its objectives, and in this respect there were some reservations from Ray. He didn't believe that the idea of the possibility of organising information was emphasised enough, although later statements seem to contradict that assertion. 'They saw the problem well enough - they realised that information was stored at the school about themselves, and they were interested in that' (page 4.3.A1) is a good start to the realisation of any objective; the point about 'rows and rows of filing cabinets in the headmaster's office - wasteful of space and labour etc. etc.' is an adequate continuation and the fact of 'an intuitive feel for the need for an automatic system' in the children certainly satisfies all of the course author's objectives for this lesson. Perhaps Ray is referring to the later parts of the module when he was unable, mainly because of time constraints, to capitalise on the intuition and insights the children had gained.

Written or recorded feedback on part 2 of the module is rather more sparse. Ray did teach this but had to rush quickly through the points and felt that, while the lesson and worksheets were adequate, he did not give them a sufficiently thorough testing in the classroom situation.

At Henry Beaufort school both Steve and Harry described the lessons as good 'while not reaching the heights of lesson 1'. All three reported the difficulties of knowledge mentioned earlier in this chapter (page 4.3.3), such as who are the Heads of Departments, where are the specialist rooms etc. Some children also had difficulty in understanding how the form (H/P/3) should be completed. If this was to be used to illustrate that within the school information system there are a lot of variables, the only positive feedback comes from Rosemary Trew ('they didn't seem to realise there were so many things involved - you had to jog their memory about furniture and equipment') (page 4.3.A4). In her opinion the lesson went well but in view of the fact that she seems to have taught lessons two and three in the same fifty minute period, she cannot have spent much time following up the issues raised by the worksheet.

Steve had the most to say about lesson three and the imaginative treatment he gave to it is fully described on page 4.3.A8. In choosing to devote a full practical lesson to the problem of the storage and retrieval of personal information, he was passing on his own insights into the information problem to the children in a particularly incisive way, and this treatment illustrates that the basic material of the course can be modified to suit the teacher's own interests and ends. It is interesting to note that he considered that personal information and its form and availability were 'off the track a bit'. Perhaps he sensed that children of this age were not yet ready to understand the full implications of the privacy issue, since in private conversations he had expressed a deep personal interest in the subject. He knew too that later modules provided the opportunity to take this aspect of the subject further. Again, Rosemary Trew did not take the issue very far, perhaps because she did not have any personal feelings or knowledge about it. Her class suggested that personal information 'must be very useful' and that 'it was a lawful thing' (page 4.3.A4). However, in discussing how the children fill in a card at the beginning of term, she started to fulfil the teaching requirements of the lesson and gave to some of the children an awareness that there must be a reason for it. Both Steve and Rosemary commented that the children were already fairly knowledgeable about the sorts of information that go into a school file. Steve's class was 'pretty clued up' and Rosemary's 'already realised there was a record'. Harry's interest in lesson three is not recorded but his approach was different that that of

Steve. He used the sheet (H/P/4) to prepare the way for the edge-punched card exercise, since the latter was in fact his main interest in this module. He preferred to let the method lead to the message, in contrast to Steve, who was a little shy about mechanical means and codes and ciphers, and felt the need to establish a complete rationale beforehand.

Ray has some serious reservations about the generalisation into an information system, although again, since it was done in the last few minutes of the lesson, it has not had a thorough testing. The lesson tended to become a not-very-convincing parade of induced jargon phrases, and the line between these and a sense of essential vocabulary is thin. His idea that a direct example or analogy would be a better way of giving that vocabulary (page 4.3.A2) is worth looking into and would perhaps take the exercise out of the vacuum into which he thought it had sunk. Ray also had doubts about teaching children about information systems explicitly at this stage in the course. This depends, of course, on whether the teacher has chosen to teach module 2 immediately following module 1, but the point remains valid that perhaps the course becomes over-intellectual at this stage for this age of child, and that there should be a wait until there is a definite need to cope with the vocabulary before teaching it.

The edge-punched card exercise was tried at Henry Beaufort by both Harry and Steve. The main written feedback concerning this is shown on page 4.3.A7, in which Harry is commenting on the reactions of his class to his treatment of the subject. The class were certainly enlivened by the demonstration of retrieval of birth dates, since they all wanted to see how their own particular card emerged from the pack. The subsequent follow-up, which concerned the updating of records and the need to formulate careful plans, is a good example of using practical methods to illustrate a point of information. The fact that the class 'became too excited with other things' in the edge-punched card exercise is a measure of the enjoyment which the children obtained from it, and the fact that the question of conservation of information on the edge-punched card was not treated is an indication of lack of time rather than lack of desire on the part of either the children or the teacher. On the other hand Steve had some doubts about his own ability to use edge punched cards, even though we had spent some time explaining them beforehand. His class did perform the dates of birth example but were unable to go much further

because of lack of time. However Steve had spent some considerable time in the previous lesson demonstrating the need for information storage and retrieval methods, and considered that to take the edge-punched card exercise further would be labouring the point too much.

In fact this lesson was very much a case of personal preferences; teachers for lessons. Harry, who felt perfectly at home with codes and ciphers and logical means of retrieval, looked forward to this lesson for some weeks and chose it as his main means of demonstration. Steve, on the other hand, considered that this might be too much of a mathematical exercise for his own particular mental blockage, and placed the emphasis elsewhere. At Yateley, Ray was unable to teach this because of a lack of time, but also he too expressed reservations about his ability to cope with the mathematics of it. Rosemary, with whom some considerable time was spent in explaining the edge-punched card concept, displayed a terror of logical relationships expressed in such concise form, and was heartily relieved to have this lesson cancelled because of school administration problems.

4.3.4 Summary On the whole, module 2 was acceptable to both the children and the teachers, both in terms of its content and its presentation. Some lessons, particularly the first lesson which presented the Case Study (H/P/1) and had the children role-playing the part of the headmaster, were extremely well-received by all teachers. With the other lessons, each one was received differently according to personal motivation. But all of them were taught and enthusiasm was reported. The single exception to this was lesson 4, which attempted to generalise into the components of any information system and to give children a vocabulary of information processing terms. For various reasons, because the teachers themselves were unfamiliar with the jargon, or for lack of time, or because they did not feel it appropriate to teach this at this time, the lesson was skimped or ignored. This lesson needs therefore to be looked at with the possibility of moving it to a more propitious part of the course, or omitting it altogether as being unsuitable for children of this age.

Transcript of a conversation with Ray Cackett in July 1974
at Yateley School.

- Background: This is a continuation of the conversation started on page 4.2.A5. Ray had taught the course for three terms, but had only taught this module (2) once in that time. The conditions under which it was taught were extremely unfavourable, the main drawback being that he was asked to compress four or five weeks teaching material into two weeks. Nevertheless, as these reactions show, the children did not seem to notice or mind.
- Ray: The Headmaster Information System was next. I think that this was one of the most enjoyable parts of the course. I think they enjoyed the Case Studies particularly - especially the one of the policeman covering the accident which had them acting as the headmaster - getting them to solve the problem, a very real problem, that was the chief advantage - the reality of it - it could happen.
- NL: Yes and it could happen to them personally.
- Ray: Yes it's a very real situation for them.
- NL: And it's in the school environment they're familiar with. The major objective quite apart from that though, is to put over the idea that information in a school can be organised, and of course they didn't get quite as far as the edge punched card exercise.
- Ray: I don't think that point was made as well as it could have been, and when it came to the lesson I don't think I emphasised it as well as I should have done.
- NL: But then, as I remember, we were short of time and trying to fit too much into the time available. The point would have been better made with the edge punched card exercise and perhaps a full hour devoted to it.
- Ray: Yes. I think they enjoyed it as an exercise but they probably didn't see the objective clearly enough. I think they saw the problem well enough - they realised that the information was stored at the school about themselves, and they were interested in that. They didn't seem to know that quite so much information was there.
- NL: They didn't realise also that information takes up so much space which was another point brought out.
- Ray: I think we brought out that point well enough about the rows and rows of filing cabinets in the headmaster's office and the house offices. Yes, and we did make the point that this is extremely wasteful of space and labour etc. etc. They got that point.
- NL: You think they got an intuitive feel for the need for an automatic system?
- Ray: Yes. I'm sure they did, but even so I don't think they realised how big the problem is - the illustration of the timetable is the classic thing.
- NL: Yes, that's on the Case Studies sheet.
- Ray: Yes. It's a classic problem that they might not understand.
- NL: That really was another problem we didn't have time to get round to. The other Case Studies were very sketchily done.
- Ray: Yes. We never did get around to that.

- NL: Sheila did get round to them actually with her class and they took to them quite well.
- Ray: Yes it's always cropping up and they'll realise that they're always getting different teachers or none at all which is just due to a lack of communication or transmission of information in school.
- NL: Yes, if they can get a feel for that link between information and the communication of information it's an important lesson for them later in life.
- Ray: Yes. I agree.
- NL: Yes, as you say I think module 2 went down well - it was at the right level?
- Ray: Yes I'm very happy about that.
- NL: And given more than two weeks - say, 3 or 4 - perhaps something could be made from it.
- Ray: Or conversely, prune it.
- NL: I'm not sure about that - but one thing I'm not too happy about is the 8 stages of an information system lesson - it may be getting too advanced for these children at this stage.
- Ray: Yes. In that one I was trying for a long time to induce responses from them. Getting them to say the right words was quite hard work. They were being led.
- NL: Yes, but that's fair enough.
- Ray: Yes but it was more than that - they were being told, didactically. Do you think it's necessary for them to have that written down in that form?
- NL: They do use it later on in the individual information projects. They're expected to go through that process of information collection, checking, storage and retrieval in their own projects. But perhaps that formalisation should be left until that module. Perhaps it's too early in the course to put it over.
- Ray: Mm. Perhaps. When I did it it was the last few minutes of the lesson so it wasn't well done. Have we got a direct example or analogy? Can't we take a problem and show them each stage in turn?
- NL: Yes. You can take any information problem - for instance collecting the heights and weights of children, and deal with how they go about it.
- Ray: Or perhaps we could relate it to a subject they're doing at school. Wouldn't that be applicable to the information they're receiving and treating in say one of their science subjects?
- NL: Yes. I think the point can be made several times in several different ways - that exercise is in a bit of a vacuum.
- Ray: Yes it is. It's not related to anything. You've just said these are the stages in setting up an information system - in the abstract.
- NL: And they don't know what an information system is anyway.
- Ray: We didn't actually work through a problem.
- NL: OK. So it would be better if related it explicitly to a problem - and perhaps consider moving it.

Transcript of a conversation with Rosemary Trew at Yateley School on 17.10.74.

- Background: Rosemary had completed the teaching of module 1 and followed immediately by teaching module 2 - A Headmaster Information System. She was at this time having some discipline problems with her classes although this does not come through on to the recording. Also much of the conversation was carried out with constant reminders about the content of the module and frequent references to the text of the notes. She seemed vague and ill-at-ease during the whole of the conversation.
- NL: This Headmaster Information System module. How many weeks have you done of it?
- Rosemary: Last week we had the Case Studies and this week we started the School Information System - so that's two weeks.
- NL: How did they go on with the Case Studies?
- Rosemary: Well, it just happened to coincide with an accident outside the school which was
- NL: I know what you mean - not fortunate, but useful.
(the first Case Study in the module concerns a school accident)
- Rosemary: Yes. So that got their interest quite quickly.
- NL: They read the Case Study?
- Rosemary: Yes, they read the Case Study. They didn't seem to have much idea how to go about it - all they could suggest was to go to the hospital and ask the boy - they couldn't think in stages. They seemed to think it was quite an easy feat.
- NL: When they were given the clue - the initials - did the light dawn suddenly?
- Rosemary: Not suddenly, no. They did eventually get on to the possibility of using the register and taking the names of the children.
- NL: Did you bring out the point about the difficulty of finding the registers?
- Rosemary: No. I brought out the point that it is difficult to bring the children together quickly to take a register and the problems of absence. So they had to think of some other alternative.
- NL: Do you use the teachers' notes while you're going through it? It's a problem isn't it of reading something and teaching at the same time.
- Rosemary: No. I make notes from the teachers' notes beforehand.
- NL: I see. Good. There are several points in this exercise, aren't there? First to talk about the problem and how to get more information, and the clues they had - narrowing it down. One point that could have been made was the amount of time it took to get the registers and go through them - so if there were a more automated system
- Rosemary: I didn't think of that actually. That would have been a very good point to bring out.
- NL: Yes. Because the module quite obviously goes on to talk about

- Rosemary: Computerisation.
- NL: Well, not quite computerisation, but perhaps more mechanisation.
- Rosemary: Well, yes, the last thing we did take was how long they thought it took from the policeman arriving at the school until the boy's name was found and they were able to inform the parents.
- NL: How long did they think?
- Rosemary: Well, they thought about two hours - at least they got the point that it took a long time.
- NL: OK. Then there was the other sheet of information problems.
- Rosemary: They went through those themselves - they didn't ask many questions.
- NL: Do you think they saw them as information problems?
- Rosemary: Not really, no.
- NL: OK. So having gone through those, how did they get on with the next sheet?
- Rosemary: We did this one this week.
- NL: Were they able to answer the questions?
- Rosemary: Most of them, yes. Some of the questions they couldn't answer like names of Heads of Departments and number of classrooms.
- NL: So what was the point of asking the questions in the first place?
- Rosemary: Well, they didn't seem to know there were so many things involved. You had to jog their memory about such things as items of furniture and the equipment needed in a school.
- NL: So that point came over too?
- Rosemary: Yes.
- NL: What about keeping track? Did they see the need for that?
- Rosemary: They seemed to realise that you need to keep records - very carefully in some cases like of pupils and teachers. We talked about personal information and how they filled in a card at the beginning of term.
- NL: Did you ask them what it would be used for?
- Rosemary: Yes. Some of them didn't have any idea. But the others quickly suggested that it must be very useful.
- NL: Were any of them bothered about giving information?
- Rosemary: Personal information? No. Because they already realised that there was a record. They thought that it was a lawful thing and hadn't got round to wondering why people wanted to know.
- NL: No, they obviously won't be bothered about the privacy issue yet, and probably never will be - unless it's pointed out to them.
- Rosemary: Unless I do it.
- NL: Yes. Do the children enjoy filling in the boxes?
- Rosemary: Yes. My children find it much easier to answer the questions by writing it down on the paper in the spaces provided, rather than copy it out in full. And they enjoy the novelty of it, I expect.

- NL: Don't they have worksheets in any other subject?
- Rosemary: Not many, no.
- NL: And they obviously enjoy filling in worksheets?
- Rosemary: To a certain extent. As long as there aren't too many of them. Actually they come to the end of a sheet and ask what else? So I tell them to think of some other questions, and they often say I can't think of any more because they've filled all the boxes in - which can be a disadvantage of them.
- NL: Yes. It tends to constrain in that situation.
- Rosemary: It does. But that's the only disadvantage I can think of.
- NL: Do they automatically want to keep this neat, or do you have to tell them, or don't they bother?
- Rosemary: I don't think they write as neatly as they might in an exercise book, because they tend to take more pride in an exercise book.
- NL: Have you given out the folders?
- Rosemary: Oh yes. That was a great innovation.
- NL: So now it means more? It's a record of work done.
- Rosemary: Yes.
- NL: What about marking them? Do you do that?
- Rosemary: Yes. I usually have a look through and some I mark. It depends how much time I have. Usually we go through the answers at the end of the lesson and they tick.
- NL: Yes. Well, it's not a competition about who can get more ticks.
- Rosemary: Yes, some questions have more than one answer.
- NL: And there's another thing the sheets can be used for - not only to put thoughts down on paper but also to initiate some discussion.
- Rosemary: Yes. That does happen. I write down an answer on the blackboard and then someone pipes up and says I've got a different answer - so we decide that there could be two or three answers and go from there.
- NL: Yes. Some of the questions are open-ended.
- Rosemary: But you can only do it if you've got the time to discuss everything.
- NL: Yes. Do you have problems in getting through the material that's there in the time available?
- Rosemary: Yes - and to discuss it fully. We get through the questions but there isn't time to discuss it as much as I would like - I think the discussions should take up a third of the lesson. And the more you talk about the questions, the more they think about them.
- NL: That's interesting. There does come a point there where people switch off.
- Rosemary: Oh yes. At the beginning of the lesson, some of them.
- NL: Yes. Some never switch on. Sometimes it's unfortunate that you have to terminate a discussion which is interesting to a few for the sake of the many.
- Rosemary: Yes. The best way is to go around and talk individually with the children or in little groups of three or four. There isn't time obviously to see all the children. They do get very interested sometimes - quite carried away.

- NL: That's great. At least, if we can get them heated up about something we can get them interested and concerned. That's part of the course.
- Rosemary: Yes. So they're dying to see this computer. Does it fill up at least half the room?
- NL: Oh no; this isn't a real computer. This is only a computer terminal, it's just a keyboard and something to print out - a bit like a typewriter.

Transcript of a conversation with Steve Ward at Henry Beaufort School on 8.11.74.

- Background: These are Steve's comments on lesson 2 of module 2 - in which he explains how he has taken the subject matter and given it his own treatment. He was teaching it to second year mixed ability children.
- Steve: Well, I'm sort of vaguely in front and behind. When I say this I mean that we've gone off at a bit of a tangent as a result of wanting to pursue further some of the points that have been raised. I'm in front and behind inasmuch as we are talking about information banks and designing our own information courses before we've gone for a little walk round the school. That's only because it seemed to follow naturally from what we'd done. We will, in fact, go for a walk round the school because I think we'll run up against a brick wall along our own deliberations and we'll need to do that to prove certain things to us.
- NL: In what sense are you talking about information banks?
- Steve: Things like libraries, school offices, individual classrooms, resources - we're looking very generally across the broad spectrum of life as 20 understand it, starting off with how you find out about little Willie who got knocked down by a bus.
- NL: Yes, I see. You're extending this concept of having taken the Case Study and deciding that there's a problem to solving the problem more or less along the lines that the module suggests, in that there are different buildings in the school which contain information, etc.
- Steve: Yes. In fact we've got to the stage of saying: 'Yes, in the year 2740 or whatever we can see that what we wrote last year in our English projects, life is going to be more mechanised and computers are going to be taking the place of our present, in some cases faulty, information and resource systems.
- NL: So you've tried to project a school of the future, have you?
- Steve: Oh yes. I tried to do this with this class last year so I have the advantage of being able to refer back to that.
- NL: I have an article at home which projects a school of the future. The teacher not as a teacher but as an advisor, and individualised learning systems throughout the school with individualised syllabuses for each child, starting from where he or she left off the previous day and using all sorts of educational technological material. Have they seen it in these terms?
- Steve: Well, put it this way, I was leading them towards that.
- NL: They wouldn't know about this sort of thing would they?
- Steve: No. Some might. Two or three in that group, perhaps because of the nature of their parents' professions, are well aware of the vast advance of technological society, and have a very wide technical vocabulary for children at that stage of development.
- NL: Words like?
- Steve: Technological, technical, computer, electronics, magnetic, systems and resources, information bank - that's where I got it from. But my terrific interest at this time is that it now leads off into our theme 'beyond the real' into all sorts of creative work. It's getting us to the preparatory stage of the Brave New World in a couple of years. Laying that sort of foundation.

Transcript of a conversation with Harry Wright at Henry Beaufort School on 18.11.74.

Background: This conversation covers the later lesson of module 2 - the edge-punched card exercise, which was used, in a school information context, to illustrate how information could be stored and retrieved in a simple way.

Harry: Certainly the kids really enjoyed the edge punched card business.

NL: Oh yes?

Harry: It came to life after we had got them to work out we agreed to go with the class on a system for doing dates of birth, a terribly wasteful system, but still we've got to be really obvious for the sake of the thicker ones. So in fact we used the top edge for the day in the month, the 60 or 61 hole for year of birth, which was quite handy, and in the hundreds, up one side of the card for the month. And then we collected all the cards in and tried to find out if anyone had a birthday that day. Nobody did, so we found out who had a birthday coming up soon. There were three that week, so we put the needles through, shook the cards - great! So then everyone wanted me to do theirs just to see if that would come out. And that went down very well.

NL: It made the point then?

Harry: Yes, and then I got them thinking about different kinds of information that the Headmaster would want to put on their card and I also got them to think about what information he would want about me - and that was quite revealing.

NL: I bet it was. Did they also think about conservation of information on the card?

Harry: I didn't guide it along that way. We got too excited with other things and that got missed out. We did talk about updating information, the need to keep updating and one of the things early on that someone mentioned was putting a child's age on a card. And I asked whether that was the most sensible way of doing it. They had a little think and decided that, since age changes, dates of birth were more sensible.

NL: Yes, it might have been a nice exercise once you had decided on the information to give them a card and ask them to find a way of putting all the information on to the one card. If there aren't enough cards they can plan it out on the planning sheet. (H/P/6)

Transcript of a conversation with Steve Ward at Henry
Beaufort School on 18.11.74.

Background: This conversation concerns the third lesson of module 2, a Headmaster Information System, in which the teacher is asked to bring home to the children the amount and nature of personal information about them held by the head teacher of a school, and to emphasise the difficulties of collecting, storing and retrieving this information. There are recommended notes and worksheets on pages H/T/10 and page H/P/4 in the course, but here Steve has used his own initiative and ideas to produce a worthwhile and entertaining practical lesson.

NL: Have you done the edge-punched card exercise yet?

Steve: Not yet. I felt that we needed to do a bit more background before we got to the edge-punched cards. I've done a few conjuring tricks and what I want to demonstrate is 'hey presto' we don't have to struggle with 600 dossiers, especially when someone's had them before and put them back in the wrong order. We did quite an interesting exercise - following on from this sheet 'What does the Headmaster know about you?' (H/P/4). I got them to design what they thought the Headmaster's form should look like - treading a bit carefully of course . . .

NL: Yes? But you got them to make explicit what sort of information he wanted?

Steve: Yes and they all said things like name and address - they're pretty well clued up about what things go on in there. I didn't let the discussion about the motivation of this get too far, because apart from anything else, that's off the track a bit. They actually designed what they thought the record looked like and then filled in some of it. The point I wanted to prove was that at the drop of a hat, if you had something like 600 forms and you wanted to find all the people whose birthdays were between the first of May and the first of June 1963, you've got quite a job on your hands looking through that lot to find it out.

NL: I see. And that's when you're going to bring the edge-punched card exercise in?

Steve: That's when I can bring it in but first I want to show them how difficult the other way is. They all filled one in - there's 27 of them and I interspersed those with some blank pieces of paper. Of course it isn't a perfect way to demonstrate, but I said "Right, how long is it going to take you to find that lot out?". Then of course, after a minute and a half or so, they cottoned on to the fact that they needn't look at the blank ones, but it still took them quite a nice time to sort them all out. So we estimated that it would take something in the region of two hours just to sort out that information for the whole school. And then we extended that one stage further by bringing in human error and human fallibility, so I gave the pile to someone else and said "Right, I want the names of everybody whose last names begin with J, K or N" and that took quite a long time. They were beginning to realise that you were dealing with pieces of paper with vast quantities of information on them and, although it was all there, when you wanted to get at it then, by crikey, you have a job on your hands. So that point is proven with a vengeance. So now the next point is how to improve on this and we discussed how we might do this and decided that since there are ten pieces of information on each sheet, we could divide them into ten lots - say, one of them alphabetically by name beginning with A, another one in Date of Birth order beginning with 1st January, or roads in which they live beginning with A - and the permutations on how you might order this lot are phenomenal. We calculated that we would have something in the region of 12,000 different

pieces of paper, which we decided was neither quick nor efficient.

NL: That's fascinating. Once you've done the edge-punched card exercise and demonstrated that there is a quicker and easier retrieval method, we are going to bring in a terminal and that's the sort of information they fill in on computer cards before-hand. That will complement nicely what you've been doing.

4.4 Module 3 - Information in Police Work and the Law

- 4.4.1 General Introduction to Module 3 A full and detailed description of the content of module 3 is given in Chapter 2, section 2.2, as an example of the approach in the 'Information' course. There is thus no point in repeating that here and the 'Lessons and Methods' section will be omitted from this part.

The initial idea for a module on police work and the law was mooted in conversation with Ray Cackett early on in the course design. A small paragraph in the 'Guardian' newspaper about the Police National Computer planted the seed of an idea, and we considered that this might grow into a series of exercises on information in police work. It was also fairly easy to think up other lessons which would be valuable in the information context, but the details of module content were deliberately left vague until some other research had been done and other people talked to.

Overtures were made both to the Public Relations Department of the Police National Computer Division at Hendon and to the Hampshire County Police Department at Winchester. The former did not deign to reply, but the Communications Officer of the Hampshire Constabulary, Chief Inspector Baker was willing to arrange an interview at a mutually convenient time.

Accordingly, arrangements for Ray Cackett and the course author to meet Chief Inspector Baker and a list of questions about the uses of the Police National Computer, the implications of that use, the details of its configuration etc. was prepared. Our host was very informative insofar as he knew the answers, and helpful insofar as he was able to make his own educated guesses about the future without divulging official secrets. As a computer expert, his expertise lay far more on the applications and operations side of police computing; the hardware details were unimportant to him and he was able to illustrate how the computer could be used both on a national and on a regional scale. The latter use is based on a command and control system using mini-computers sited in the regional police offices. The major application for the Police National Computer was as a register of stolen cars and he was able to explain by reference to specific examples how this would work, a very useful basis for Case Studies, some of which have been used in the module. As to the other PNC applications either planned for the future or in the writing stage, Chief Inspector Baker was unable to be very informative. Applications such as fingerprint matching or registers of known offenders were suggested as being

likely candidates, but he was intractable on these, either because, as a regional officer he did not know what was centrally planned, or because of the implications of contravening the Official Secrets Act by divulging information of this sort. He did talk at some length about the problems of setting up a missing persons file, and hinted that this might be a possibility in the future. Nevertheless, there were areas we discussed which proved to be useful for lesson construction in later weeks. Notable among these was his reflection of police attitudes to and distaste for the way they are portrayed on television. He thought that a sharp distinction should be made between the police on television and the police in reality, so that children are taught that real policemen rely on information rather than coincidence, hard work rather than a dilettante dashing about from one situation to another, and that real people act and say things far differently than is portrayed on television. The lesson which incorporates a Z-Cars script is an attempt to concur with his request and to redress this balance. Other lessons which have their origins in the talk with Chief Inspector Baker are those on police applications of the computer, and the first lesson, which deals with the difference between 'information' and 'knowledge'. While this latter was not directly inspired by anything discussed in the interview, what was stressed time and time again by Chief Inspector Baker was the importance of the man on the beat - therefore the lesson 'What do you know about your friend?' and the beat simulation later in the module are efforts to enable the children to understand the problems of the policeman on the beat in a practical way.

The lesson on the Police National Computer is still a little thin on authentic prospects and applications. This is in spite of the later attempts to have questions about PNC configurations and applications answered by other methods. Second contact was made through a colleague of the course author from LAMSAC, an organisation which has more direct contact with the police authorities. His enquiries led precisely nowhere, his own comment being 'since PNC applications are covered by the Official Secrets Act, the information one can get from any of these people is the same as one could get from a chapel full of Trappist Monks.' He tried. The author therefore decided to make a second attempt, sending a full account of credentials, and the reasons for the request. This letter elicited a reply referring to the article in the magazine 'Computer Weekly' printed when the computer first became operational. The reply also regretted that no further information could be given. In fact the news article gave no

more information than was already known, ie that it had become operational on 1st January, 1974 and that the first application was to make available a list of stolen cars. Thus other sources of information had to be consulted. In the United States, where they are not so coy about the way they use computers, perhaps because the civil liberties lobby is powerful, the state police departments who use the machines allow manufacturers to write up the details into small booklets. These extol the virtues of the computers and include a great amount of detail about the applications for which they can be used. An example of this is the 'ALERT' system used by Kansas Police Department. This has been written up into an Application Brief by the IBM Corporation, and is available to all who wish to read it¹. From it, one can surmise upon the possible police computer applications to be introduced in this country during the next ten years, and the lesson in module 3 on police computer applications includes some of these. In fact a more complete list can be drawn up by reference to several Application Briefs covering several states of America, although of course care has been taken to make full allowance for the different way in which the police and the judiciary interact in the respective countries. Another source of 'police and computer' snippets is the newspaper. For example, under the heading '1902S aids Dundee Crime Detection' the 17th May, 1974 edition of the Glasgow Herald reports:

'An improvement in the crime detection rate is one expected benefit of a criminal record system being implemented for Dundee City Police. The first stage of the system, which has been designed and developed by Dundee Corporation in consultation with ICL, has now gone live on the Corporation's 48K 1902S.

The stage already operational covers records of previous convictions. Stolen property records, reported crimes and the fire-arms register will be phased in over the next few months.

To get details of previous offences from the convictions file an officer at a Visual Display Unit keys in the name of the person being investigated

Conviction Data is being extended to incorporate such factors as modus operandi, appearance and known associates'

It makes an interesting comparison with similar situations in the United States of America that, when the Chief of Kansas City Police wished to incorporate a system for forecasting crimes on to the ALERT system, it caused a 'databanks and privacy' earthquake which had repercussions through-

1 ALERT (Automated Law Enforcement Response Team) Kansas City, Missouri, Police Department. Published by IBM Corporation, U.S.A.

out the United States. The newspaper article from the 'Guardian' shown on page 4.4.A22 illustrates this fact, and the concern shown in the United States over such issues. In this country, articles such as the one quoted above occur relatively frequently, particularly in the 'trade journals', and if the Chief Constable of Dundee were to wish to extend his system to 'forecasting crime' - after all he already has most of the data he needs to set it up - one wonders whether there would be the slightest frisson in the response of the public in this country.

This is why lessons at the end of module 3 are devoted to the possibility of misuse, rather than to the use of, computers. In effect, the story 'Computers Don't Argue' was discovered in an anthology of short stories produced for schoolchildren, and of course, as the treatment of this module by Harry Wright and Steve Ward at Henry Beaufort School shows, the Science Fiction field offers many openings for ideas on the subject. At this age there is no effort being made to formalise the issue of databanks and privacy into pros and cons. This is probably better dealt with when the child has had more experience of the world. Nevertheless, one hopes that the story makes the child of this age aware of the problem and its importance without making it overdramatic.

There are a number of reasons why police work should be chosen as a suitable topic in a course on 'Information', and in particular in a course which adopts a structured approach and emphasises practical work as its chief *modi operandi*. Firstly, there are excellent opportunities for the inclusion of creative work, the roleplaying exercises of the drama lesson, the creative writing exercises in the English period and the scope for practical demonstrations of the work of the policeman. Then there is the reality of the policeman's job as a gatherer and processor of information, which brings in the idea of information as something personal, something relevant to all of us, children too. The extra dimension to the information story brought in by the use of the computer helps children to see the computer as an extension of the human brain, helping to solve problems which could not otherwise be tackled because of the limitations of time and processing power. In carrying out the exercises the children hopefully recognise that there is not only a personal need for information but an interpersonal one too, so that communication and sharing and discussion play their parts in solving problems.

Information processing may not be new, but the use of the computer, particularly in police activities, is new, and it has the advantage of being

real to children steeped in the tradition of the police as a television spectator sport. Indeed one has seen more and more mention of the Police National Computer in some television police series, much in the same way that forensic medicine has enjoyed its vogue in the past. Thus one can talk to children and work with them 'from their own level', in that they know something about the subject already. The exercises and worksheets can be constructed to operate from the known to the unknown, and to give new insights and experiences which children can value.

Lastly, in police work there is the social aspect of the work. One of the main tenets of the 'Information' course is that computing is essentially a social science rather than a physical or mathematical one. This is confirmed in this module by treating the issues of police-child-public relationships in present day society, discussing the potential of the machine for good and bad, and in the setting up of social situations in which the child may become involved with the job of the policeman. Many teachers have said, in their more cynical moments, that the choice of police work as a topic was an excellent one because of the frequency with which some of their pupils come into contact with it. Hopefully module 3 deals with the issues in a humane and understanding way, emphasising the constructive side of police work and allowing the child to identify in a positive way with the policeman and the artifacts at his disposal.

4.4.2 Reactions Pages 4.4.A1 to 4.4.A8 contain transcripts of conversations with the various teachers who have been involved with this module, while pages 4.4.A9 to 4.4.A15 contain some valuable notes made by Jackie Lord, who took over from Rosemary Trew in the Spring Term of 1975 at Yateley. The reader is referred to these transcripts before continuing with this chapter. As a result of these some additional material has been added to the module, especially in the provision made for the less able children. On the whole, the module was considered to be too academic by some of the teachers; not surprisingly, since it was originally written for the 'house band' forms at Yateley school. The reactions of some of these higher ability children are presented in the form of written summaries on pages 4.4.A16 to 4.4.A21. While their comments refer to other modules of the course, the majority of them mention lessons in module 3 as being of particular interest.

So what, in general, can be said about module 3? Firstly, the two teachers at Henry Beaufort who taught most of the lessons and used their own particular

methods, were more lavish in their praise of the material than of any other module. This may be because they had had a whole term to become accustomed to the style of presentation, and they were able, without feeling guilty, to modify it drastically to suit their own purposes in the teaching of English. This is of course within the spirit of the material and is what was recommended to them, but, in the event, the overall emphasis is on information processing and handling occasionally became obscured in the glaze of the imaginative treatment they afforded it. At Yateley, the three teachers concerned tended to treat the recommended subject matter and approach with a greater reverence for, and with closer reference to, the notes. This again is understandable; Ray Cackett, whose first year comments were unfortunately not recorded on tape, was very helpful in the construction of the module and would obviously wish to see some of his ideas brought to fruition in the way he saw them. Jackie Lord had been asked to take over from Rosemary Trew during the holiday immediately preceding her teaching of module 3. She was therefore struggling with the philosophy and content of the course, and because it had been sprung upon her without an adequate briefing, or even a warning, she had certain reservations and pre-judgements which she was never to lose during the teaching of the course. Lastly at Yateley, Sheila Oviatt-Ham did show the imagination and mental agility to alter the material to her own purposes, but she did not lose sight of the objectives of the course in doing so. Perhaps, to explain how the lessons did or did not match up to the recommended content, were received by teachers and children, and were or were not omitted, a more detailed appraisal should be given to the individual lessons as they were taught.

Lesson 1 is an attempt to portray the policeman as an information gatherer, much in the same way that we too process information about people. It tries to say something about the levels of information we can have about people, and in a sense gives an insight into our own personal needs, drawing an important distinction between knowledge and information. To help in this worksheet (P/P/1) is provided, 'How much do you know about your friend?'. This is designed to illustrate the concept that, while one may have knowledge about a person, one does not always have all the information about that person, whereas a policeman can, by pure observation, glean information without knowledge. In this way one is saying something about the job of the policeman, enabling the child to identify, and also something about the difference between information and knowledge.

Sheila Oviatt-Ham (page 4.4.A2) tended to skip over this quite quickly. She saw it as an introduction to the television lesson, a subject about which she has often enthused, and she seems to dismiss the topic in one sentence. In effect, the feedback provided by the children on pages 4.4.A16 to 4.4.A21 tends to disprove this. Of the six uncompleted essays shown in these pages, five mention the worksheet for this particular session. Of those who expressed an opinion about it, all were complimentary, and, if one allows for the tendency of children to overstate a case, the comment of P. James (page 4.4.A20) ('The paper we did on how much we know about our friends was brilliant. It was very funny to look at how people saw you') shows that he at least gained some insight and pleasure out of it. The fact that this lesson, rather than others, lingered in the childrens' memories with pleasant aftertastes is interesting. There could be many reasons for this but perhaps the most powerful is the way in which it personalises the problem in terms which the children understand and find interesting. However, at the other end of the ability spectrum, Jackie Lord was struggling with her first 'Information' lesson. Her comments are reproduced on page 4.4.A9. Before the lesson began she appears to have had some trouble in the interpretation of the lesson notes. Her comment that they are long is valid. Indeed, they were meant to be, so that beginners like Jackie could receive as much help as possible. Perhaps there has been some miscalculation about the teachers' understanding of conceptual material, but this must be taken in the context that Jackie herself is an experienced teacher, that Rosemary, a probationer, was thankful for the copiousness of the notes, and that the Henry Beaufort teachers didn't consider this to be a problem. The matter had been discussed with Ray quite early on in the teaching of the course and, while he too deplored the length of the teachers' notes, he saw the point of it for the less experienced teacher. It was at one time agreed that perhaps two levels of notes were desirable, but this is another task which has not been implemented largely because of a lack of time. Jackie's other points concern the teaching of the lesson. Her preferred approach of using a 'Wanted' poster and a form as a joint exercise for the lesson indicate her preoccupation with keeping lower ability classes busy in some form of practical activity for as long as possible. Indeed, conversations with her elicited the strong opinion that lower ability classes should not be involved in oral discussion for more than ten minutes at a maximum, and preferably for five minutes at an average. Thus her criticism of later lessons as being too discursive is prompted by this strongly-held

conviction. The 'Wanted' poster approach is discussed in Harry Wright's treatment of the material later in this section. It was suggested to Jackie as an alternative approach particularly suitable for less able children. The fact that the exercise had, in her opinion, a 'high noise potential' must again be taken in the context of the fact that this was Jackie's first lesson. The classes she was teaching were acknowledged to be 'difficult' by other teachers in the school, and the high noise level may have been as much a function of the class as of the material. Certainly, Steve Ward's highly personal treatment of this exercise (page 4.4.A4) does not agree with this diagnosis, since his class 'worked in deadly silence for 15 minutes', but the more interesting matter is that this point about noise has been made at all. The recommended approaches in the 'Information' course may indeed produce a greater noise level, but this is primarily a matter for the teacher, who has always the last word on the subject of class control. It is the author's own opinion that, if the children are noisily discussing the work they are doing, this can be an indication of their interest, assuming of course that what they are being noisy about is relevant to the subject matter being taught. However, it is readily acknowledged that this point can more easily be justified in the abstract than in the actual classroom situation, especially where notoriously difficult classes are concerned.

Ray's efforts with this lesson were tempered by the great pressures on him in other lessons. At this time, his new 'A' level Economics class was taking a lot of his preparation time, and, by his own admission, he was doing minimal preparation for the 'Information' course. In the previous year he had taught lesson 1 and had used the worksheet with some success with brighter, house band, children. At that time he had expressed some doubt about the ability of this material to last a whole lesson. His reaction to the lesson this time tended to confirm this even though the children seemed to take longer to grasp the points. Also, as has been indicated earlier (page 4.4.A1) he had not overcome his doubts about the suitability of the 'Information' course for lower ability children. There was some basic misunderstanding on his part of the purpose of the exercise. On page 4.4.A1 he says that he thought, 'it was part of the exercise, to do someone outside - because if they did someone in the class you got a certain amount of discussion in the class and that was really defeating the whole point of the exercise. I think the objective was to show that the knowledge was lacking about close friends wasn't it?' There are two misunderstandings here. Firstly, the decision to 'do' someone outside the

class was a fair enough approach but it tended to take away much of the personal, child-centred, interest from the exercise, and precluded much useful follow-up work. Secondly, the realisation of the lack of information about close friends is only a means to an end, rather than the end itself. The objective was to make a distinction. What Ray taught was a series of facts which may or may not have led to the distinction being made. Certainly Ray is himself aware of the lack of preparation and organisation for these lessons and is apologetic about it. This has its roots in his belief about the inadequacy of the children, but, more intensely, in the sheer pressure there is on the teacher at the classroom level to prepare and teach lessons on several subjects to children of all abilities.

In cases where there is the opportunity to incorporate facets of the course into the normal syllabus this pressure eases. Pages 4.4.A4 and 4.4.A5 explain how Harry Wright and Steve Ward tackled this first lesson at Henry Beaufort. Harry did not use the worksheet or 'questionnaire' as he called it. One reason for this was that he had noticed among some members of his class a resistance to these as a test for learning, and another was that he felt the need to persuade the children to write in a more creative way without the aid of what might be construed as a prompt. Accordingly he designed the 'Wanted' poster lesson to make the same point, while using the questions on the sheet orally to lead the children into the problem. From this the children would learn how difficult it is to describe in informational terms the distinction between physical appearance and the mental and spiritual characteristics which make a person a 'friend', as opposed to an acquaintance or a person seen for the first time. In the follow up exercise, which entailed identifying the person described, other insights were taught, such as the changing nature of information as it relates to people, or such as the information given by clothes. The elimination exercise carried out at the end of the lesson was designed to give yet another lesson on the nature of investigation. The reaction of the girl who objected to the phrasing of the 'football' question (page 4.4.A4) indicates that some passion was generated by this lesson, and perhaps also added another teaching point about the framing of questions on which the teacher might have expanded if he had the time.

Steve's treatment of lesson 1 was even more imaginative. In setting up the situation of a 'spy quotient test' he managed to find the sometimes unusual combination of silence and enthusiasm. The fact that the children were keen

to discover who had got the questions right is a demonstration of their interest. The introduction of different topics in reading from novels, and discussing disguises and how they may be changed, was an excellent way of leading naturally to the next lesson on television treatment of the policeman. During the course of an earlier briefing session, Steve had been concerned that he may be 'prostituting your course'. In effect, by the introduction of new ideas and new ways of teaching both Harry and Steve have greatly enriched the course, and have demonstrated how to use the fairly loose course structure to suit their own purposes. The danger in this might be whether the lesson objectives become immersed under the embellishments. In this case they have not done so, and the children have probably learned more about information in this context than they would have done if Harry and Steve had strictly followed the course notes. In addition, the children have been liberally entertained, and hopefully, through the catharsis of pleasure, some of them may have gained in awareness.

Lesson 2 is the answer to Chief Inspector Baker's plea (page 4.4.3) that children may be taught the differences between the highly fictionalised television world of 'cops and robbers' and the real world of the 'copper on the beat'. The television script '200 Tartan Teddy Bears' (pages P/P/3 and 4) has been available to the teacher from the early days of the course. The sheet of questions 'The Police on Television' (P/P/2) was constructed in response to, and to a design of, Jackie Lord's suggestion shown on page 4.4.A10. What has emerged from her remarks, and this was more confirmation of a latent suspicion, was that there is insufficient material for the less able pupil in the course. There is a shortage of material which requires them to draw, rather than to construct word pictures which they had difficulty in doing. There is a lack of easily understood, spacious worksheets with which the less able child would feel able to cope. These were valuable comments, and, to some extent, they have been acted upon. Nevertheless, from Jackie's description of the lesson (page 4.4.A9), it was not entirely unsuccessful. The children were competing with each other to compile the longest television programme lists which must have made for a lively session (with a high noise potential ???), and the children worked willingly enough in their drawings. Only with the Z-Cars script were there problems, and it is doubtful whether any material would have satisfied those who cannot read, save the showing of an actual television programme or the taperecording of a short radio thriller (this was in fact discussed as a

possible project at one stage of development in this module). In spite of her difficulties, Jackie appears to have constructed a successful lesson from the material made available to her. In conversation, however, after the lesson, she did make the point that she would have expected the worksheets to have been part of the course material, since a disproportionate amount of preparation time is taken up if they have to be constructed by the teacher. Because of unfamiliarity with the subject matter, this preparation time is already lengthy. These are fair comments, although it must be said that, to cater for a wide range of ability levels, and to draw up worksheets for these, takes up a considerable amount of time.

Sheila extended the 'police on television' concept in the way that one may expect from an English specialist, by asking the children to write their own plot (page 4.4.A2). She does not herself have a great deal to say about this lesson or the material she used, but the children themselves do comment on pages 4.4.A16 to 4.4.A21. P. James (page 4.4.A20) thought the Z-Cars script very boring but 'enjoyed writing the detective story immensely'. Leslie Deacon (page 4.4.A19) thought 'the best peice (sic) of work' out of all the things she could remember 'was the Z-Cars script'. Michael Dwane and Peter Schofield merely described what happened (at least they remembered the lesson). J. Connel 'did not enjoy the Z-Car paper' and Ricky Selfe 'had something to do with policemen and Z-Cars' but he didn't like it 'because there was no fun in it'. Thus, in spite of differences of opinion, the majority of children in the sample appears to be against the script, although this says nothing about the reasons for this; whether it is understandable, too detailed, or whether it is what it says which puts them off.

Steve approached the script through his drama lesson again (page 4.4.A7). His class used the script for 'investigations and interrogations' and in so doing discovered two major teaching points in the exercise, the use of coincidence and over-characterisation in the plot. An extra spin-off from treating the subject in this way was to discover the difference between the way that people actually talk to each other in real life as opposed to television dialogue. Harry took the coincidence theme further by extending it to real situations from within the childrens' experiences, a good example of using these to achieve interesting insights into the real world of information.

The Sherlock Holmes filmstrip which acted as a focus for lesson three was lost after the first showing by Ray Cackett in February 1974. In fact this

proved to be no great loss since the visual back-up it provided for the tape was only minimally effective. The tape, which was recorded using Ray as Dr. Watson and the author as Sherlock Holmes, survives and has been used by Sheila, Ray, Steve and Harry, while Jackie Lord preferred to use the written script alone. Her criticisms were similar to those of the previous lesson; that there was insufficient follow-up work for completion by the class. Nevertheless, she again appears to have had some success in constructing a worthwhile lesson around the script and she extracted, for the benefit of the children, the salient points of knowledge, observation, deduction and action. The questions she has drawn up (page 4.4.A12) were designed to give the children a basic knowledge of the informational objectives of this lesson. The activity under the 'action' column makes an attempt to personalise the material into the childrens' own imaginations and experiences. The remark about 'fancy technological aids' (page 4.4.A11) perhaps betrays the scepticism of some teachers towards the use of educational technology in the classroom, and there seems to be an element of surprise when she says that the class 'actually enjoyed' having the script read to them - whether this surprise stems from a lack of belief in the material or a lack of belief that the class could achieve the 'rare commodity' of silence is not specified by Jackie. In conversation, she repeatedly stressed the need for practical written or drawing exercises which could be used for the majority of the lesson time, and had a dread of the open-ended noise potential situation with these classes.

Apart from factual mentions of the Sherlock Holmes tape on page 4.4.A2, there is little feedback from Sheila, although several of her children seem to bemoan the lack of visual backup, and others mention how pieces of information can be built up into larger inferences. Again it was Harry and Steve at Henry Beaufort who produced the most imaginative use of the tape and followed it up with useful exercises. Harry, for example, used it to start off the composition of a mystery story of their own, incorporating the elements of information, deduction, knowledge and action. He also did a very effective group exercise on 'hands' (page 4.4.A6), which threw up all sorts of interesting facets of information and deduction and which were to be used in later lessons. Steve's slightly different approach used topical elements from a Sunday paper and serialised books, and combines the previous lesson's theme of television with a modern Sherlock Holmes story. In its turn this was also combined with a later lesson on the computerised police force. This was a nice juxtaposition

of elements of the module into a very sensible approach to police work, and it seemed to work. 'It's making them think a tremendous amount' and 'There's a lot of enquiry going on' (page 4.4.A7) are comments which indicate enthusiasm in both teacher and child, and the crime story appears to have acted as a catalyst for the problem solving activity.

Lesson 4, the simulation of the policeman on his beat, evoked a great deal of interest among all the teachers concerned, except perhaps for Jackie Lord who would not have trusted her classes to behave themselves in the unstructured situation. In spite of this interest, however, the lesson was never actually carried out, mainly because the teachers did not have the time to set up the 'beat' or the question sheets which would have accompanied it. However, the Case Studies in lesson 5 were attempted by all and transcribed feedback has been obtained from Steve Ward and Harry Wright at Henry Beaufort school (page 4.4.A7), and written feedback is contained on pages 4.4.A15 and 16, from Jackie Lord. The sheet of case studies which goes with the lesson (P/P/9) was used by all three of these teachers, but Jackie concentrated principally on the fully written up Case Study in the teachers' notes (pages P/T/11 to P/T/15). This was unfortunate, since, as she stated in her written remarks, and made much more plain in conversation afterwards, she was duplicating some of the work done by Rosemary Trew in the previous term. This of course was a bad communications fault, although it was the result of the change of teacher half way through the course. Jackie should have been told of the similarity of the Case Study to that described in module 2. In effect however the particular points she picked out from the module 3 version were those which made it differ, and perhaps the children did not inform her of these differences or did not notice them. The questions asked are worthy of inclusion into the main body of teaching material, especially numbers six and seven, which again involve the use of the child's imagination to a great degree. However, what is disappointing, and also perhaps surprising in view of the success of this type of lesson in module 2 (see page 4.3.A1), is Jackie's assertion that the material was very 'remote from the needs and abilities of my two classes'. What perhaps went wrong here is the recommended emphasis throughout the lesson on 'discussion and ideas produced by and from the children', a format which is distasteful to Jackie. It is possible that her revised format would have produced a similar satisfaction of the lesson objectives, had there not been the problem of repetition.

Harry Wright also had a disappointing experience with this lesson. The problem of girls becoming anti-computer is surprising since the machine has not yet been mentioned in the module. This was taken up with him in later conversations and the general consensus of our thoughts was that the girls themselves were not essentially anti-computer, but were anti-logical thought. This is a much more serious phenomenon. At this point it is probably apposite to mention a comment made by the author's own daughter, aged 11. After being urged to think things out for herself in a logical manner in answer to a particular problem she had, she remonstrated, 'Oh daddy, why do you have to be so logical, it's so boring!' Perhaps this is symptomatic of much of the public feeling about computers and logical thought, and Harry's teaching problem is a manifestation of this protest. However, thankfully, not all the class were switched off by the need to think things out and page 4.4.A7 shows how Harry presented the case studies in, for him, a fairly orthodox way. The results at least demonstrated an ignorance of the world and its functioning which the content of the 'Information' course is hoping to overcome.

Steve, of course, revelled in the material for the Case Studies by once again stamping them with his own teaching personality. Again, he used drama to introduce the scenarios (page 4.4.A8) and again he followed this up in the English period with a bright idea, this time of asking the children to act as witnesses to the playlets and to sign statements of what they might have seen. At the same time he was able to bring in a discussion on bugging as a result of a newspaper article, and to follow this up by preparing for later parts of the course in which the misuse of technology, and computers in particular, is dealt with. Harry too talked about the society of the future with reference to appropriate literature, and this of course was a deliberate step by both of them, since it will be remembered (page 3.1.6) that one of the English department's themes for the second year at the school is 'Beyond the Real'.

One thing that has been learned with monotonous regularity in the teaching of this 'Information' course is that very little ever goes to schedule. The depredations of school events, the incursions of school administration and the absences of staff mean that inevitably lessons become lost, usually at the end of term. Further when a course is going well, as it has been particularly at Henry Beaufort school, one does not wish to disturb the momentum which has been created, and so lessons carry over to the next week. In this way important points can be made and bright ideas tried out. An example of

this occurs in the interview with Sheila Oviatt-Ham at Yateley (page 4.4.A2), in which a complete three weeks of the term to be spent on module 5 disappeared from the timetable because there was a need to complete an on-going exercise. This is neither a criticism of the teachers nor of the course - it is better that the children see a thing through to its completion than leave writings half done and worksheets blank. This is certainly one thing we learned in the first year of testing, when Ray Cackett was being pushed from week to week to do the impossible. This resulted in many uncompleted lessons and created a wholly artificial situation in the classroom. What it has also meant is that whole chunks of module 3 have not been tested. Lesson 4 was one example already mentioned. Lessons 6 to 11 have at best only received a sketchy testing perhaps by one teacher. Some of these have not been tested at all because they are late inclusions or modifications to previously unsuccessful lessons. Lesson 11, dealing with 'Computer Fraud and Embezzlement' is an example of a late arrival not taught at all, lesson 8 has been taught only by Ray Cackett, and that quickly at the end of another topic. The remainder of this section will therefore only be able to deal with reactions to those topics which have been taught from within the rest of the module.

Lesson 6 has been taught only by Ray Cackett. His impressions were that the children obtained great enjoyment out of the exercises such as guessing a minute and estimating distances, but he did not attempt to set up the recommended experiment (see teaching notes, page P/T/15). There was insufficient material here for a full lesson and so he went on to lesson 8 to complete the exercise. There was, too, very little opportunity for written work and Ray felt that this lesson could be combined with lesson 1 to emphasise the points there about police observation. At first glance Ray is correct in saying that the material is insufficient to sustain a whole lesson, but there are two possibilities open to the enterprising teacher here. Since some work in the police module may be incomplete, this may be taken as an opportunity to catch up on this. Alternatively, English teachers would undoubtedly be able to suggest some creative work as a follow-up to the experiments, perhaps by encouraging the children to describe how an identity parade might be held (scope for drama work here too). This would further emphasise the point that information sincerely held is often likely to be wrong and that this is an important factor to be taken into account.

Lesson 7, the Crime Story (pages P/P/10 and P/P/11) has already been

mentioned as being the subject of one of Steve Ward's dramatic epics. In effect the story has been more popular with teachers at Yateley, although it is not the subject of detailed feedback. Both Ray and Sheila have used it with their classes and reported that it has given food for thought and opportunities for creative follow-up work by the children. The prime purpose of the story is to prepare the way for a discussion about police computer applications in lesson 8. However, this latter aspect has been less successful. Steve and Harry could find neither time nor place for the more straightforward presentation of computer applications, and Sheila too did not find the subject worthy of inclusion in her English course. Only Ray has in fact taught the police computer applications lesson as it is set out in the notes, and using the worksheet (P/P/12) as a base. This lesson too was sandwiched into the final ten minutes of the story at the end of the lesson. In trying to encourage the children to think for themselves what the police might use the computer for Ray found himself giving the children the answers, after finding that they had few ideas on the subject. He read with them the paragraph in the middle of the sheet about the Police National Computer and then attempted to elicit from the children what it could be used for and how it might be used in that application. Ten minutes is not of course long enough for this process and the exercise was not completed. Moreover, Ray would have preferred to teach this kind of factual material in a different, more didactic way, following this up by written work.

Lesson 9 has been taught by both Ray and Sheila using the pamphlets and worksheet provided (P/P/13). Both of them report successful lessons with the children working hard at the material and enjoying doing so. The tape/slide demonstration for lesson 10 was not ready until late in 1975, and even then there were flaws in it, mainly because of the lack of familiarity of the speakers with the recording equipment used. Thus it has been tried out only with Ray's class, since he was the only one to arrive at a point at which it was relevant in his course. It has also been shown on numerous occasions to teachers' groups throughout the country. The results are interesting in that, while the adults are prepared to be a little more patient with the unfolding of the story letter by letter (see pages P/P/14 to 21), children are not so ready to cooperate in this way. Ray reports that this tape/slide presentation took two complete 55 minute lessons (in fact, the presentation itself, unhalting, takes 25 minutes), and that the whole of this extra time was taken up in

explaining the nuances and significances of the plot to the children. It was extremely hard work, especially at the ability level of child he was teaching it to, and he doubts whether it is at all suitable for children of that age, cartoons notwithstanding. The author was present during the second half of this marathon showing. Indeed, Ray had to stop the tape after every letter, indeed it was very hard work and indeed there were some perplexed faces among the children. It was also true that a high proportion of the class was trying very hard to understand the story and quite eagerly participating in the question/answer session to the best of their ability. While the lesson was far different from that envisaged in the notes, being completely broken up into its constituent parts, many children appeared to get something out of it, and if, at this age and ability level, one can get over the idea that computers can be misused, if only as an intuitive sort of comprehension, the lesson has served its purpose. There are many things wrong with the tape/slide presentation as it stands at the moment, slowness of speech, technical faults, and too much repetition, but these can be edited out and because of the pilot testing in both adult and child environments, it is known what to look for in improving it.

4.4.3 Summary - There are many lessons to be learned from the pilot testing of this module. Firstly, where the teachers concerned have been prepared to be imaginative, to modify the material to suit their own needs, it has been a conspicuous success. This has been particularly so at Henry Beaufort school, although there were also moments at Yateley when individual lessons made an impact. Secondly, there is a serious shortage of follow-up material for the less able children, particularly in cases where the teacher wishes to stick to a particular format of lesson, and is unhappy about discursive treatments. In this testing, the lower ability groups have, not unexpectedly, been the least motivated by the material, and this would probably be true of all material presented to them. After all, it is what the teacher expects them to be like. In the mixed ability groups at Henry Beaufort there were few motivational problems except with a small group of higher ability girls who seemed to take exception to logical thinking as a way of life.

But to draw distinctions between the two schools is an invidious exercise. It is true that the module has been better accepted at Henry Beaufort on the whole, but with the 'house band' forms taken by Sheila Oviatt-Ham at Yateley

there has been equal enthusiasm. And even in that situation one of her forms was far less motivated than the other. Nor can one draw distinctions between teachers. It is true that Jackie Lord was new to the course and a little bit sceptical of its aims. It is true that Ray Cackett was sorely beset by organisational pressures in the other courses that he took. It is also true that both these teachers were faced with three classes at the lower end of the ability range which also had well-known behaviour problems. And no-one can say that Jackie did not try to make use of the material and adapt it to her own needs as she saw them. Some of her suggestions for written material are excellent and have been acted upon, and many of the lessons she taught were successful in spite of the class. Another lesson to be learned from the teaching of module 3 concerns the content of some of the lessons. Lessons 1, 6, 8 and perhaps 9, have been criticised as not containing enough material for an hour's teaching and these need to be looked at again. Other lessons, notably 3 and 10, contain more than enough material and need to be pared.

The question of whether the module has met its objectives of giving children an appreciation of the work of the policeman, of showing how information is an essential part of police work and introducing them to the ways by which it is collected, processed and retrieved, of producing the intuitive awareness of change in the way things are done now relative to how they were done in the past, and of introducing the idea that information can be misused as well as used, is not easy to answer.

The material in module 3 has given teachers the opportunity to put over these points in their own ways, and the reactions described in this part indicate that, for the most part, they have taken advantage of those opportunities.

Transcript of a conversation with Ray Cackett at Yateley School
on 17.10.74

Background: This was the first teaching of the police module (3) with less able children. Ray had taught it to able second year children in the previous term with some success.

Ray: Yes, I've done the sheet 'how much do you know?' - and I suppose it took about twenty minutes depending on what detail they were doing it and who they were doing. If it was somebody outside rather than somebody in the classroom I think it took a bit longer than that. I encouraged them to do that - I thought it was part of the exercise, to do someone outside - because if they did someone in the class you got a certain amount of discussion in the class which was really defeating the whole point of the exercise. I think the objective was to show that knowledge was lacking about close friends, wasn't it?

NL: The point really was to show the difference between knowledge and information - the sort of thing on that form is the sort of thing that's held for instance on police files, it's what a policeman could, by observation, answer - but he wouldn't necessarily know that person. Also it's the sort of information that's held on a computer file.

Ray: I think I didn't probably make that point clear enough, emphasised it enough. I think they got the fact, it was quite evident, that there are certain pieces of information you could look at and see, and others, more opinionative and abstract, that they just wouldn't know without discussing it - we need to develop that point a bit more. I think this police thing has really been a disaster because I just haven't it's my fault, just lack of organisation.

NL: Have you only done the one lesson?

Ray: All I've done is really what we said. Fiddling about, talking about other things, but not really part of the course as you've got it because I just mucked it up, muddled it up.

NL: But you didn't get far with it anyway so it's something that can be repeated when it does come in.

Ray: I should be able to catch up the time - it's been absolute confusion the last couple of weeks I'm afraid.

NL: OK. So you've done the first part of the intro - what comes next are the Case Studies.

Ray: I'm not worried about what's to come - I can cope with that.

Transcript of a conversation with Sheila Oviatt-Ham at
Yateley School on 6.11.74

- Background: Mrs. Oviatt-Ham had taught some aspects of module 3 to a class of third year children during the previous summer term. As an English teacher she was more interested in the creative aspects of the course and had been scheduled to teach only four of the eleven lessons of the police module. Her classes this term were two second year house and boys classes (above average ability levels).
- Sheila: We took the first week of module 3 - the question sheet on your friend - and talked about knowledge and information as seen by the police. Then we talked about the masses and masses of television programmes and the difference between American and British programmes this week, and looked at the Z cars script and the information in it, drawing it out, and they mapped out their own brief plot of some sort. If we have any spare time next week I'll let them do some of these. I'm going to get the Sherlock Holmes filmstrip and tape next week too. In my notes on this there's lots of things about case studies of crimes - slide sequences and so on - do these exist?
- NL: There's a sheet of Case Studies, but I think you mean the 'Whodunnit?' - a Yateley Crime!, in which case there isn't one. It was one thing that Ray and I talked about at the very beginning - a series of slides which gives a succession of informational clues to the solving of who wrote Mr. Cackett's name on the blackboard. It never got done.
- Sheila: I see, that's a pity. I was away last week but one so it's a question of finding the Sherlock Holmes stuff and then I can finish off the police detection stuff next week. I could use an extra week on doing their own scripts - if you wanted - or I could leave it at that.
- NL: Yes. It's not a matter of whether I want it - it's whether you feel it worthwhile putting it in, and if so, do so by all means. Take no notice of the timetable I've drawn up. You'll notice that you have three weeks on the Transport and Road Research Laboratory from next week. I suggest that you use these on the police module.
- Sheila: Yes, OK. I'll do the wind-up on this and then the Sherlock Holmes. I suppose I'm turning it into English a bit - but purely from the information angle.
- NL: That's great. You're teaching it.
- Sheila: If necessary, can I construct also the walk with half knowing what to look for and the other half not - the beat simulation? Have we anything set up for that?
- NL: By all means. We've got something set up for it. It's fully documented in the teachers' notes. The only thing we haven't got is a sheet of questions - that's because things change - like notices - and there was not much point in drawing up questions.
- Sheila: OK. I can fill in that extra week with that.
- NL: Good. How are they enjoying it?
- Sheila: It's going down much better than it did with the third years. I think it's nearer their level.
- NL: Do you think they enjoy filling in forms more at this age?

Sheila: Yes. They don't mind that at all. They love the files altogether. I've got two very different groups - one of them is absolutely super and most of them have actually chosen to do the course as opposed to anything else. They're absolutely lapping it up and loving every minute. The others I gather are a great problem group everywhere else. They haven't been too much of a problem to me, but information is something that's not easy to teach if you're trying to discipline them the whole time.

NL: Problems of motivation?

Sheila: Yes. I think it's the ones who haven't had the choice of doing it or not, and the structure of the group in general. It's a matter of approach really - I find that I can't just repeat yesterday's lesson with them, the group is so different.

NL: I see. And you find that where you have discipline problems it's more difficult to teach? - but then, everything is.

Sheila: Yes of course. But they're not bad discipline problems at all. There isn't so much general motivation.

NL: How did some of them get an option? I didn't know about this.

Sheila: It's mainly because we haven't enough technical teachers. The second year boys had a choice between woodwork or engineering or information. So I've landed two very different groups. The academic intellectuals who don't want to get their hands dirty and the ones nobody wants.

Transcript of a conversation with Harry Wright and Steve Ward
at Henry Beaufort School on 15.1.75.

Background: Both Harry and Steve are teaching module 3 for the first time and attempting to use the material in accordance with the requirements of their scheme of work for English. This transcript deals with the preparatory stages of the module, in which Harry and Steve are trying to give the children insights into the nature of information, and its relationship to knowledge.

Harry: I didn't say anything about information. I didn't give out the questionnaires but in effect I did the questionnaires first of all by asking them to jot down the answers to a few questions about a friend or an enemy or a person they thought they knew well. Most of them of course chose someone else in the class. Then we talked a little about descriptions and 'Wanted' notices and what you do if you haven't got a photo or a police artist who can make up a reasonable likeness. Then I said that what you don't know is that the friend or enemy you've just written about is a criminal and is guilty of murder, forgery or whatever. So I want you to prepare a 'Wanted' notice which will give a description of this person so that we can immediately recognise who it is. So they all got down and I said they could decorate it into a 'Wanted' poster, and they set to and did it enthusiastically. When they had finished I asked how many had chosen people in the class and it worked out at about three-quarters of them so that was OK. Then I had them collected up in two halves, and this half was given out to that lot and vice-versa. So that everyone now had a piece of writing done by someone else about a third party. I then asked various ones to read out what they had in front of them and we tried to guess who it referred to. It was very interesting - with some descriptions everybody in the class put their hands up. We discounted the ones that none of us knew I knew like those about Great Uncle Bertie. The ones that weren't successful we had a bit of discussion about why, what was missing and who was it. We also did a bit on elimination - there was one which at first sight could be any boy in the class but had a description of what he was wearing. So we got all the boys to stand up and then to sit down as we read out the items. Eventually we were left with one trembling little lad still standing on his feet - and he happened to be the one. So I said 'Quod Erat Demonstrandum' and the bell went.

NL: Did you have the time to make the point about the difference between information and knowledge?

Harry: No. I'm hoping to start off with that this week.

NL: Even so, the point was made in a practical way, wasn't it?

Harry: Oh yes. We did discover when talking about football teams that there are some female chauvinist sows among them who objected to the phrasing of one question which seemed to suggest that only boys support football teams. As a girl she was most put out.

NL: How did your lesson go Steve?

Steve: We started really in a drama lesson talking about the stereotyped spy who always wears dark glasses and white raincoats etc. and carried this on into the information lesson. I took your question sheets and said 'Now in the same way that England Football Team Managers send out their spies to look for talent, MI5 and Secret Service Agencies do much the same thing.

The Home Office have asked me to give you a 'Spy Quotient' test.' I built this whole situation up - some knew I was kidding, others weren't so sure - into the why's and wherefores. The sheets were turned down on the desk, and I gave them a time limit for completing the 'examination'. Anyone found cheating might have an accident on the way home. I think they responded to that situation, and certainly, for 15 minutes there was dead silence. Again about three-quarters chose someone in the class - when they'd finished we went through it orally - they were very keen to find out who'd got what right. I think the number of halfmoons question was very good because it made the point. Then we did something similar to Harry. Next lesson on Monday morning we gave out a piece of paper each, asked them to choose someone in the room and give a description. Then we had quite a talk about what was important and what wasn't - like clothes and how they change - and how sideboards and beards and moustaches can be shaved off. Then we had an extract from a Desmond Bagley novel about a man who looked into the mirror one morning and saw another face. I asked what that might say about information and they got the point that in that context all information becomes highly suspect and dubious. From that we got onto talking about Kojak and Columbo etc. and they're now doing some creative writing. This all fits into Drama as well. The whole thing is taking the form of a project that's going to last a good time. I've got all the material I need there.

- NL: Yes, fine. It would be perhaps an idea to take this aspect as far as you want until they get fed up with it.
- Steve: Yes. That's exactly what I shall do now. I shall feed in from your course in the light of this project. Most of what you have there I have a use for - perhaps not always in a whole class situation, but sometimes with a group.
- NL: You might be interested in using the Z-Cars script next week from a different angle. How it might have been presented on TV in drama, and watching for coincidences and characterisations in the information lessons.
- Steve: They're quite switched on to this police thing - especially the boys. The girls don't attack it with the same fervour - they're a bit more detached but nonetheless very happy with it. A lot of the boys listen to police messages. They're interested.
- NL: That's another aspect that could be added to the module.

Transcript of a conversation with Harry Wright, Steve Ward,
and Jenny Leigh at Henry Beaufort School on 14.2.75.

- Background: Harry and Steve were well into the teaching of module 3 at this time, and were treating it according to their own needs within the English and Drama lessons. The conversation concerns the ways by which they got over the concepts of information deduction and processing to the children.
- Harry: We had some problems with finding the track on the tape. But when we'd found it, the kids listened interestedly enough, didn't they?
- Steve: To the Sherlock Holmes tape? Yes.
- Harry: It went down quite well. I used it for the more imaginative spin-off. We got the idea of information, deduction, knowledge and action and I got them to make up a mystery story of their own about their favourite detective, but which incorporated these elements, - some of them produced some very interesting pieces of work. A lot of it was run of the mill mediocre rubbish - but they quite enjoyed that exercise.
- NL: You didn't take an object in the classroom and ask them to do the same sort of exercise?
- Harry: Yes, we did a thing on hands and examined one another's hands very carefully. I used my left hand, with the ring on it, and put them in groups of six. My group decided, or deduced that I'm married, I smoke, I do jobs about the house in a not very skilful way, I'm a school teacher or someone who works with chalk and ink blots - and they decided that anyone who works with chalk and ink must be a teacher - that may have been a revelation to some of them - they got quite a lot from that.
- NL: Are you going to live a long time?
- Harry: Well, no. They didn't move into the realms of palmistry - we kept out of that.
- NL: You're slightly anaemic?
- Harry: Oh yes. I pointed that out to them - that's not anaemia, it's shortage of calcium. Then we all looked at our hands and found out who wasn't eating enough cheese.
- Jenny: Did you find out any nailbiters?
- Harry: Oh yes. We had some people who were nailbiters and we decided that these people were people of a nervous disposition. It was quite good fun actually - we spent about ten minutes to a quarter hour doing this. We had a look at shoes too.
- NL: Did they get as far as mentioning the importance of fingerprints and spatulations, etc.?
- Harry: I think we mentioned in passing that everyone's fingerprints are different, and indeed every finger is different.
- Steve: What we had a look at with fingerprints, and it turned out to be a nice demonstration, was, in the Sunday paper I take there is a colour supplement thing about the psychology of fingerprints - so we read that out and did a bit of psycho-analysis and found out that it was all complete nonsense. But

what is interesting is that we're running a parallel thing at the moment. We're taking Sherlock Holmes and modern crime investigation and making a lot of comparisons. So we started off with the tape and that got us into the Hound of the Baskervilles which I'm serialising, and at the same time your Crime Story going on in a parallel way. And they were saying things like 'What facilities did Sherlock not have that they had in that?' Which is an interesting exercise because we're looking very much at lines of communication and we were trying to calculate for instance how long it would take for a steam train to get from Waterloo to Devon in 1891, and other ways how we might communicate with each other. That's all been quite interesting - it wasn't in fact a creative, more a semi-creative exercise - they've taken the crime story and tried to rewrite it as a Sherlock Holmes story - so they all run around in Hansom Cabs.

NL: That sounds good. What did they do about credit cards in the crime story?

Steve: Well, that's one thing that got us into a discussion of the banking system of the day, and the equivalent of credit cards were of course letters of note. It's making them think a tremendous amount - there's a lot of enquiry going on - bombarding them with more structured questions - it's really given them a problem to solve.

NL: Have you managed to get Television into the script as well - by looking at 200 Tartan Teddy-bears?

Steve: Oh yes. In the beginning of all this I've asked them to look closely at a number of television personalities and compare these with the fictitious ones we've done in drama. We found that what is portrayed on television about detectives is not the way they go about it in real life. We approached 200 Tartan Teddy-bears with that in mind. We had a nice drama lesson on investigations and interrogations using the script - they soon discovered that some of the ways people spoke to each other just wasn't on in real life.

NL: How about the coincidence factor - the policeman in the right place at the right time?

Steve: Coincidence? Yes, they were very quick onto coincidence.

Harry: We did a spin-off from coincidences and went off into coincidences in our own life. It was agreed that they were very few and far between - they do happen but not very often, and certainly not as often as they occurred on 200 Tartan Teddy-bears.

NL: Did either of you get round to the Case Studies?

Harry: We cut out the first one anyway because we'd done that one before. You know I've got this group of girls who have become a bit anti-computer, and they didn't see a lot of point. It was annoying because they didn't say so or I would have left it and moved on to something else. As it was they just sat nice and quiet and let me waffle on and the others do their bit - but then when we got down to the Case Studies and I asked them to do a bit of writing and to say what they think happened, and how you would tackle this situation they just wrote obvious things which showed they didn't think much of it. Again they brought in enormous coincidences - like the bloke travelling at 70 was a doctor or something.

NL: What happened if they didn't catch him?

Harry: Oh. They just left it and said 'He was never found again'. Another example -

for the clapped out mini in the farmer's field the policeman said 'I'm not on duty anyway, so what'. In another, he cycled back 7 miles to the police station to tell them about it - walkie-talkies, and telephones didn't come into it. Some of the stories were remarkable.

Steve: So were some of mine. Actually we had a lot of fun out of that. Probably because I treated it in a very different way. I used the Case Studies themselves as a stimulus for some drama. I divided the class into 3 groups and said 'I want you to be a character in that story or add any others which you feel would logically come in and work out the situation dramatically. Out of that we got quite a log of imaginative work and perception, observation, action and deduction, etc. Then in the afternoon I told them to fill in a witness report - I told them to fill in a signed statement as to what happened - that was quite an interesting experiment and the results varies from acutely perceptive to totally flippant.

Harry: I did a thing at the end of the lesson - started them off for homework on a futuristic thing - I didn't have time to read them the story, but it's an Azimov story about a chap walking in the streets at 9 pm one evening and the automated police car draws up beside him and asks him all sorts of questions - I used that as an introduction to the police force of the future and we spoke about a recent 'Barlow' programme where they brought in the police national computer. I would have liked to have spoken a bit more about the thought police in '1984' and that sort of thing where we come into the misuse of computers and electronics.

Steve: We brought in bugging as a result of this 1948 bugging device in the Communist Party Headquarters - a lot of the kids cut this out and brought it in. So I also dug up an old article from my student days from the Times Educational Supplement in which someone was suggesting that the answer to the school discipline problem is a good television monitoring system like they have in stores. So we're slowly coming round to the future and the things you have at the back end of the module.

Information and Police Work.

- Lesson 1
- I managed to elicit the words "observant" and "information" from the class.
 - "Wanted" poster and information in form worked best used in conjunction, especially with colour band forms.
 - The exercise had a high noise potential!
 - The teaching notes seemed too long and complicated (their information was not readily available!) They need condensing and to be presented in the form of numbered items or questions to overcome this. Since the background information preceding the lesson notes is so full, itemised lesson notes should be adequate + more usable.

- Lesson 2
- Members of the class competed with each ^{other} to compile the longest list of Police + Thriller series. The word "Thriller" was ambiguous and led to too many irrelevant diversions. We reached a total of 73 series or programmes, including Deputy Davey!
 - I asked the following questions on the board and read them to the class as they were ready for them:-
 - Why are police series so popular on TV?
 - What must a policeman have to solve a crime? (Evidence & information)
 - Read the Z-cars plot (Some of them had seen it; some could not read!!!) then draw pictures of some of the scenes which show a coincidence - where someone just HAPPENS to be ⁱⁿ the right

place at the right time.

c) Everyone wrote down:

Real policemen have to ~~not~~ rely on
INFORMATION not COINCIDENCE.

This whole lesson would work best for
a colour band in the form of printed
sheets with spaces for their answers -
even square "boxes" at the bottom for
their "coincidence" drawings.

Final format for this lesson on computer paper as below -

1) Police and mystery series on TV	2) Police series are very popular on TV because
3) To solve a crime a policeman must have	
4) Read the 2-cars plot (assign each round the class)	
5) Draw two pictures to show how coincidence plays a part in this story (scenes 19, 23 and 24 ?)	
6) <u>CONCLUSION</u> In order to solve a crime, real policemen rely on INFORMATION <u>not</u> COINCIDENCE.	

Module 3 ; Lesson 3

The film ship did not arrive; I could not make use of the tape.

The film ship commentary was good and better used on its own without fancy technological "aids"! The classes followed in silence (a rare commodity) while I read the script to them. They actually enjoyed it.

I then set a Quiz, divided into 4 parts, headed Knowledge, Observation, Deduction and Action. This, or something like it, should have been duplicated with space for answers, if only to counteract the problems of the slow workers, in the colour band forms.

Lesson 4 ; 3rd + 4th February.

The material was very remote from the needs + abilities of my 2 classes. It took me several hours to work out a format which might be acceptable to these classes. Even so, I was not happy with the end result which was not a success with the 2P// and 2Y boys but worked better with 2P who particularly enjoyed drawing a picture or plan of the scene of the accident. I was disheartened when each class told me they had already been through the printed material with Miss Trew.

Some more + more searching questions need to be added to this Quiz.

Sherlock Holmes Quiz.

Knowledge, Observation, Deduction, Action.

A) Knowledge.

- 1) Who wrote about Sherlock Holmes?
- 2) What was the name of his assistant?
- 3) What was the name of Holmes' arch-enemy?
- 4) In what famous Street in London did Holmes live?
- 5) What was the name of the kind of hat that Holmes wore?

B) Observation

In the conversation between Watson + Holmes:

- Red (died) (shrimp) postcards
HW
Pawnbroker (1000s of tiny marks)
- 1) What did Holmes observe that led him to believe that Watson had visited the Wigmores St. Post office?
 - 2) What did he observe on Watson's desk?
 - 3) What initials did Holmes observe on the watch?
 - 4) What ^{made the other} marks inside the watch?
 - 5) What did Holmes observe round the Keyhole?

C) Deduction

- P.O.
- 1) What did Holmes deduce from 1) the mud on Watson's shoes?
 - 2) the pawnbroker's marks on the watch? (brother had been poor)
 - 3) the marks round the Keyhole? (drunk when winding watch)
 - 4) the watch was dentier in 2 places (untidy, careless man, pocket kept watch in)
 - 5) there were 4 pawnbroker marks on the watch. (brother often poor but got back his money to redeem watch).

D) Action

What would you do if, when you came into the house one afternoon, you saw a mark on the front door by the lock, the front door was unlocked; there were signs of a struggle on the door.

floor; you heard a sound of movement as you stepped inside the front door.

- 1) Analyse account of accident into 9 main facts.
Sort these under 2 headings -
Essential Non-essential.

- 2) What questions arise from the few facts given?

Sample:-

- Who is the woman in the green coat?
- Who is the driver of the car?
- Was the accident avoidable?
- Who is the small boy?
- Is he seriously injured?
- What does the policeman do immediately?
- Which school did the boy attend?
- How fast was the car going when it hit the boy?
- Did it hit the boy or did the boy run into it?

- 3) Sort questions into order of importance.

- a) Take "What does the policeman do immediately?" He must take action before questions can be answered.
What does he do?

Get in touch with the police station. (How?)

Take names and addresses of witnesses.

Take name and address of car driver.

Draw a plan of the scene of the accident. (What does he include)

If there is a traffic holdup clear the road.

Clear the traffic jam.

Ask if anyone knows the boy's name.

Find out where the boy has been taken.

Ask about the woman in the green coat (the key witness?)

- 3) Next course of action: IDENTIFY the BOY.

a) Why?

b) How?

Check coat pockets if possible.

Check school badge on blazer

Contact School if School day.

How does Headmaster trace the boy

What we know

- i) The boy belongs to our school
- ii) Doesn't stay to school dinner (probably)
 - or Isn't on first sitting at dinner (possible but breaking school rule)
 - or Is playing truant (unlikely to do so in school uniform)
 - or Has changed dinner sitting with someone (also against school rule)
- iii) Lives on the village side of the school (probably)
- iv) Not known by bystanders so could be a new boy to the area (possibly)

6) Supposing You were the boy in the road accident; empty your pockets; list the items you find - what would they reveal about you? Is there anything there that would positively identify you? If so, what?

7) What description of You might the policeman give the Headmaster if he had not been able to identify you?

Michael Lurie

Information

A list of topics we have done on information technology

① We went down to the end of school leave, and we then wrote down information of the area around us. When we got back to class we were asked on what we knew about the kind of school hall.

② First of all we had a sheet given to us on which write what we knew about our best friend ~~the~~ his appearance, his name in full, where he lives and sisters he has and if so their age. These were the sort of questions we answered.

③ We were shown a film on which we ~~was~~ saw how man first used his brain as a computer to store information of the world around him. He then developed further until in the end he built computers to store information.

④ We were then given a script on a popular T.V. series Z.CARS it was called 200 Tatan Teddy Bears. We then read the script and divided it up into 5 different scenes.

⑤ We followed up this script by writing our own detective story, this was also done in scenes.

⑥ After that we listened to a tape about a well

known detective called Sherlock Holmes, in this we were shown how with small pieces of information he managed find out what the person who owned the pocket watch was like.

⑦ ~~The~~ Last of all we were given a sheet of questions about ourselves.

J. Cassel

INFORMATION

7-1-75

I thought the film we had about machines was not very interesting as it was in cartoon form. I found the trip down to the bottom of School Lane was quite interesting as you looked for information we did not see. I enjoyed the sheet about "How much do you know about your friend" as there was a lot of good questions you had to answer. I think the filmstrip of Sherlock Holmes would of been better if we had seen it as all we had was the tape. After the filmstrip we had to write a story script of a detective story. I did not enjoy the 2 car paper. On the whole I enjoyed best the Computer Study. I enjoyed punching out the Code Card for the computer and I

found the computer terminal very interesting. I would like to study more about the computer. On the whole I enjoyed the Information class.

Jan 7/15

Ricky Selfe

when we went down to the end of the school lane we were to look for information and we had question sheets and it was great fun. We had to do something about police men and zcars but i did not like that because there was no fun in it. ~~with~~ we had a film ~~on~~ on an information machine and we had to do question : i liked the film but not the questions. we had to do something ~~but~~ about how much do we ~~it~~ know about one of our friends. The best was the last information lesson is we had to go to a place near the staff room and we went to the a kind of type writer which put information to a computer in a different place through the telephone wires ~~it~~ that was great and i liked to press the buttons.

Information

- 1 Information about Yateley.
- 2 Information about a telegraph pole.
- 3 The information machine.
- 4 How much do you know about your friend.
- 5 A Z-cars plot.
- 6 Computer cards.
- 7 Doing things with a computer.

I think the best piece of work out of all of these, was the Z cars plot. It was interesting to see how the police catch criminals. In that script there was three plots.

The next best thing was going out of school and seeing how much information was around us, just one telegraph

pole had 36 questions about it.

You need information for lots of things, you need it in police work, gardening and many other things. If a gardener was trying to sell a plant, the customer would like to know many things about it.

The information machine was alright. In that film it showed you how man used his brain to do things. If you chop down a tree, you must know which way it will fall.

I think information is a good subject.

P. James

Information

7/75.

Generally I have found the
Course very interesting. The
film we had at the
beginning of term I found
quite uninteresting. I did not
like the way they put it in
Cartoon form. I found the
trip down the lane
interesting. It was surprising
how much information you didn't
see. The paper we did on
how much we know about
our friends was brilliant.
It was funny to look at
~~what~~ how people saw you. I
~~didn't think~~ think the film strip could
have been good but as I
did not see it I don't
know. The tape was good though
I enjoyed writing the
Detective story immensely.

I thought the 2 card ^{perip} strip
was boring. I enjoyed and
I think most people did,
enjoy the computer work.
I really enjoyed the
using the computer terminal
and wish we could have
longer ^{g's} on it.

Information.

A list of topics done of information. I thought the term.

- ① We went down to the end of school buses and we then wrote down information of the area around us.

When we got back to class we were tested on what we knew about the end of school buses.

- ② Next of all we had a sheet given to us on which we wrote what we knew about our best friend. eg. his appearance, his name in full, what brother's or sister he has and if so their ages.

There were the sort of questions we answered.

- ③ We were shown a film on

which we ~~were shown~~ ^{saw} how man first used his brain as a computer to store information. He then developed further until in the end he built computers to store information.

- ④ We were then given a script on a popular television series Z CARS it was called 200 ton Teddy Bears. We then read the script and put divided it up into 5 different scenes.

- ⑤ We followed up this script by writing our own detective story. This was also done in scenes.

- ⑥ After that we listened to a tape about a well known Detective called Sherlock

Holmes. In this we were shown how with small pieces of information he managed to find out what the person who owned the pocket watch was like.

- ⑦ Last of all we were given a sheet of questions about ourselves.

Private eye

SIMON WINCHESTER, Kansas, Friday

ACROSS in Washington, the Congress and the Justice Department are still embroiled, as they have been for months, in a furious debate over how to control the spreading powers of the FBI's giant criminal records computer.

Here in Kansas City, where the present FBI chief, Mr Clarence Kelley, fostered one of the first electronic police forces in the country, authorities are nevertheless quite happily going ahead with an installation of their third crime-fighting computer: to be installed on Monday morning the big blue-and-white IBM 370-158 will take the controversial field of transistorised crime warfare into a new and even more dangerous area — that of forecasting and preventing criminal activity.

The manager of Kansas City's famous ALERT, or automated law enforcement response team, computer is a balding, intense civilian with steel-rimmed spectacles named Mel Bockelman, who came here six years ago from the Air Defence Command headquarters in Colorado Springs. He is, in a sense, a passionate man. "Frankly, I just love my computer. I know there's been a lot of bad publicity and that about it, but I give until the year 2000 — then people will come to accept that babies like this are really beneficial."

The "bad publicity" to which Mr Bockelman refers has been a cross he has had to bear with uncomfortable regularity. The last time ALERT made the headlines was in April when it turned out that someone down at the city hall had tapped into his terminal — and there are already 225 such keyboard terminals, some of them on the front seats of police patrol cars — a request for any criminal information about one Michael Myers, who was then running for a seat on the council.

All one had to do was to type out at the computer terminal a single line of basic information. First the code AD Test, then the name, Myers M, then his race and sex, M, then his date of birth, say 2.10.35, and then a signal to ALERT to get with it. Two seconds later the cathode ray screen would have filled with little yellow letters saying that Mr Myers had been arrested two years before on a drunken driving charge and that in court was found guilty on the lesser charge of careless driving. That information was spread around a bit and, needless to say, Mr Myers never got the job.

The conviction records of any individual are freely available at any police station in America to anyone, including newspaper reporters, who claim they need to know Arrest records, however, are supposed to be scrupulously guarded — and this is one of the two vital flaws in the ALERT system. The first is that more or less anyone with access to a terminal could get access to the computerised files; second, which is rather more significant in this case, is that ALERT gamely told the inquirer that Mr Myers

had been arrested for drunken driving, but never convicted.

Under the traditional rules all one could ever find out about the poor man was that he was convicted for careless driving — scarcely a reason for losing an election — but, thanks to ALERT, his much more serious drunken driving arrest, for which he was never convicted got out as well. That availability of arrest data, both here and at the much bigger National Crime Information Centre computer in Washington, is a matter of continuing bitter controversy.

But while that simmers on, men like Mr Bockelman want to extend the computer's brainless art, into still more secret sides of an individual's life. Specifically he wants his IBM 370-158 to be able to forecast a crime rather than react to it after it has happened. And in this field he is both open to suggestion and happy to speculate.

"At the moment it's all a big unknown. We just don't know exactly what we are capable of. We have been trying for some months now to predict on a statistical basis where crime is likely to break out and when — we file everything by its location in the city within a block or less, and by the minute of the day, and the day of the week it happened, and we are able to predict with a fair precision the likelihood of a criminal offence happening in that certain place at a certain time in the future. But that's not enough.

Computers like ALERT would have the capability, too, of looking at a person's bank account, say, they would note unusual payments in or out, they could spot things like probable blackmail and fraud and income-tax evasion.

Since ALERT was installed crime has risen steeply in the city — this year so far in spite of all the humming circuitry and millions of dollars spent, murders in Kansas City went up from 74 to 101, rapes from 283 to 319, total serious crime from 23,000 to 28,000. "But that's nothing to do with the computer," says Mr Bockelman. "It shows that society is getting more and more troubled. Perhaps if we can prevent some of that by being allowed to do more with our machines, we would reverse this troubled trend once and for all."

"We want to be able to take every single detail of every single crime and put it all in here and match and cross refer and add in data about the background of known criminals and of men we arrest and about their names, their families, and their jobs and so on, until we can tell precisely who, what sort of a person, will be involved in the predicted crime." Finding out if a man has just lost his job, say, and the fact that he is behind on his payments for the car, for example, would give the computer good grounds for thinking that he might do something. The police could then keep an eye on him and "for his own good," make sure he stays on the right side of the line.

4.5 Module 4 - The Computer - An Information Machine

4.5.1 Introduction to the module In view of the comments expressed earlier (page 1.1.7) about the inadequacy of machine-based courses, and the futility of teaching children about the internal mechanisms and the logic of the computer, it may seem surprising to find that module 4 deals with the computer as an information machine. There are several good reasons for this:

a) The need to make the course as complete an entity in itself, so that this machine-based treatment may take its place among all the other approaches and topics covered by all modules.

b) The need to answer questions about the nature of the machine which will inevitably be raised by the children, and by the teacher who is conscientious enough to want to follow these topics through.

c) The particular approach adopted in this module, the use of bits and pieces of scrap computer which give, not only an idea of their purpose in the machine, but also a wider insight into the development of technology over the comparatively short period of twenty years.

d) The addition into the module of aspects of computer technology which concern the children as people and as members of a larger society; among these are the sections on careers in data processing and on future uses of the computer.

Indeed, particularly in the light of the requirement outlined in b) above the machine approach can provide a valuable contribution when put into the context of the total information scheme. It is only when it acts as the main vehicle, and often the sole one, of instruction that it gives an inadequate, and often distorted, view of the place of the computer in the world in which we live.

In the construction and selection of material for this module the needs of the non-technical teacher had to be constantly taken into account. The jargon and depth of detail in the computer world can be daunting to one unfamiliar with it, and the prime assumption had to be that the teacher of this module has no knowledge whatsoever about the computer as a machine or about any jargon words connected with it. Thus where there is a need to get over factual material to the children, this had to be done through the use of worksheets and pamphlets which contained that information, putting

the burden of learning onto the children rather than the teacher. Alternatively, the teacher had to be spoonfed through a system of codes and ciphers which put the words into his/her mouth. Where the material is more discursive and open-ended, the teacher can control the topic onto more familiar ground and can adapt the notes and worksheets to his own use, whether it be the introduction of some creative activity, or the creation of structured worksheets, or the initiation of a group discussion, or presentations by individuals or a debate.

As far as the learning needs of the children are concerned in module 4, the essential material needs, as always, to be put over in as stimulating a way as possible, and at a level at which the child could understand enough of the ways by which the computer performs its function if he were in the second year and new to the computer. To cope with this problem, the use of actual bits and pieces and the recommendation that they be handled by the children, the creation of whimsical worksheets such as that in M/P/10, the use of slides and pamphlets, and the personalisation of subject matter as in M/T/37, all help to establish a feeling for the nature and function of the machine and its place in modern and future society. The box of bits and pieces from scrap computers has been supplied to the pilot study schools by the IBM Schools and Colleges Computer Information Service as have the pamphlets and booklets for lessons 3 and 4. It is recognised that, in the future, these may not be available, although there are at present no plans to discontinue the service even in the uncertain economic climate of 1975/76, and that alternative means may have to be found of putting over the ideas expressed in the teachers' notes and pupil worksheets. Already several of the pamphlets which were available in 1974 for the tests are now obsolete, a measure of the difficulty of choosing up-to-date material and maintaining its topicality in a situation in which computer architecture is changing rapidly. To some extent it has to be acknowledged that some aspects of these lessons are already out of date, particularly lesson 1, since the scrap computer bits would not be available to schools if they were part of current technology, but in the sense that they are used as props to illustrate a conceptual idea and to introduce elementary facts about the speeds, capacities, and organisation etc. of the modern computer, this is not an important omission. Many of the lessons included in this module are a result of the experience of the author in talking to school groups about computers over a period of time. The methods and approaches recommended have been found to be successful in the past. However, the teacher teaching this module for

the first time is not expected to have anything like the same depth of experience either in the handling of the equipment or in the workings of the computer world. This would involve some considerable preparation time on the part of the teacher, and unfortunately there is no way of making this easier.

4.5.2 Lessons and Methods The reader is reminded of an earlier recommendation to read the module before the following description. The bits and pieces needed for lesson 1 are listed on page M/T/3, the teaching notes cover pages M/T/4 to M/T/18 and the pupil worksheets M/P/1 to M/P/9. In addition the pamphlets for worksheets M/P/5 to 9 are shown at the back of module 4 in volume 2 with one or two exceptions, which have been obsoleted. The set of slides (M/V/2) is not yet in existence, although there will be a definite need for these in an author-independent study of the material. As may be seen, this is one of the lessons which has been structured so that the teacher can follow through the teaching material with reference to a particular diagram (M/T/17). This provides the link not only between the threads of the subject matter in the lesson but also between the actual lesson times in which it is taught, since it is extremely unlikely that the whole lesson 1 will be completed in one hour and sometimes even in two. The key diagram which it is recommended all the children are supplied with and fill in as the lesson progresses is shown on page M/P/1, and its completed form is shown in the teachers notes on page M/T/17, the numbers on this latter form referring to the paragraph numbers in the teaching notes for this lesson. Of course, teachers are at liberty to modify this format if they so wish, and those with a knowledge of computer systems will probably do so, but the tight structure is composed to help those without that experience. The first part of the lesson, which allows the children to handle the bits and pieces, is designed to arouse curiosity, and this formula has been used successfully in many lectures by the author in schools. Indeed as much as 20 minutes of excited discussion and speculation among the children about the purpose and function of this or that piece, without a word being said by the teacher has passed, and in that sort of atmosphere the rest of the lesson can be easily accomplished in satisfying their curiosity. It is not the intention here to describe the lesson since this is adequately done in the teaching notes, but the purpose of teaching it in this way is not only to help the confused teacher but also to get the children to appreciate the difference between a computer and a computer system, to

help them understand the three conceptual functions of the machine of Input-Processing-Output, and to inculcate some facts about the nature of the machine in terms of its ability to work quickly, to store vast quantities of information and to communicate through a printer with the human beings who need the information they have programmed it to perform. Another basic idea in the lesson is to teach the way by which it is essentially a binary machine, and to illustrate the power which can be achieved by the effective use of its binary nature.

This last fact is taught using sheets M/P/2 and M/P/3, the former using well-known concepts to illustrate the binary system, and the latter, a message in machine code, which the children use to simulate the machine at work. During the first session, it is unlikely that children will get beyond this point, so that the piece of ferrite core storage will perhaps be the only actual artifact used. Nevertheless, hopefully their appetite will have been whetted for the remainder of the lesson. It will be noticed that, for ease of reference, the relevant piece has been underlined in the teachers' notes. Once the lesson has succeeded in putting over the elementary conceptual and practical units of the computer system, the second phase is to teach something about speeds and capacities etc. of these units. This is mainly factual matter which the children can find out by using the pamphlets provided. Sheets M/P/4 to M/P/9 contain questions which use several of these pamphlets as a reference source, and this is an opportunity for the teacher to make individual contact while the children discover the information for themselves. Experience shows with these sheets that they need help in cutting through the jargon.

Lesson 2 takes the theme of 'computer people' and tries to make the point that computers wouldn't work without them, that their functions are diverse, and to relate to what they already know about the machine from the previous lesson. For this lesson three worksheets M/P/10, M/P/11 and M/P/12 are used, the latter two in conjunction with a pamphlet (M/V/5) and four descriptive sheets about the various tasks of some computer people which can be turned into overhead projector transparencies if required, (M/T/23 to 26 inc.). The slides of the Card Punch and its Operator do not at present exist (M/V/4). Again, the teaching notes on pages M/T/19 to 22 give the substance of the lesson and it is not intended to repeat that here. Nevertheless, there are some aspects which need explanation in terms of what it is the children are expected to achieve in this lesson. The questions on sheet M/P/10 are an attempt to explain how the job of the programmer requires certain qualities

of logical thought and careful application. While they have a certain amount of tongue-in-cheek humour they nevertheless require such qualities to answer them. The more serious aspects of the job and the greater detail of what it entails are given in sheets M/P/11 and 12. The job of the Systems Analyst is difficult to describe in terms which are within the childrens' own experience since he normally operates from a knowledge of the working of a business environment, and this is outside the normal range of a child's interests. This is why sheet M/T/25 tries to explain in simple words how a business is organised while outlining the essential complexity of the information flow. It is probable that an analogy with the information flow in an organisation which the children know, such as the school, or, at a simpler level, the home would be a better way of putting over these concepts.

Lesson 3 refers back to the key diagram in M/P/1 and illustrates by reference to three more bits and pieces the development of computer technology over the last twenty years. This could be an awkward lesson to teach for someone who knows nothing at all about electronics, even though the essential concepts are made as simple as possible, and worksheets have been designed to enable the children to find much out for themselves. This lesson is designed to give children an opportunity to understand the changes taking place over the past few years and the pace of those changes. In so doing they look at the history of computation using the booklet 'More About Computers' (M/V/7) and the worksheet 'How things have changed' (M/P/14), and are able to make comparisons with the rates of change in computer technology in a relatively short space of time. From within their own experience they make comparisons between the household gadgets available to their grandfathers and parents when they were young and those available now. The teacher has the choice of how much detail he wishes to go into especially when describing the three generations of computers, but it is hoped that, at the end of the lesson, children will appreciate the connection between the computer and the acceleration of the pace of change in the recent past, and be thinking about its implications for their future lifestyle.

Lesson 4 is to some extent a consolidation of the intuitions gained in lesson 3 in that it deals with the applications and implications of the modern computer. Again it tries to draw parallels with the past by comparing how the modern household might come into contact with the output of the machine today and pointing out that things were different in the past. It is not expected that this lesson will be completed in one session. For the applications part alone there

are four worksheets (M/P/15 to 18), which use as their source various pamphlets detailing different applications of computers in the modern day (M/V/8). Further the recommended approach involves much preliminary discussion work using a pamphlet on the point-of-sale terminal (M/V/9) and overhead projector transparencies which make distinctions and points of contact between our everyday life and the use of computers (M/T/37 to 39). By the end of the first part of the lesson, the children should have an appreciation of the many uses of the computer, and how these may affect them in their everyday life, as well as a more detailed appreciation of how it is used in some important areas. The second half of this lesson, which covers implications of the use of the computer, and attempts to foresee the future and its effect, can be a discussion type of lesson or the opportunity for creative work by the children in which they can allow their imaginations full rein. In building up to this situation, the pamphlet (M/V/9) may provide a link to the previous lesson and the teacher is provided with two sheets on predictions (M/P/19) and effects (M/P/20) of the use of the computer in the future, around which he can construct one lesson or many. This latter sheet may be beyond the intellectual reach of some second year pupils but it is within the judgement of the teacher whether he wishes to select, to ignore or to modify.

4.5.3 Reactions The reader is reminded of the earlier recommendation to study the transcribed feedback before reading this section. The transcripts are on pages 4.5.A1 to 4.5.A10 at the end of this part. Before discussing the reactions of the teachers to this module in the pilot study there are three points to be made.

a) This module has been extensively rewritten since its first draft. Lessons 2 and 4 have been added from scratch and because of this they have not been taught in the pilot schools, although the author has extensive experience of teaching the subject matter to school pupils of all ages and levels. In addition lesson 1 has been revised, more in approach than in subject matter. The original version is what was taught by Ray Cackett and referred to by him in the transcript on pages 4.5.A1 to 4.5.A2. Lesson 3 has only been touched upon by Ray, but again the author had some experience of teaching the subject matter, although in a different way than that laid out in the teaching notes.

b) The technical content of some of this module produced an odd effect

on some of the teachers, in that they were, by their own admission, 'terrified' of teaching it. This phenomenon will be discussed later.

c) Because so little has in fact been tested at Henry Beaufort and Yateley Schools it is intended to draw upon the experiences of the author in other schools.

Whereas in module 3, by far the most imaginative approach and work was done at Henry Beaufort, in module 4 the recommended approach seemed to be far more to the taste of the teachers at Yateley School. This is in spite of the fact that though it was taught there under its original title of 'The Engineering Aspect of Computers', which might have been calculated to deter any but the most technical of teachers. It will be remembered however that it was Ray Cackett (page 4.2.A2) who preferred to give the children a more explicit grasp of the computer as a requirement for teaching the course, and so this trend in consumer satisfaction is not unexpected. Certainly his comments on page 4.5.A1 about the content of the module show that he was confident enough to approach the subject matter without qualms, and to confess his ignorance to the children if he did not know the answer to a particular problem or question. This contrasts strongly with the attitudes of both Harry and Steve at Henry Beaufort expressed on pages 4.5.A5 and 4.5.A6. 'My nerve cracked and I had to confess that I hadn't done it' (Steve) and 'Even I, at one stage, thought that fools had rushed in where angels fear to tread' (Harry) are expressions of trepidation bearing little resemblance to the confident innovations of module 3. It may be surprising therefore that the lesson given by Harry which is the subject of the cassette presented as appendix 1 showed no sign of temerity and trepidation, and in fact it overcame the problems of teaching about binary states in a typically neat and instructive way by using a bank of light switches. This lesson is résumé-ed on page 4.5.A4. As will have been noticed, both Harry and Steve use a profusion of figures of speech when describing their experiences in the classroom.

Although one finds some disagreement about the content of the module, it is in the approach to teaching the content that the module should be more severely examined. Here again there is a divergence of view. Ray's enthusiasm for the use of bits and pieces of computer and the motivation they generated in his children is not shared at Henry Beaufort in the same way. Harry wanted to use the box as a stimulus 'to draw and make patterns and start them thinking about the Brave New World' (page 4.5.A3), whereas

Ray's reasons were to produce the impact for teaching the subject matter in the classroom (page 4.5.A2 'their interest is stimulated and that's the main thing'). Indeed, page 4.5.A3 shows that Harry was brought back to the main stated objective of the lesson and had to be extensively briefed in order to enable him to give the lesson in its full technical majesty. Sheila, too, who taught module 4 in her last term at Yateley was apprehensive about using pieces with an electronic origin. Regretfully, there is no written feedback on her lessons since she had left the school before she could be reached with recorder in hand, but she found a greater rapport with the later lessons on applications and implications that with the earlier ones, and eschewed lesson 3 on electronic advances altogether. It would have been interesting to obtain Steve and Harry's comments on the last lesson as a contrast but there was unfortunately no time for them to teach this.

As for the lessons themselves, lesson 1 was the most frequently taught. Both Ray and Harry presented the content to the children; Ray more than once. On the second occasion he was more selective in his use of the bits and pieces but with little reduction in effect, and on the whole he was very satisfied with the material and the suggested means of presentation as page 4.5.A1 shows. Reservations were mainly about the master diagram (sheet M/P/1) and the possibility that it may even be a distraction rather than a help, but even about these he was ambivalent since on the same page he states 'without a diagram it would have been difficult' and 'do we gain anything by having them fill it in stage by stage?' (page 4.5.A1). He found the exercise on codes 'very useful' (Sheet M/P/3), but the combinations exercise 'a bit difficult', although he later conceded the point about mathematical parallels at this age. Harry's lesson, as has been said, bore none of the apprehensions he had been stating. This may have been due to the presence of the author in the classroom, as he said 'to put me right on the technical bits', and to the enthusiasm of the class in going along with his method of illustrating binary combinations, using light switches as outlined on page 4.5.A4. The codes exercise too was exactly at the level of the children and they enjoyed immensely deciphering the 'secret message'.

In fact, this lesson, in more confident hands, can be an excellent means of putting over the main functions of the computer and its peripheral units. The author has visited several schools with a box of bits and pieces and put over the same concepts in different ways, sometimes using the master diagram and the

other two sheets sometimes not, sometimes using any one of these, depending on the time available. The main impact in his experience has come at the beginning of the lesson, when the bits and pieces are given out to the children without comment. Depending on the level and background experience of the children, this part of the lesson can take anything between five minutes and half an hour, and one gets a feel for the moment when it is time to collect up the artifacts and continue with a more didactic explanatory approach. In general the less awareness of computers the more help one needs to give in the way of worksheets, although the code sheet has always proved entertaining at all levels and ages. Having engaged their interest in this way, the children are interested in having their curiosity satisfied about what it is they have been handling and it then becomes a personal experience for them. It helps of course to have a few facts and figures at ones fingertips, such as the speeds and capacities etc. of the peripherals being demonstrated, but this is a facility which comes with practise, and this is perhaps why judgement on this lesson taught for the first time by a teacher who is completely new to the subject matter is a little unfair. One has, like Ray, to admit that one doesn't know the answer to all questions, and accept this as a part of the information story.

The only other lesson which has been taught, and that in part, by the teachers carrying out the pilot study is lesson 3, which Ray has touched upon. This is an even more specialised field in the computer area, and knowledge of electronics is a rare commodity in schools, even within the Physics Department. Ray thought that this was a 'very worthwhile part anyway' even though he had to push it in at the end of another lesson. The author again has most experience of teaching this, although it has mostly been included in a presentation which also taught the concepts of lesson 1. Particularly valuable to this has been the description of 'Eniac' (sheet M/P/13), which has given children a view of the early computer, which they know to be vastly different from the present generation of computers, and from which they can form value judgements about succeeding advances in technology. It has been the author's experience that children are able to relate this to the rate of change in the development of technology in the world at large, and discuss the effects of such changes on people in a surprisingly mature way. Such discussion has been short because of time constraints on visiting speakers, but evidences of this have been, for example, the class which discussed the effects of micro-miniaturisation on the home and the various uses of the pocket computer, and

the ways in which increased access to information, mainly through their television screens (without having been told about CEEFAX¹) will affect people.

The last point to be made about Ray's teaching of module 4 is the difficulty he found in using the sheets on peripherals with the pamphlets supplied by the IBM Schools and Colleges Computer Information Service. Sheets M/P/4 to M/P/9). As has been stated before these were originally included at the end of module 4 before it was rewritten to encompass other topics. The rewriting has moved the discussion of speeds and capacities to lesson 1 where they can be fitted into the lesson at a time when the unit itself has been taught. It is probably right that children should be made aware of the speeds of computers and their capabilities in relation to the speeds and capacities of human beings doing the same jobs. Whether this is the best way to do it is problematical. Ray certainly considered that the pamphlets were not fit for children to use because they were not written for children, and this is a valid point. But neither were the leaflets on the Transport and Road Research Laboratory written for children and as Sheila Oviatt-Ham later indicates on page 4.5.A1, these have been used successfully in much the same way. Perhaps the difference lies in technical content and facts and figures. Before consigning them to the dustbin, it would perhaps be better to obtain a second opinion on using them in this way. Certainly the IBM Schools and Colleges Service has distributed many thousands of these pamphlets to schools throughout the country and received encouraging responses from teachers. The fact that children needed 'a lot of help' (page 4.5.A2) is to be expected; it is the circumstance in which that help is given which is important, and it may well be that the formal approach of pamphlet and question sheet is the wrong one in this instance.

The lesson on Computer People, lesson 2, has not been taught, either by the teachers involved in the pilot study, or in this way by the author. It is true that children are interested in people and the way they go about doing their jobs, but this often applies to older children who are thinking of taking up a career. The purpose of this section is quite different, being more to explain the place of the computer in the modern world with reference to the

1 'CEEFAX' is the experimental information presentation system being investigated by the BBC, by which people may have access, using their own television screens, to general information at any time. Weather forecasts, recipes etc. are examples.

jobs that are performed to accommodate its existence. Thus, to explain the jobs, one must understand the nature of the work to be performed; this the children may have intuitions about after having been taught the first lesson, but they have little knowledge of the commercial and business world. Those things essential to a knowledge of what the Systems Analyst does are mentioned in the lesson. Perhaps what would be better would be a personal practical exercise which puts the child into a mini-Systems Analysis situation apropos the information he has to sort out for himself and the information flow within his own personal information system; this could lead back to the concepts of information as taught in module 1.

4.5.4 Summary Module 4 has undergone such a transformation in approach from its earliest form that it is difficult to ascribe reactions and evaluate its efficiency. In general, the module was more popular at Yateley than at Henry Beaufort. It was also more popular with non-teachers of English than with teachers of English, who tended to be very wary of the technical detail contained in it. Those teachers who have tried to teach it have taught it well, but still have mixed reactions. It is possible that the real difference lies in the label under which the course is taught; where it is a course which has the title 'information' and in which the computer can play an explicit role, technical content is not seen as a barrier to teaching; where the course forms part of the English syllabus, there is a reluctance on the part of teachers to make the technical content so obvious.

On the whole however this module has received insufficient testing for any firm conclusion to be drawn about either content or approach, and further studies will have to be carried out.

Transcript of a conversation with Ray Cackett at Yateley
School on 16.7.74.

Background: This is a continuation of the conversation shown also on pages 4.2.A1 and 4.3.A1. Ray was attempting to review the course after a year of operation. These are his comments about module 4.

Ray: Well, you've seen how successful the Engineering aspect of computing is.

NL: Yes, well, I've certainly taught it successfully before and I know the subject - but that's not the problem. The problem is somebody teaching it who isn't as familiar with it as I am.

Ray: I think that this has got impact, there's no problem about impact. A table full of bits and pieces immediately arouses interest and it can be help for a good couple of weeks. The problem is getting to know the material, but I think after a couple of times of reading through there's no real problem. I think they enjoy it. They ask lots of questions.

NL: Some of which you could answer.

Ray: Yes. Some of which I could answer and some of which I couldn't. I don't really think it mattered. Their interest is stimulated and that's the main thing. I suppose there is a danger of losing interest if you can't answer most of the questions satisfactorily but most teachers have got some idea of the principles.

NL: Well. If you can't you're posing an information problem, aren't you?

Ray: Yes, to you. But I don't know that the others see it that way. I think I did it successfully anyway.

NL: You didn't find any problem identifying the pieces?

Ray: Not really. I think we were a bit more selective on occasions. The second time I taught it we didn't use them all - it was only one week instead of two. It's a bit difficult to explain the functions of some of them - they're a bit airy-fairy. Without a diagram it would have been difficult.

NL: You felt at one point in time that the diagram was a little superfluous. The one they filled in as they go through.

Ray: What do you mean by superfluous? They don't use it again?

NL: No. The point you made was that it isn't absolutely necessary and that occasionally it was even a distraction.

Ray: Yes I think that's a valid point. Do we gain anything by having them fill it in stage by stage?

NL: Well, the point of it is that they've got a record of what they've done.

Ray: Yes. Well, you can give them a record without filling it in as you go along.

NL: But if they filled in their own record it might mean more to them. I don't know.

Ray: Yes. That's true. I think that's probably all right.

NL: I think you also said that they were also making the distinction between the computer as a machine, the unit, and the concept of how the machine works, or what it was for.

Ray: I must admit that the concentration when you talked in class was on the peripheral unit and the storage. A lot about that. I suppose that's acceptable really, because the man on the visit pointed out the CPU as being in the corner somewhere and spent the rest of the time talking about the peripheral units.

NL: The module isn't quite like that because we spend an awful long time talking about storage - we do exercises on it - and binary. They do that exercise of interpreting the code.

Ray: Yes. That's a very good exercise. Yes I don't think I understand really, and I don't think the kids would stand much chance of understanding in detail, what is going on inside.

NL: Yes. You found it took a long time. You had an extra week for the peripheral units anyway.

Ray: Yes. I mean there's lots and lots you could go on to - they've got more access to them - they can see these things. Most of the things you've got are connected with this, aren't they?

NL: You spent a long time on cards didn't you?

Ray: Oh yes, cards. They got to know that later on.

NL: Yes, but it's useful there and saves a lot of time explaining when you come to the terminal exercise.

Ray: Yes. I think that module is very successful. It's adaptable. You can pick and choose.

NL: Yes. Provided you know what's what.

Ray: Yes, and this exercise on codes was very useful. They enjoyed that. They got the idea straight away. There's no problem there. I think they found the combinations exercise a bit difficult.

NL: It's something they will learn in maths at this age anyway.

Ray: Yes, that will be all right. The next thing in this I didn't do much on - the three generations of computers.

NL: I think you touched on it.

Ray: Yes, very briefly. Trouble was I never had the time. I think it's a very worthwhile part anyway.

NL: And then there are these forms on the peripherals, using the pamphlets.

Ray: Yes. They found these rather confusing. They needed a lot of help. The language used, it wasn't written for children. They found them very difficult. They didn't understand what the language was on about actually.

NL: Yes it's difficult concept to get over. I don't think these sheets can be modified, they'll have to be thrown out all together. One problem is that they all deal with IBM machines and I don't want to appear to be biased, but it's very difficult to get hold of the other manufacturers literature in quantity. I think we're going to have to find something different at the end of this module. There are points about speeds and capacities which they ought to know, if only to make comparisons with their own speeds of work. These can be merged with the first part.

Ray: Yes. There's no reason why you shouldn't for example give them a page of

book to read and make comparisons of speeds of disks, etc. Something practical to hammer home the point.

NL: I'll work on that one.

Transcript of a conversation with Harry Wright at Henry
Beaufort School on 8.11.74.

Background: Harry was a little nervous of teaching module 4, since it is a little machine oriented. This conversation takes place in fact before the lesson which introduces the topic, thus Harry is checking up on what he is going to say and thinking of ideas of how to say it.

Harry: If I may digress for a moment, the artistic and creative side of me says that a box of bits and pieces like this

NL: Puts you right off?

Harry: No it doesn't actually. It's just that I don't get the urge to link them all together and make a computer out of them. I want to draw them and make patterns and start them thinking about the Brave New World. I could use a box like this as a stimulus. And these little cards - they thrill me.

NL: Yes. In fact those circuit cards have been used in Art Colleges for mobiles and collages etc. But the object of your lesson this afternoon will be to identify the computer as a processor, and this box here is to try and draw out of the children that a processor has three functions - arithmetic, store and some form of control.

Harry: Is it useful to bring in the library analogy? Where a kid borrows a book and takes it home and when it comes back, if it is to be useful again it's got to go back to the right place on the right shelf?

NL: Yes, they could well understand it better with an analogy like that.

(here is a long briefing session about Harry's lesson in the afternoon)

Harry: What really horrified me when I first read this lot was the title 'Building up a Computer System - The Functions of the Central Processor' - the bits needed are the piece of ferrite core store which I couldn't tell from a fox, TROS module and so on.

(here is a further long conversation outlining the various bits and pieces and their functions)

Outline of the lesson given by Harry Wright on tape at
Henry Beaufort School on 8.11.74.

Background: This follows on from page 4.5.A3 and is the lesson which results from the briefing session given there.

This is an outline only and only the first half was recorded - the taped half-lesson is presented as a cassette tape in appendix

1. Teacher gives out worksheets and introduces visitor (NL) and his purpose. (to help out with the technical bits) 5 mins
2. Brief review of last lesson. The filing of information in the school, edge-punched card exercises. All teacher-pupil questions. 4 mins
3. Introduction to the possibilities of the computer as a storer of information, library analogy, (explanation by teacher). Some jargon (store, retrieve, etc. - questions drawing words from class). The computer in the child's life, how it used to be done (teacher-child interaction). 5 mins
4. Introduction to the rest of the lesson, (explanation). Passing messages - how information was communicated by signals eg smugglers' bonfires, radio, talking with hands (all class suggestions with discussion). 4 mins
5. Search for a binary system in the classroom - demonstration of light system (bank of four switches), working out codes with room across the corridor (practical demonstration using switches on and off and building up binary combinations) - class-teacher interaction for whole of time. 12 mins
6. Back to computer - how it uses binary system to store things. A look at slides of computer storage (NL explains and asks questions) 10 mins
7. Use of sheet M/P/2 and M/P/3 - children do exercises 25 mins
8. Wind up of things learned and summary of lesson (teacher-pupil interaction). 5 mins

Transcript of a conversation between Maurice Hart, Harry Wright, Steve Ward and Norman Longworth at Henry Beaufort School in July, 1975.

- Background: Maurice Hart, Senior Lecturer in Mathematics at Clifton College of Education in Nottingham was evaluating the 'Information' course for the National Computing Centre and with a view to its introduction into Nottinghamshire schools on a trial basis. He was therefore taken to Henry Beaufort School to speak with the teachers involved. The conversation concerns those aspects of teaching the course in which he required clarification.
- NL: Maurice is here to find out what's been happening.
- Harry: Do you want a brief resume of what we've been doing from scratch as it were?
- Maurice: I think Norman has put me in the picture as to who has been doing what, ability ranges and so on. What I need is your view of the course, your reactions to it, the childrens' reactions to it and that kind of think, and perhaps how you see the course.
- Harry: Yes, well. I did write that little memo which summed up our feelings.
- NL: I'd like a copy of that.
- Harry: In which case, since there's only one copy, I'll let you have the rough notes. In essence there's a lot in the course which we found interesting. We chose to go into the experiment because there were lots of things in the prospectus, as it were, which fitted in with our second year work. We work on thematic approaches and in the second year the kids do a long stint on 'survival' and 'beyond the real', and we thought that computers and information and a lot of the lesson suggestions fitted in very interestingly with the two themes.
- Maurice: Does this thematic approach start in the first year?
- Harry: Yes. First, second and third years and the themes tend to get bigger and more umbrella like as they go up the school. As for reactions, we've been trying this with two mixed-ability second year classes - the full ability range in fact - since we normally move some kids for remedial lessons, but in fact we haven't done this for the 'Information' course. This raised certain problems - we found that some of them needed a lot of help because of their reading difficulties, and in fact we got a bit bogged down when we dealt with some of the data connected with computers. Even I, at one time, thought that fools had rushed in where angels fear to tread.
- Steve: When you were sporting around that box of things I was quite convinced that Norman had brought in a stimulus for creative writing, whereas Harry actually thought about assembling it. I began to go a little pale around the gills.
- Harry: In fact we did question a little bit whether we needed the 13 year age group to worry about things like what a nanosecond is and some of those astronomic numbers. I found that even the better kids, the quite numerate ones, don't know what a million is. It's just a word, and to say that this machine has 16 thousand 481 bytes or whatever and can do things in the time it takes granny to knit half the row of a sock, brought

the reaction 'so what?' And in fact some of the girls in particular got turned off and they've created a problem. So that anything that has the word 'computer' in it you have to sidle into the lesson. You see the little shutters go down in front of their eyes. This was partly our own inexperience, I'm sure, in that we entered this field with great temerity and very little knowledge, and perhaps what we have learned from the course has taught us a great deal about how to tackle it. And also information about information.

Steve: Yes I think we shall probably go forward and use some of these ideas in the future, but I shall use that in different ways, having learned from the mistakes I made in doing it this way. In that sense it's been valuable.

Harry: I think that some of our most successful lessons have been ones in which we have departed from the suggested lesson notes. Read them ourselves, digested them, and then turned them a little more to our own ends, and the ones which have been least successful have been those where we have felt very inadequate and very ignorant and just handed out the lesson notes (worksheets) and with a brief introduction said 'try your hand at these, kids'. I think children sense when teachers are floundering.

Maurice: That's true. And when they're not interested as well. After all, enthusiasm generates enthusiasm doesn't it?

NL: So, it's really overstructured for your purposes?

Harry: For us, yes. We're autoskediastic. That is we're making things up as we go along.

Maurice: One of the things you were saying when I interrupted you early on was the way this course fitted into your English and the concepts you were teaching anyway. This course is pretty structured, isn't it? In a way that's one of the things I like about it. You're actually getting them to do something at this stage rather than leave it completely open-ended. How does the fact that it is so structured fit in with what you are doing in English? Have you found any difficulty in adapting to the structure?

Harry: Yes and no, I think. Yes, in the beginning when we stuck religiously to the structure. No when we were prepared to depart from the structure and impose structures of our own. In one sense I seemed to be spending a lot of time getting kids to write one word and one-sentence answers, when the English teacher inside me was thinking they ought to be doing more connected work. Now, it's perfectly true that many of the modules have work which invites children to write compositions; some are commentaries, some quite imaginative and open-ended, others are much more factual and based upon observation and experience. And in fact within the course there are all kinds of writing which are those we would be doing in English.

Steve: And drama as well. I've found that some of it can be adapted very well to this in particular the Case Studies. That's how I went about teaching that body of material, in the drama lesson.

I divided them into groups and gave them a Case Study each, and they acted it out. So, by their roleplaying, they explored the situation and the possibilities involved. We then went on to our discussion and writing stages afterwards.

Maurice: This is interesting isn't it? Because one of my comments to Norman was that it betrays his background as a Geographer. Now you pick it up and

start turning some of it into drama. I think that this interdisciplinary business is one of the good features about it. Has this happened within the school? Have your colleagues in other departments taken part?

Harry: Well, they've shown an interest. It was only that we were floored by the timetable, which we were already committed to before we agreed to do it, that prevented our historian and our mathematician from taking part.

Maurice: That would have been a team-teaching exercise with other second years.

NL: It would have been the same course but taught by different people.

Harry: Yes, certain departments of the school wanted to teach particular modules. We're thinking that next year we're going to continue still in a fairly limited way. We're going to widen the number of people taking part, but we have a problem with the second years and third years. A number of people take German and others do not. It tends of course to be the more linguistically able who do German although choice comes into it and some who are gifted choose not to do it; and it's always a bit of a problem knowing what to do with these other groups, who are then regrouped. And so we are thinking of doing the information course with these people for two lessons a week.

Maurice: I see. So you are definitely seeing it as a basis for developments in the school. I mean you want to go on using it and this means that you must be satisfied customers in a sense.

Harry: Oh yes. There have been things about which we have been tearing our hair out and had our doubts about. We've told Norman this and he's discussed with us other ways of putting it over.

Maurice: Anything in particular?

Harry: Well, I think I mentioned the rather detailed module 4.

Steve: And in fact I did very little of that, because my nerve cracked and I had to confess that I hadn't done it.

NL: Yes. But with the thematic approach this is surely one of the dead ends you explore and then perhaps say it's not for you and come back to the mainstream again.

Harry: Yes. There's so much material there that I don't think we would have time to do every possible bit of every module that Norman had laid out. We can take short cuts through.

Steve: This is something I learned fairly early on. Rather than drive myself insane and stick rigidly to the timetable that's been laid out, you were going to get much more out of it by skipping over certain passages, and spending longer on one where the development was coming from the children and they wanted to go along that particular path.

Maurice: Do you think any of this might have been coloured by the fact that you were teaching in a slot labelled English? When they came they expected to be doing English kinds of things?

Harry: Yes, a little bit. Again, coming back to the worksheet method. I think, if they did 2 worksheets in a row in successive weeks they asked where our story-writing had gone to. At this age kids enjoy very much making up their own fiction and we only have five periods of English a week. I think some of them thought they were being done out of things which were less hard work.

Maurice: So in talking about nanoseconds and things perhaps they thought they ought not to be doing this in English?

Steve: I think there are some people of decided views, who have set ideas on what they should or should not be taught. I'm sure this has contributed in some ways.

Harry: Yes, I think part of my trouble was the girls. One girl is extremely articulate, and having voiced her objection early on, I think she got quite a lot of her cronies to support her.

Maurice: I've tried doing bits of this with a group of girls and I found some of them anti-anything to do with computers. I wonder whether it might be possible to alter some of the course to look at this.

NL: Yes. I was going to say earlier that the original version of module 4, which was highly structured, has been altered considerably, so that there are now three or four lessons at the end which are very much more open-ended. Things like future uses of computers, and speculations about implications and effects.

Steve: I'd like to make the point in mitigation that not all girls were absolutely anti. In fact some are very very keen but then tend to be the more mathematically minded.

Harry: And we have of course got a number of children whose parents work for IBM, and my articulate girl is balanced a little bit by another girl who's rather quiet and much less articulate, but whose father works for IBM and has offered to bring in all sorts of interesting things. But she's the sort who tends to come up at the end of the lesson and whisper in your ear.

NL: There are some modules, aren't there that aren't readily associated with computers. I'm thinking of the police module in particular.

Steve: But then it does because there's a question which says 'what use does, or could, the police make of' which we had a very good discussion on and that took us to Brave New World and Big Brother - we got quite interestedly onto the moral aspect - which was very valuable.

Maurice: Yes. That's good from the Computer Education point of view. That's in a way the world I come from and I think that's the thing that hasn't come through at all in a course which is labelled 'Computer Appreciation'. To start discussions with children on that aspect is really quite difficult. If this course does that, that's a good thing.

Harry: Yes. It would worry me a little bit for a course like this to be taught only by mathematicians. I feel that very often they overlook the sociological implications and we tend to do quite a lot of that. I wonder in fact whether the children who are a little bit anti are inheriting a fear of something new, something threatening, which they get from their parents.

NL: Yes I wonder how far children do talk to their parents about what they learn at school. Have you any evidence of this?

Harry: Well, certainly, children have talked about this to their parents because at the last open day there were a good handful of parents who asked me to explain what all this computer/information business was. How did it fit in with English. Their children had been telling them all about it. So

clearly there has been some feedback from the children to the parents - they haven't just sat there like cabbages and gone off like cabbages.

NL: It seems to have raised some anxiety among parents?

Harry: I don't know about anxiety. I think one or two were just a little bit puzzled to see how it fitted in with English, and I had to give a quick resume of my thematic approach and what we would be doing anyway. I don't think any parent was antagonistic.

Maurice: What about marking? Did you take the worksheets and mark them? If so, on what basis?

Harry: Well. On the whole with second years our ordinary English marking doesn't use marks out of ten or grades, but merely makes appropriate comments, corrections and recommendations. With the worksheets, some I mark with the class, and where there are questions which are interesting because a lot of kids have got them wrong or whatever, we stop and discuss it. Others I've simply gone through, and ticked or crossed, sometimes with appropriate comments. Where it's a normal piece of connected writing I've marked it as normal.

Maurice: Do you find that that part of it is a burden?

Harry: Well, it's something one would have to do anyway. Marking is one of the English Teacher's burdens.

Steve: Me too. I've done all that Harry's said.

Maurice: When you're thinking of development would you really prefer it if there were something on the timetable labelled information or whatever, and have it taught in team-teaching mode or multi-disciplinary mode, rather than it form half of the English syllabus?

Harry: Yes. I think in some ways that's true. I think that point about the psychological impact is quite a good one. If you label a thing Maths or English or Geography or whatever children come with certain preconceived ideas and some of them get a bit worried and there's quite a long settling down period. If you choose a name which is perhaps meaningless to them they come a bit more open-mindedly and one may not have a resistance. Next year, we're hoping that we're going to have some students in from Southampton University, who are going to be working in the team-teaching situation. Exactly how it's going to work we're waiting to see.

Maurice: In the Nottinghamshire schools in the first and second years, a third of the timetable isn't in fact allocated to subjects. It's integrated studies and they don't do subjects like Geography and History. It seems to me that this course would fit into that sort of situation I was just thinking that if you put something called information into the timetable and presented it as an isolated thing then the children might look a bit askance.

Steve: I can see advantages in both directions. In many ways I would like to forget the titles 'information' or 'computer studies' and introduce the material as English. Over a period of an academic year one could introduce quite a lot of it in that way without ever mentioning that you're going to embark on a particular issue.

Maurice: That would eliminate module 4 then - and perhaps the terminal exercise in module 6.

Harry: No. That would be one of the lessons. You see, the kids enjoyed the terminal. I don't know whether this was because they got out of the classroom, or were able to tap out a few keys.

Steve: I'm sure the ancient chinese proverb of 'I do and I understand' has something to do with it. I think that meeting the machine head-on and there it was and they could see it, feel it, touch it and there it was opened up a lot of eyes.

Harry: Unfortunately, the one girl whose name was mis-spelt was the same girl who (tape fault).

NL: That was her fault. GIGO

Steve: I spent a long time looking in the dictionaries for GIGO (tape fault)

Maurice: What about the preparation side?

Harry: Let's face it, where I have embarked on things without sufficient preparation I have most often got into difficulties.

Steve: Ditto.

Harry: On the other hand, I think one gets quite enough from a quick read-through. Most of the teachers notes don't require hours and hours of solid reading. If one reads the teachers notes and the worksheets

Maurice: Is there any material you've taught twice, and you know what it's like the second run through?

Harry: No. I haven't taught anything twice. But I'm sure I'll teach it better the second time.

NL: Is it a burden that the notes are quite copious? Certainly it's been found so at the other school, and some have spent 2 or 3 hours preparing.

Harry: Are there any notes on the HAIKU? If there are I've lost or mislaid them.

NL: Module 6? I think there are.

Maurice: Do you think you'd have been able to cope better if you'd had some training? Say, an in-service course or something like that with a look at the material and a discussion of some of the films.

Harry: I don't know. I'm all in favour of courses. But in practical terms that's hard. There is the difficulty of too many courses. You can't attend all you need.

Maurice: Getting on one would have been difficult even if there had been one?

Harry: Yes. Perhaps an evening a week over 4 or 5 weeks at the teacher's centre would have been helpful. I think I would have struggled more if I hadn't had Steve to weep and wail at and fairly frequent visits by Norman.

Maurice: You like the aspect of someone from outside the school to visit and put you right?

Steve: Certainly. It's got me over one or two rough passages.

NL: There's also the problem of the technical side. Someone to put the program and data into the computer for module 6 for example. You could have done it yourself, but it would have taken a fair amount of training to enable you to do it - and time.

Steve and Harry: Agreed

4.6 Module 5 - The Transport and Road Research Laboratory

4.6.1 Introduction to the module It has been stated earlier that a study of 'Information' in this course includes the study of information 'in its total context' (page 1.3.2). This is consistently so whether the child is studying the concept of information in the environment, as in module 1, the wider applications of information in a specific area of activity, as with the police in module 3, or, as in this module, information within a particular organisation. Thus well known information-handling concepts such as its collection, analysis, preparation, storage, processing, retrieval and communication, may best be studied by reference to such topics as the organisation's geographical position and access, its function as a user of peoples' skills, and its physical layout. All these things are just as much a part of the information story. One of the problems in studying an external organisation such as the Transport and Road Research Laboratory is its apparent remoteness from the experience of the children. Some of them may have heard their parents discussing their places of work, often in pejorative tones; some may even have had the benefit of visiting a factory or commercial establishment; but the majority will know little of life outside the school and home, and very few will have had first-hand experience. The first problem to be confronted, then, is to arouse motivation; to make the place seem real and alive and worthy of study. It is not an easy one. Content, approach, the disposition of material, the knowledge and enthusiasm of the teacher all play a substantial part.

The Transport and Road Research Laboratory has much to offer both teacher and child. For the teacher, there are a whole host of pamphlets and descriptive booklets from which he can acquire necessary information. There is also a well organised film library containing many films on different aspects of transport and roads, which can be hired free of charge. These are also artifacts for the use of the child too, but there is also much to appeal to the imagination of the child. There is, for example, a Research Track, constructed on the Laboratory site, on which cars, buses, lorries can practise manoeuvres, a skid-pan for spectacular vehicular acrobatics, a large prestressed concrete block into which old cars are sometimes crashed to assess weaknesses in structures and in people, banked bends round which vehicles are driven at high speeds, and a dummy-making factory, since crashing people into obstacles tends to be wasteful of manpower. And all these are of course part of the information collection process, since the Laboratory experiments for the evaluation of data. Another aspect of the infor-

4.0.2

mation collection story too is the receipt of traffic accident data from police stations throughout the country. This may provide a link with module 3. The traffic accident problem too, is one which affects children and teachers personally. There is then much that is of interest at the Transport and Road Research Laboratory, around which can be constructed a body of teaching material which not only shows how information is the commodity vital to its existence, but extends into the socially desirable areas of accident prevention and exciting research into future forms of transport. One link between the organisation and the experience of children lies in a study of traffic, since children are very aware of the problems of crossing the roads, of noise in traffic, have parents with cars and are taught to recognise road signs from an early age.

4.6.2 Lessons and Methods Teachers notes for this module are contained on pages R/T/2 to R/T/16 inclusive in volume 2. The pupil worksheets, some of which are reproductions of Transport and Road Research Laboratory material, and most of which are original, are contained on pages R/P/1 to R/P/32. As has been intimated in the previous section, the first task is to enlist the cooperation of the pupils in studying this module and to show it as a place at which exciting things happen, and where results they can see for themselves are produced. The first lesson, therefore, deals with traffic signs and symbols, and can be treated in several ways; as a test of knowledge of traffic signs, as a discussion of their place in the environment, as an efficient means of putting over a message, or as evidences of a changing world. The lesson can then be carried on to a discussion of the movement of people, and could be approached for example by encouraging the children to work out the number of miles travelled by themselves, by the whole class and by the whole school, in a day, in a week, and in a year. This resultant information might now be divided into that spent on the various forms of transport including foot. Again, as in other modules, the first lesson is intended to indicate the nature of the transport problem and to make it real by personalising it. The existence of the Transport and Road Research Laboratory as an organisation concerned with solving such problems can be put into the context of the problems the children have now worked out for themselves.

The second lesson comprises a geographical introduction to the location of the Transport and Road Research Laboratory. As a means of achieving the personal involvement of the children in the object of study this was less important at Yateley, since all the children know exactly where Crowthorne and the

Laboratory are, and were already aware of it as a local employer of labour. However, for schools more than, say, forty miles away from Crowthorne, it would be exceptional if the children had ever heard of the village, still less know where it is. Hence the geographical introduction to its location, which hopefully makes the place come more alive. Certainly the author's experience as a teacher of Geography indicated that children were more highly motivated to learn about the habits and customs of a place when they know exactly where it is, rather than if they are studying a label which might be anywhere in the world. The exercise too is a further introduction to the theme of transport, since the children are encouraged by the worksheets (R/P/1 to R/P/3 inc) to travel there in imagination in a form of transport, using atlases, road maps and a local map provided.

In the third lesson, the children, having arrived, are encouraged to find out more about the things the Laboratory does. This is taught with relation to the problems it studies, and a film 'Safely on the Move' is recommended for use in this. It points out in graphic form some transport problems and shows how the Transport and Road Research Laboratory was set up to study them. It acts also as an introduction to the idea that, to do this, it has to have information, and thereby puts into the minds of the children the concept of the Laboratory as a collector of information. The objectives of the question sheets which may be used with the film (R/P/4 to R/P/6 inc) are several. Question 1d, for example, portrays the position of the Laboratory as an information collector, by encouraging the children to carry out a private class survey of car ownership among parents. Other questions deal with the experiments carried out at the Laboratory, and yet others remind the children of the statistics mentioned in the film and their uses, so that a clearer idea of future problems may be seen.

Sheets R/P/7 to R/P/15 inclusive are provided for the fourth lesson, which deals with facilities, aims and objectives, and people at the Laboratory. It is envisaged that this lesson will take at least two weeks at one hour per week, since the notes are copious and the material provided open to a wide variety of uses. It is from these descriptions that children learn about all the exciting things at the Laboratory; the skid-pans, the Research Track, etc. but at the same time they should get a feel for the multiplicity of information to be processed. The collection, analysis and storage stages in the information story are taught at this point.

If lesson four was intended to produce an intuitive response to the information

problem, lesson five sets out to focus on a particular problem, that of collecting and processing accident statistics, so that the children may learn the importance of facts and figures as well as attitudes and intuitions. Lesson exercises involving personal statistics start off this process of grappling with the problems of processing, retrieving and representing data, and the sheets of tables (R/P/16 to R/P/19 inc) illustrate several ways by which the Laboratory communicates. The question sheet (R/P/20) was designed to provide practical exercises in interpreting tables and in extracting information from them. The choice of accident statistics as a basis for this activity was of course, no coincidence, since the same figures could be used for a lesson on Road Safety as much as for a lesson on 'Information'.

Lesson 6, which will probably take more than one week, could be described as a Case Study, but it uses this as a springboard for a great deal of work on people, and services, on the collection and transmission of information, on the recording of information in mathematical format, and as a platform for illustrating the horrors of traffic accidents. All these things are very different, and are best taught by using the film 'Accidents and Car Safety', although the story 'The Crash' (R/P/21 and 22) has been written to replace this in case it is not available. A lesson which combines the story and the film might be even better. Other resources which can be used in these lessons are 80 column punched cards, the question sheets R/P/23 to 26 inc, and the Stats 19 forms (R/P/27 and 28). In this series of lessons we are now getting close to the computer as an information processor. The information problem is seen to have become a computer-sized one, the use of the Stats 19 forms for the rewriting and transmission of information adds emphasis to this. The Stats 19 form provides a very good illustration of how information may be converted into numbers, of the process of transforming information into data. There are, too, valuable exercises on using these forms to extract stories and maps, which illustrate the reverse process of transferring data into information. No great issue has been made in the 'Information' course about the difference between information and data; it is considered that if such distinctions are made at the wrong time they would only tend to confuse. However, this is an opportunity to make this important point in context and with the practical example as an emphasis.

Now that the necessity of using the computer has been acknowledged, lesson 6 focusses onto the machine itself. This reinforces what has been said about it in

other modules in general terms, and describes the system used at Transport and Road Research Laboratory in particular. Sheet R/P/31 is a recapitulation of what the children perhaps already know, although if the teacher has not kept to the numerical order of the modules, the children may not yet have encountered the machine, in which case teaching about the computer by using this sheet can be approached as a new topic. Sheets R/P/29 and 30 are a description of the particular system and language used at Transport and Road Laboratory, which makes the point that particular software is needed for particular problems. This may be an esoteric point for younger children and in some situations the teacher may feel it expedient to omit the section on RATTLE.

Lesson 8 is important in that it introduces the children to the idea of the concept of information communication, a facet which has not been previously emphasised, but which is nevertheless important in the context of allowing the children to see that the work of the Transport and Road Research Laboratory is done for some purpose. Methods of putting over a message are discussed with reference to its target audience, the facilities at one's disposal and the amount of detail to be included. Naturally these are studied in the particular case of the Laboratory, but the problem can be generalised into the childrens' own communication problems. Several games such as 'Chinese Whispers', which illustrates how information can become distorted with repetition are appropriate for the classroom situation. This of course can lead, in the English lesson, into exercises which make a particular study of communications methods and media.

The last lesson summarises the work which has been done about the Transport and Road Research Laboratory during the previous weeks, and uses sheet R/P/32 as a worksheet for the children. Alternative ways of summarising are, of course, open to the imaginative teacher; role-playing exercises, stub speeches, essays, etc. In addition, the most obvious reinforcement, if the Laboratory is within reach of the school, is the setting up of a visit to the site through the Public Relations Department, although these are often reserved for young people at sixth form level. Hopefully, because of this material and the demonstration that it can be made appropriate to children of a younger age group and lower ability level, the powers that be at the Laboratory have been inspired to re-appraise their policy about visits; nevertheless the main problem is not necessarily one of willingness, but of pressure on the departments concerned to fit in the many people who wish to visit the Laboratory, without prejudicing the work they do. Schoolchildren, especially those who do not

form potential recruits to the workforce, inevitably take a low priority in the visits schedule. As will be seen however, such excursions have been made by the children of Yateley School who pursued this course and these have been made more appropriate to the particular class by a fairly detailed prior explanation of the needs with the Laboratory staff.

4.6.3 Reactions Module 5 has been taught on four occasions by three teachers at Yateley School. In the first year of pilot study Ray spent four or five weeks on a subset of the material with 'house band' (higher ability) children and included a visit in this. The material has also been taught by Sheila Oviatt-Ham to two classes of 'house band' children, one of which also made a visit, by Jackie Lord to two classes of 'colour band' (lower ability) children, and again by Ray to a class of 'colour band' children. Both these latter teachers were not able to arrange visits to the Laboratory, because of internal school difficulties. No written or recorded feedback has been obtained from Ray, but pages 4.6.A1 to 4.6.A4 form a transcript describing Sheila's experiences with the module, and pages 4.6.A5 to 4.6.A13 contain work done by Jackie Lord's classes. Jackie modified the material considerably in her treatment of the subject and this will be described later in this section.

The set of slides for lesson 1 has not yet been taken and so for the pilot studies this had to be cancelled. Only Jackie Lord, seeing the need for a simple and personal introduction to the subject for her lower-ability children, improvised a lesson using well-known road signs and the blackboard. She reported a keenness among the children to make their knowledge of traffic signs known and on the whole a successful lesson, although she did not have the time to pursue the further aspects of the importance of signs, the usage of traffic and the miles travelled by people.

Both Ray and Sheila taught module 2, Ray during the first year of study but not during the second. His reaction to it was not encouraging. He accused the author of being out of touch with the Geography classroom (which was probably very true), and confessed to great difficulty in obtaining the necessary visual aids for the completion of the exercise, particularly road maps and maps of South-East England. If this was true of the Geography Department, it is not surprising that Sheila, from the English Department, experienced greater difficulty, including atlases in her compendium of non-available materials. Ray's particular criticism concerned the requirement of neatness in drawing

maps and in presenting them in colour. This was always the author's pet preoccupation when teaching Geography and one suspects that this criticism reflects a difference of approach. Both Ray and Sheila were right in expressing doubts about the value of the exercise for children who live only three miles from Crowthorne, and both of them pointed out that this exercise would be better tested in a school far away from the Laboratory, where there is a need for the children to have this information. Both of them, too, made effective use of the area map (R/P/3), (They could have immediate reference' - page 4.6.A1), although they were doubtful that this could sustain a whole lesson.

The film 'Safety on the Move' was used by all teachers and all classes. Both children and teachers enjoyed it and found it at an acceptable level even for the less able children. Sheila made the most effective use of it, as described on page 4.6.A1. It is in the follow-up that the differences occur. Neither Ray nor Jackie considered that the closely-packed sheets of questions were a viable proposition for their classes. They had both made that point before in other modules. Jackie did try to use them and the use made of two of the sheets is shown on pages 4.6.A14 and 4.6.A15. From this it can be seen that the child who attempted it was struggling with some of the longer questions even though he seemed to be happy enough with the short one-word statistical options, and the fact that he has completed only one and a quarter sheets out of three indicates the difficulties involved in timing. With lower-ability level children it is not always possible to sustain the content of a lesson and to carry motivation from one week to the next. It may be more possible if the film is available for reshowing but film libraries do not work along these lines. However, sheets 4.6.A5 to 4.6.A13 show how the imagination of Jackie's class was caught by the experiments on the Research Track shown in the film. Jackie put them into the person of the experimenter and asked them to describe in words or pictures how they would set up their own experiments to test cars using the facilities at the Laboratory. The standard of work in these sheets is surprisingly high when one takes into account that this was a 'colour band' form noted for its non-cooperation. The selections are taken at random from the sheaf of papers handed over (the children were in fact told that the author would be taking the sheets away for assessment) and do not represent the best of the class. It is interesting to note too in some of them how the idea of 'collecting information' for a purpose seems to have gone home - sheet 4.6.A12 is a particularly good example of this with the method, results and conclusion

format showing how the child has achieved a real insight into information processing.

Ray did not use the sheets at all, confining himself to an oral review of the film. One influence on his treatment of the lesson in this way was the fact that he hadn't done any preparation, believing that the film would be sufficient. The problem of carry-over seemed not to have occurred with the brighter children who were taught by Sheila. She showed the film twice and the children completed the majority of the questions in two weeks, as well as the extra exercise of designing an ideal town, which she describes on page 4.6.A1. She was obliged, in fact, to improvise several times during this term, largely because the procedure for duplicating class sets of material at the University had broken down. In so doing, she demonstrated a commendable awareness of the purpose of the module and the course, allied to a set of activities which caught the imagination of the classes she taught.

By the fourth lesson, Sheila's classes had become well-involved with the problems of Transport and the Transport and Road Research Laboratory. She was able to use the sheets of information, although she did point out that they were 'at too advanced a level for them to understand straight away by just reading' (page 4.6.A1). This is perhaps another example of how the teacher of English has an advantage in the teaching of this module, since Sheila was able to point out how technical documents are put together and the problems of communication of results. She was also the only one to use the sheets of questions on the Research Track, making use of the information sheets rather than the booklet suggested and selecting those questions from the sheet which could be answered. Ray was more selective in the use of the information sheets. As befits a Geographer, he made greater play with the map sheets R/P/10 and R/P/12 and applied his own exercises to these. He also spent a greater time on the discussion side as recommended in the teachers notes, but reported that this had much more success with the brighter children during his first year than with the 'colour band' children.

All teachers used the sheets of tables at one time or another. Jackie thought this a valuable exercise for children in learning about the presentation of information by tables and charts, but expressed a certain apprehension at dealing with numbers and figures. As a confirmed non-mathematician she had difficulty in reconciling the approach used with the subject taught, and also reported that the children had some difficulty with some of the questions, since

all of them were not accustomed to searching for information from a variety of sources. Sheila extended the exercise to include a general study of presenting information with simple, personally obtained, facts. (Page 4.6.A2; 'we did a short exercise with some simple information and presented it in different ways, pie graphs, block graphs, line graphs and tables').

There were some difficulties in obtaining the film 'Accidents and Car Safety'. The alternative presentation of this material was through the story 'The Crash' and both Ray and Sheila read this through with the children. Neither of them enthused but for different reasons, Ray considering that the language used was above the heads of his colour band children, Sheila thinking the language too flowery and sensational. Unfortunately, at this stage the cassette recorder developed a fault and Sheila's further comments became inaudible. In the follow-up to the story both Ray and Sheila made extensive use of the stats 19 form and both thought this one of the best parts of the module both in terms of the childrens' obvious interest, in the gaining of fresh insights into the recording and transmission of information, and in the opportunities it afforded to the teacher for imaginative work. Even Ray, whose main reservations had been aimed at the high level of the material, found that this stats 19 process, which could have been a difficult proposition for low-ability children, was well within the compass of his children. Only Sheila, somewhat surprisingly, reported an inability among two of her class to 'relate numbers on a form to an actual situation', (page 4.6.A3).

None of the teachers got as far as teaching about RATTLE, but Sheila 'did a brief summary' of 'the computer bit', (page 4.6.A3). However, such was the enthusiasm generated by the previous exercise, that Sheila deemed it expedient to continue with that. The 'Communication' lesson at the end of the module was not taught by any of the teachers at Yateley, largely because of a lack of time. When lessons run into another week or when time is taken out for school activities and administration it is usually the lessons at the end which suffer the most. However the last lesson of all, the summary of what had been learned about Transport and Road Research Laboratory, was included in a visit made by Sheila's class to the Laboratory at the end of the term.

The saga of the visits remains to be reported. As has been mentioned, the Public Relations Department were unaccustomed to dealing with visitors below the age of 17, and at first the prospect of actually talking to children of 13 seemed to instil terror. However, since the directive about cooperation had

come down from Director level during the period of development of the material, they were committed to catering for at least one visit during the Spring Term of 1974. It took many anxious telephone calls from Mr. Booker to the school and to the author before a formula was worked out for the type and content of the visit. The first excursion took place, therefore, in April, 1974 when a coach containing 30 boys and girls arrived at the Laboratory gates. Mr. Booker gave a short talk about the purpose and work of the Laboratory, and then the coach set out to tour the Research Track while he explained its purpose and facilities. Unfortunately only half the track was in operation at the time so that the children were unable to see the skid-pan and various other facilities which they had learned about. The children were taken into the film theatre and shown three films about various experiments carried out at the Laboratory, and this was followed by a visit to the computer room, where the Data Processing Manager, Mr. Henley Parten, displaying none of the apprehensions of his colleagues, explained the computer system. Mr. Parten radiated enthusiasm, and had most of the children enthralled with his descriptions and demonstrations of the equipment. There were, however, two or three girls who resolutely refused to become involved and made every attempt to ensure that all around them knew how bored they were. This tended to give an unfortunate impression to some of the staff there. In fact, these girls were not in any of the 'Information' classes at the school, having been included in the party because of time-tabling difficulties at the school. On the whole, though, this was a visit which made real all the things the children had been learning, and Ray pointed out that perhaps an earlier visit, before the teaching of the module had got properly under way might be more appropriate.

The second series of visits was set up for the end of the spring term 1975. It involved three visits to the Laboratory by three second year classes, who had, or intended to have, experience of module 5. In addition, two other visits for the other second year classes to Farnborough College of Technology were arranged. All of these were not easy to arrange. The Transport and Road Research Laboratory were extremely reticent about allowing parties of more than 20 at one time to be admitted, and it was only after extensive negotiation that they agreed to split each party up into two groups for the purpose of each visit. The College of Technology visits, too, involved the setting up of demonstration programs so that all the children could be accommodated. Two weeks before the visits were due to take place, the author was informed by Ray

Cackett that they were all off. A combination of the fact that other teachers had complained about the time these children would have from their lessons, the misbehaviour of some of the classes involved in other lessons leading to a withdrawal of what were regarded as privileges, and the lack of money in school fund (in fact the children were to be asked to pay their own way) led to the cancellation of all trips out of the school. One of them was however salvaged from the wreckage. A telephone call to the Headmaster of the school pointing out the preparations which had been made both by the Transport and Road Research Laboratory staff and by the author, and a promise that no expense would be borne by the school led to the reinstatement of one of Sheila's classes on the visit. Her other class however, was not allowed to go on any trips whatsoever since their bad behaviour with some teachers meant that there were to be no privileges for them under any circumstances. Accordingly, Sheila's class went with Jackie Lord and the author to the Laboratory, and were entertained as before, but this time with a full tour of the Research Track, and a browse round a Road Accident exhibition which was fortunately on site at the time. Another difference about this trip was the fact that the children were given two sheets of work to complete during the visit, the first being the summary sheet of the Laboratory (R/P/32), and the other the sheet of questions from module 6 about a visit to a computer installation (C/P/16). The visit went very well, lasting about an hour longer than it should have done, and the later reactions of the children to Sheila, who was absent on this occasion, indicate a great success. ('All enthusiasm, they thought it a splendid place and why couldn't they stay longer, where were they going next and could they go back there' - page 4.6.A3). They certainly seemed to learn a lot and there were no dissenters on this visit.

Finally it remains to comment on Sheila's own follow-up to the module. Once again, the University duplicating system failed to provide material on time, and she was left with a space to fill. The idea of producing a transport simulation on a board in order to get over information about transport problems displays a highly imaginative, and a very appropriate, approach to the study of information and transport. From her final comments on page 4.6.A4 she appears to have won over her difficult class in this course.

4.6.4 Summary Module 5 in concept would seem to have several items of interest to the teacher and to the pupil. In general, the response has been good and the

criticisms have concerned the approach and worksheets rather than the content of the module. Only in lesson 2, the geographical introduction, was doubt expressed about the lesson content and this is understandable since it was written for schools with no knowledge of the Laboratory or its location. The worksheet approach has once again been questioned for lower ability children, largely because of the copiousness and closely-packed format of the questions. It would seem that two levels of worksheet are required, the alternative being to present just one or two general points and to allow for activities other than writing for lower ability children. The existence of help from the organisation in the form of films and leaflets has obviously been of great value and use has been made of these at all levels. Also, in particular cases, much imaginative treatment has been given to some lessons and apposite extensions made to the module. More than that, the saga of the visits has shown just how dependent courses like this are on the goodwill and understanding of other teachers in the school and on the cooperation of organisations outside the school. The hostility or indifference to experimentation can often lead to the murder of worthwhile experiences.

Transcript of a conversation with Sheila Oviatt-Ham at Yateley School
on 7.5.75.

- Background: Sheila taught module 5 to her classes during the whole of the Spring Term 1975. The class made a visit to the Transport and Road Research Laboratory during the last week of the term, when she was absent. This conversation takes place during the second week of the Summer Term.
- NL: Last term you were doing module 5. Can we go through the sheets and decide which you taught and which you didn't and what happened? Let's start with the homing-in problem. (pages R/P/1 to R/P/3).
- Sheila: Yes I started off with that. I skipped it very quickly. Obviously if one asks the kids where Crowthorne is, they say five minutes away over there, end of conversation. And you're pushing it to ask them to draw maps, etc.
- NL: Yes. And you had difficulties with atlases anyway?
- Sheila: I had difficulty getting atlases and stuff out of people, yet.
- NL: I see. So we pushed that one (page R/P/3), and you showed them the map with the Laboratory on it to show them exactly where it was?
- Sheila: Yes. That was the most useful one. Better than the maps of the British Isles. They could have immediate reference.
- NL: Yes, and put crosses where they live etc. Then there was the film 'Safely on the move'
- Sheila: Yes. I showed that twice and they answered the questions. They enjoyed doing that - they did that quite well actually. I showed them the film and then handed out the question sheets to read while I rewound it - then I said 'Don't write anything during the film but you can look at what sort of questions, what sort of things to look for'.
- NL: Yes? So they got all the statistics in the first part (page R/P/4).
- Sheila: Yes, they got all the statistics because they knew what to look for.
- NL: Did they do this private survey suggested on question 1d?
- Sheila: Yes they did their own survey on that and we drew some graphs to show results. We had actually done a big survey during the week at the beginning of term when I hadn't got the material. On how a British family spends Christmas, so I didn't flog it.
- NL: I see. So they used it as an information collection exercise and recording exercise. Round this time too I had to fill in by getting them to draw car-parking facilities.
- Sheila: Yes. At some time during this course I was short of material again, so I got them to plan out an ideal town centre showing one-way systems and car parks and traffic lights so as to organise the maximum flow of traffic - to avoid heavy traffic coming through the town, while providing enough amenities for the cars that wanted to use the central area.
- NL: How did they do at that?
- Sheila: They did quite well and enjoyed doing it.
- NL: Then you got lots and lots of leaflets etc. (R/P/7 to R/P/12) Did you manage

to use them?

Sheila: Yes. I did use those. We spent some time looking at them and explaining them since the language on them is at too advanced a level for them to understand straight away by just reading. But I went through it with them and we looked at what type of information there was on each sheet and how it was presented, and then answered the questions. (Sheets R/P/13 to R/P/15) We searched for the answers on the sheets. That they did extremely well. The idea of having a number of sheets where the information was somewhere if only they could find it and having to search for it. They did that section quite well.

NL: Yes. This one 'Finding your way about TRRL's Research Track' (sheet R/P/13) required a booklet which you didn't have. Presumably you didn't do it.

Sheila: No. I looked at the questions first and told them to leave out the ones I didn't think they could answer.

NL: What about the accident statistics? Did you give them the tables? (sheets R/P/16 to R/P/19)

Sheila: Yes. We looked at those.

NL: Bringing out the point that these are ways of showing and communicating information?

Sheila: Yes, bringing out those points and at the same time we did a short exercise with some simple information and presenting it in different ways. Pie graphs and Block graphs and Line graphs and Tables and things.

NL: Very Mathematical and very good. Then there was a sheet of questions (sheets R/P/20).

Sheila: Yes. That sheet of questions they also liked very much. It was much the same idea as the last one using a number of sheets with different types of information which are presented in different ways.

NL: Do you find that, by the time they've reached this stage - they've had eight sheets of questions, closely written - they're getting bored with them?

Sheila: They (here there was a technical fault with the cassette recorder. The gist of Sheila's answer was that the children were not bored) difficulty when you start handing them out. It's quite a feat with thirty boys in a class to make sure that each of them have got the right 8 sheets and are looking at the right one at the right time. That is perhaps the most difficult aspect of the entire session. For instance, for one of the lessons they had eight separate sheets each - it did actually last two weeks as it was. The advantage with the sheets is that they can be done as homework, even though it isn't timetabled, some of them like to finish them off.

NL: How about the story? How did it go down? (The Crash - sheets R/P/21 and 22).

Sheila: Hm. Quite well. I didn't like the English Language.

NL: Well, thank you. Pity about that (mechanical fault again - the gist was that Sheila thought the story too flowery) it was a description of a film which we couldn't get hold of anyway since no-one bothered to collect it from the Laboratory

(the next three minutes were inaudible and concerned the question sheets R/P/23 to R/P/26 up to the discussion of the Stats 19 form. In general

Sheila thought the questions provoked some thoughts).

NL: Yes. It is all real isn't it. After all it was only three miles up the road where it all happened.

Sheila: Yes. They reacted very well to that and they did all manage to master the codes. (On stats 19 form R/P/27).

NL: Yes? Did they notice the connection between the figures and punched cards?

Sheila: Yes, they noticed that. We did manage to master all the information in the codes and to decode the information that was on the other one. (sheet R/P/28).

NL: Did they manage to fill in the boxes according to the story and to draw the map?

Sheila: Yes they were to draw a map of that one and most of them got that right as well. There were only one or two altogether that it simply washed over - who couldn't relate numbers on a sheet to an actual situation.

NL: Did that bring out the point that numbers on a sheet can represent events in real life?

Sheila: Yes. I pointed that out fairly forcibly at the time.

NL: Did you follow up in any other way?

Sheila: I didn't have the time.

NL: Not surprisingly. Did you manage to summarise the computer bit? (sheet R/P/30)

Sheila: Yes, we did a very brief summary of that. Again, it was lack of time really, the previous one had been so successful. And it seemed to be better to keep on that than drag them off somewhere else while they were keen.

NL: Yes. They did that didn't they? (sheet R/P/32) When I took them to TRRL together with another one from module 6 (sheet C/P/16). Have they shown you this? They got the information from the people who took them round. They seemed to enjoy that visit.

Sheila: Yes. From what I have heard, it was highly successful.

NL: Have you got any reactions from the children about that visit?

Sheila: Yes. All enthusiasm. They thought it a splendid place, and why couldn't they stay longer and so on - where were they going next and could they go back there.

NL: They stayed an hour overtime as it was. Jackie Lord was getting very worried about the time we were going to get back. So that covered a full term's work, plus some more which you've done this term.

Sheila: Yes, following up. I didn't ask them to write about the visit partly because there had been the gap of the holiday and I was away the first week of this term as well. So I prefer to start again looking forward, not back. But we did recap on it. We've done some simulated Road Safety games.

NL: Oh? Where did you get that idea from?

Sheila: From my own imagination.

NL: You've had them actually writing games?

Sheila: Yes. I gave them a large sheet of paper, and we'd discuss a fairly complicated board game which they're all likely to know, like Monopoly - we'd discuss what

the aim of the game is and how one goes about playing it, and a brief summary of the rules so they know what I'm talking about - I've got fairly intelligent children, with others you might start with Snakes and Ladders. Actually there was a TV programme recently where they were doing some simulation games as a way of teaching things - so I went on to games as a way of teaching and then went on to the subject of Road Safety and small children. The fact that they didn't understand the incantation of the Green Cross code etc. - by doing something in game, it quite often taught them successfully. Could they make up some sort of board game to teach them about Road Safety?

NL: What a good idea. And did they?

Sheila: There was nothing brilliantly successful. I got a lot of the Snakes and Ladders type of things with red traffic lights and things, you must turn left into a loop, and Zebra Crossings, speeding - cops stop you - miss three turns . . . One or two had race tracks with catches like permanent traffic lights and if you went straight through instead of stopping, you were penalised etc.

NL: I think that you might find the Transport and Road Research Laboratory interested in ideas like this. I'm sure they would be.

Is there any difference between the two classes you teach?

Sheila: Not in basic ability, no. One is smaller.

NL: You have said earlier that one class, who chose the option, was far more motivated - have they closed up?

Sheila: They enjoyed last term's thing. I've got one child in the middle of that class, maybe too, who are dying to do woodwork. But in general they are far better motivated as a class.

NL: That's interesting. Is this anything to do with the material, or the way it's presented, or could it be that they've resigned themselves to the fact that they're stuck with it?

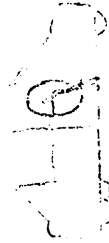
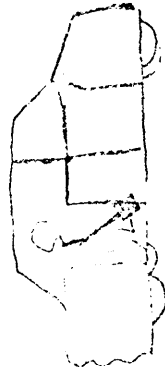
Sheila: Possibly. It's a much smaller class. It's less bother for me since they come to me, rather than the other where I've got to go to them, the entire length of the school, in a tiny room with no chalk, no board rubber and a lot of things to carry - it does make a difference.

Experiment to show the uses of seat belts

①

The Auto Research Laboratories did an experiment to show the use of seat belts. First of all they fixed a dummy into a car and it was pushed forward to get it going and then started by the man in the car behind it was directed into a concrete block. And after it was tested to see for damages to the car and the dummy.

The road research did another experiment to show this time what happens when you do not wear a seat belt. It was again pushed started and started in to a concrete wall with the dummy strapped in and was again tested for damage. This time there was a lot of damage to the dummy like head face damages legs and chest damages. But on the dummy which had been strapped in has only a little face damage.



An experiment to show what happens to an egg when it is strapped into a car and when it is strapped in.

In

The scientist made a model car and then strapped an egg into it. It then crashed the model car into a block. The egg moved but it did not crack.

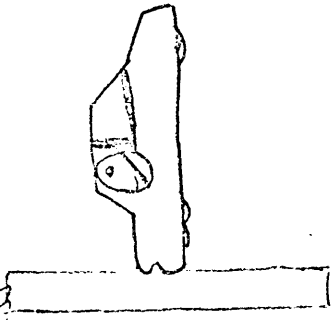
The scientist then did an experiment this time without strapping the egg in. Then he then crashed the model car into a block. This time the egg then fell out and cracked.

The Use of A Shield Ford

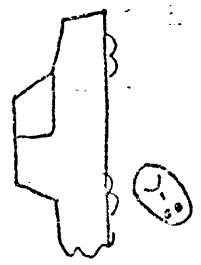
An area of ground was flooded with water. And a car was then driven along it. It then skidded but even though you turned the wheel the car wheels did not move. But with an anti-lock device when to turned the wheels they did move. These for this is much safer and could stop a very bad accident.

Guide 1829

This egg has been striped to it has not been damaged

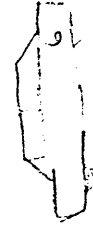
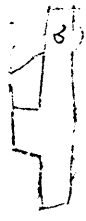


This egg has not been striped to it has cracked

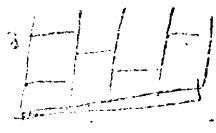
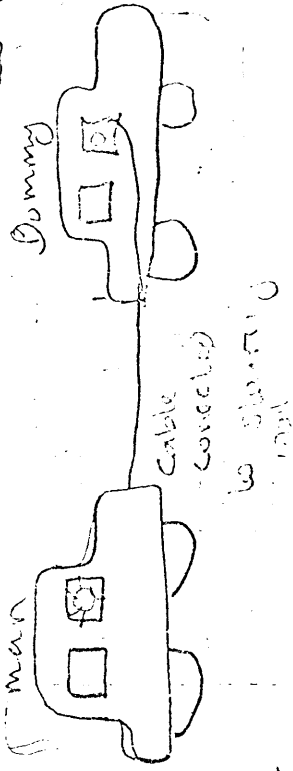


Car A is Not On The Road because it can not control the car

Car B is Back on the road it has an anti-locking device it is quite safe



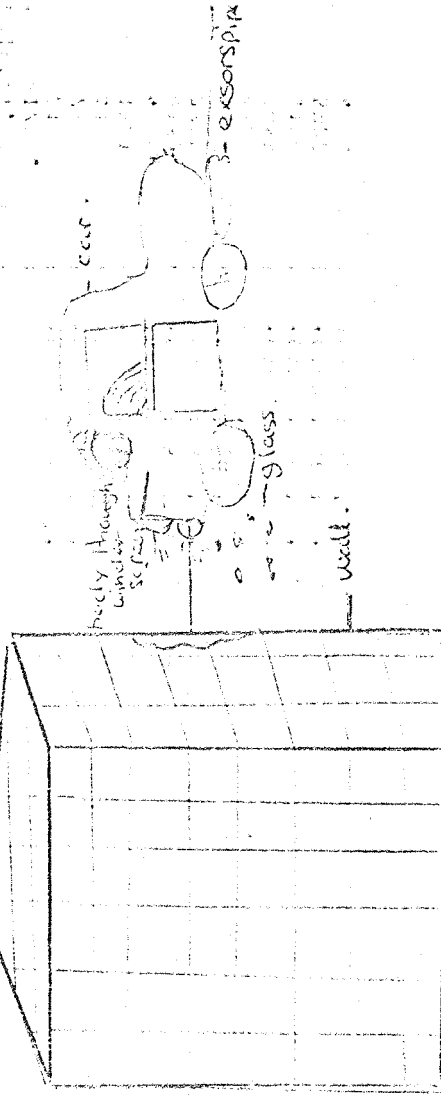
1. The best first experiment is the seal balls there is a wall where there is two cars one with a dummy and one with a real man in the one behind each other the dummy behind in front the man pushes the car in the front so it rides along there is a cable which steers the dummies car.



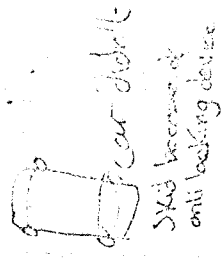
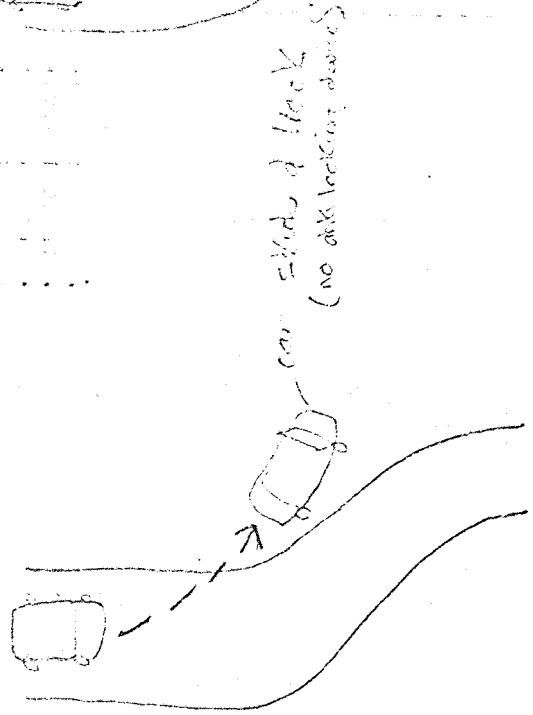
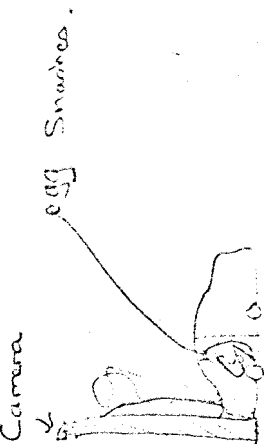
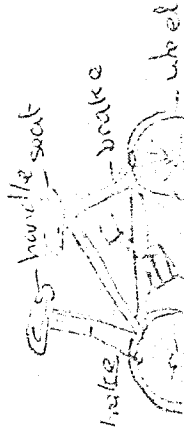
2. The skid pads are used for

If the dummy was wearing a seat belt then he wouldn't go thru the window. He might not have gone through the window but he would of hit his head on the window screen.

Now if he wasn't wearing a seat belt he might do some damage to him self and to the car. He would of went strait through the window unless the steering wheel went up and stoped him but he would of hit his chest and about one broken leg a gainst the panel at the bottom.



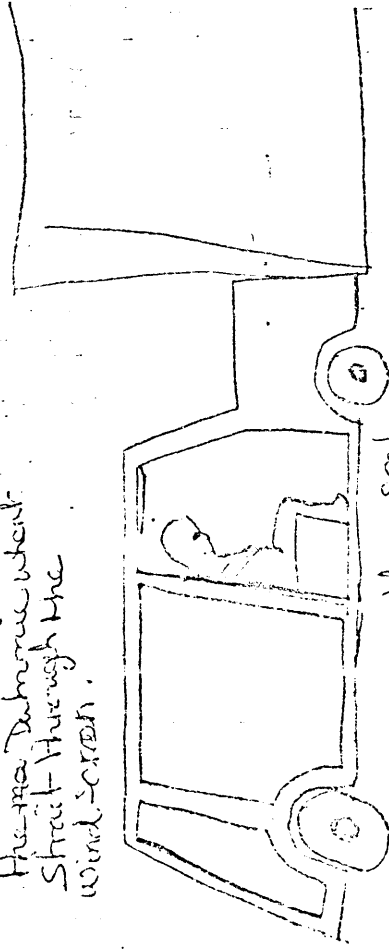
When you put on anti locking on your bike when you are sliding there it will go that way all the time if you change the handles or different way. it won't make any differents.



There were two dummies set up in to cars one with out a seat Belt and one with a seat belt. The dummies with out a seat belt went was pushed By another Car and pushed against a concrete block. The dummy went straight through the windscreen. If this was a real man there would be great injury to the chest where it hit the steering wheel and face and head injury as well where they went through the wind. But the one with the seat belt just moved forward a little then back words but did not touch the wind screen. After they had cameras watching the crash.

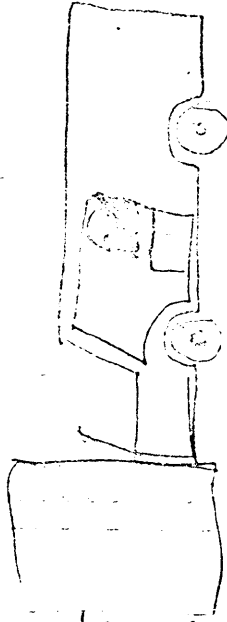


The car + Dummy with out seat belt. The car + Dummy went straight through the wind screen.



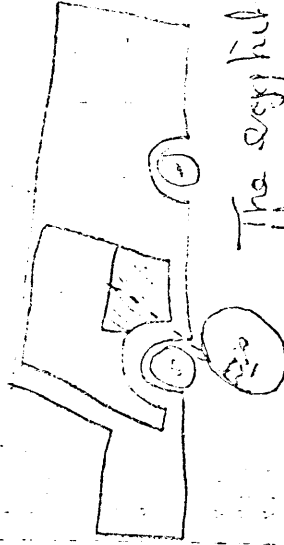
The car with the seat belt. The Dummy just falls forward and the Dummy does not touch the wind screen.

The other experiment was with an egg. They made a model car with a seat belt. They put the egg in the car and put the seat belt around the egg then they pushed it in to the block.



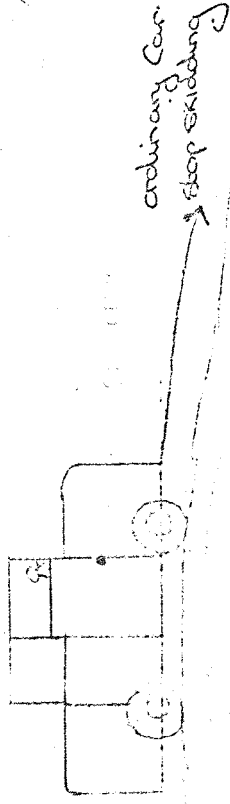
The egg stayed in.

then they put the egg in with out a seat belt.



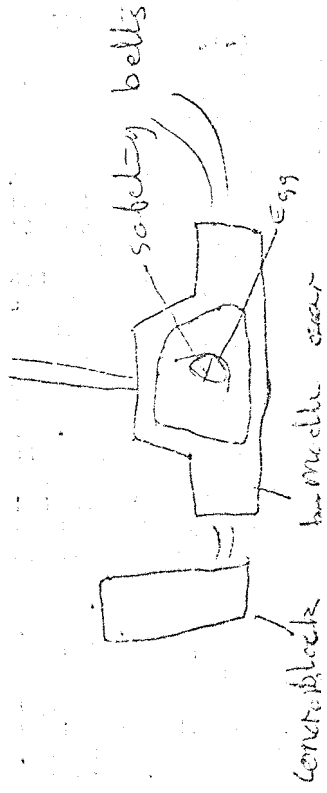
The egg hit the front of the car and smashed. This shows what could happen to a persons head in a crash.

A diagram of a Skidding Car.



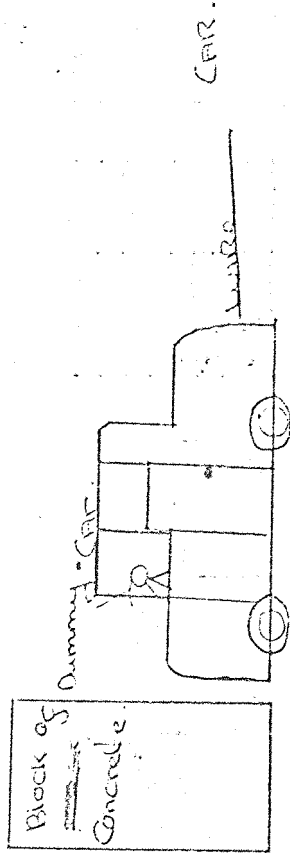
In this diagram it shows that the car with the anti locking device stopped more quickly than the car without them.

SAFETY BOLTS

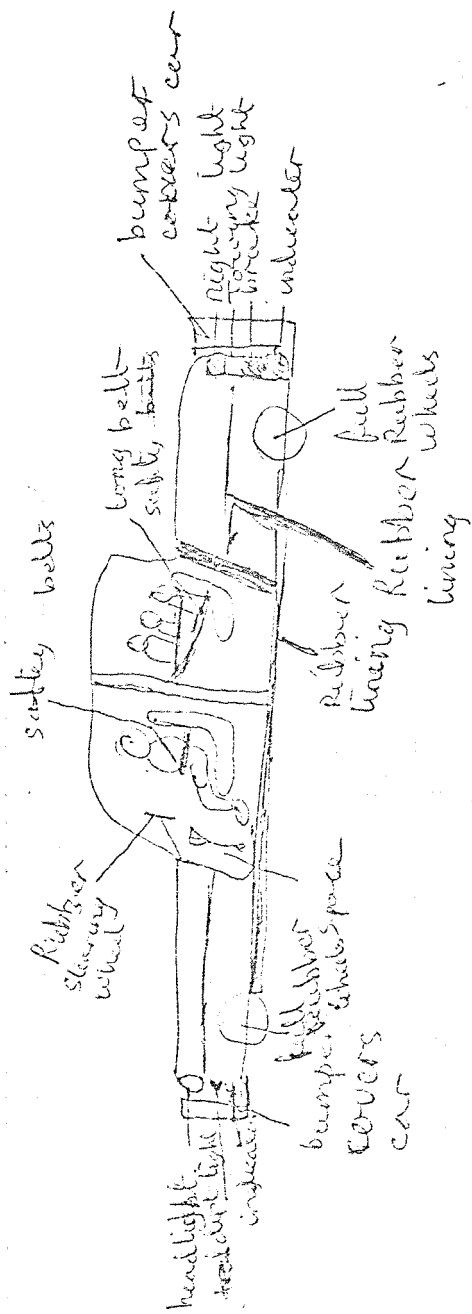


Experiments using Seatbelts

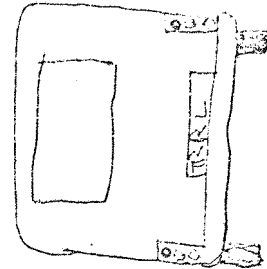
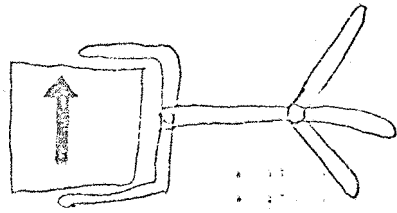
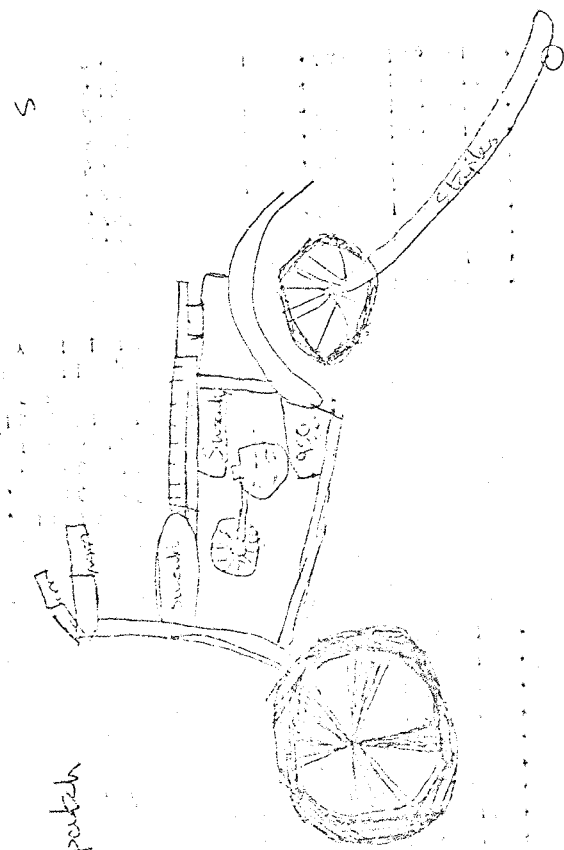
- ① The first experiment was, with the seatbelt being used. We wanted to find out how ~~the~~ the person in the car would go with a seat belt on after crashing into a concrete block. The second experiment was without a seatbelt we wanted to see what would happen to the driver.
 - a) The first experiment was done by a car with a dummy in the seat being crashed into a concrete block. The car was pushed by another car with a man in driving about 20 mph. Then the car was let go and it went crashing into the concrete block.
 - b) The second experiment was done the same way but instead of the wearing a seatbelt he didn't wear one and the car went crashing the concrete block.
- ② The dummy's head and body went straight through the wind screen if it had been a real man he would have got serious injuries.



- ② When you use anti locking devices on cars, they can be put back into control faster than in an ordinary car. A skid pan is a special piece of road that is made skidly with water thrown over it that the car's can skid and retain control when turn over. →



THE Arrow Machine

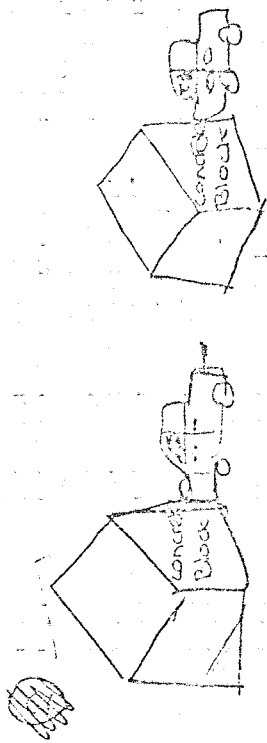


This bike is drove down the spid patch the brakes are put on and the front wheel tells how long it takes to come to a halt the 1 stops keep the bike upright

Susan Cayley 2 Purple

- ① The use of seat belts - I tested it by a dummy sitting in the car with a seat belt then crashed the dummy was unhurt then I tested it without a seat belt and the dummy went through the window screen into the concrete block.

Result is that seat belts save many accidents.



- ② We put an extra wheel on the lorry to see what happened.

Result It was far more safe.

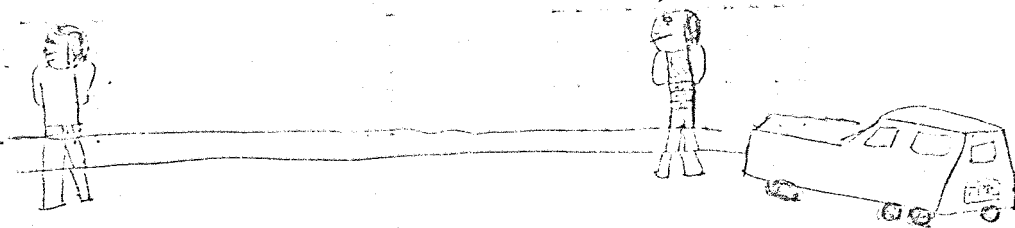
- ③ Safer crash barriers. The car went on the road then crashed ⁱⁿ the crash barriers and the car went straight back ~~there~~ safely on the road.

Result

Much safer than ordinary barriers.

- ④ They used a safer roadside equipment, a street lamp. The car went into the lamp post and the car was not damaged.

crash barrier on pavement



The people are much safer

Road Research-①

Method:-

- ① With the belts on, the dummies.
- ② With the belts off the dummies.

Results:-

- ① When the dummies had the belts on, they were able to save many lives by proving this. The car went into a concrete block.
- ② With-out a belt the dummy went right through the glass, when smashed into the concrete.

Conclusion:-

- ① These have proved that with a belt on if you stand more of a chance when you crash.
- ② With-out the seat-belt you go straight through. And you will get head injuries.

Method:-

We used a small car (model car) and put a egg inside with-out a belt. Then a egg with a belt.

Result:-

With the belt the egg stayed in and with-out the egg just rolled out.

Conclusion:-

This proves once again that it is much safer with belts.

With a belt



With-out a belt.



Road Research ②

Method:-

- ① We put the anti-lock on a car and we skidded the car.
- ② We didn't use a anti-lock on a other and still skidded it.

Result:-

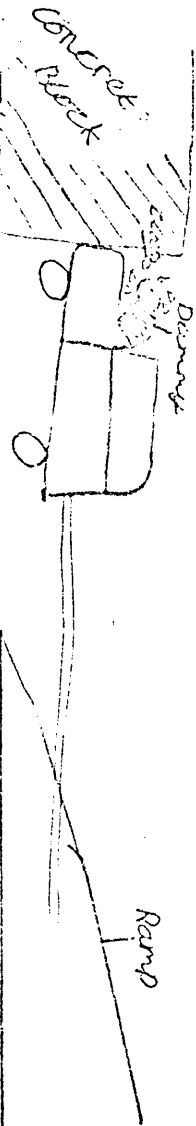
- ① With a anti-lock on the car is able to stop the car. If the car skidded one way the steering wheel will turn the same way and the car will not skid so much.
- ② With-out a anti-lock the car will just keep on skidding.

Conclusion:-

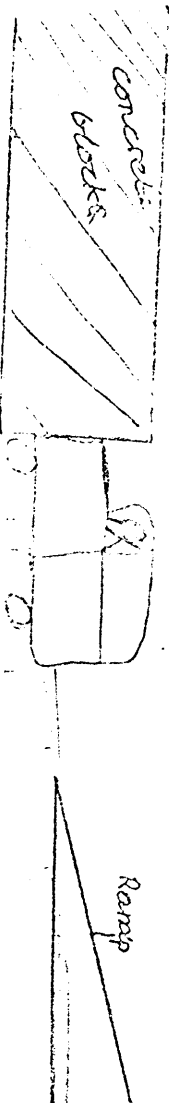
This also proves the a car needs a anti lock on the car, to help it from skidding.

Seat belts

Seat belts are to protect you when you are in a car and in an accident. About 70% of people wear a seat belt. Sooner or later everyone will be wearing a seat belt. If you do not wear a seat belt and you go into a brick wall or into a barrier you will go thru the windshield. We put a dummy in a car with out a seat belt and pushed it down a ramp and it went into a concrete block at the bottom of the ramp to see what happened. What happened was that the dummy went thru the windshield if that was a man he would have been badly injured or he could have died.



Then we got another dummy and put a seat belt on him and we did the same again. But this time the dummy did not go thru the windshield.



The Steel Pan

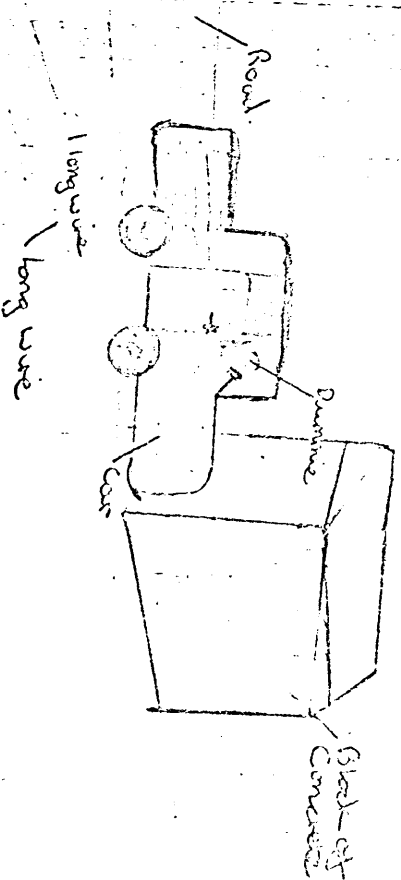
There is a wet road and two cars drive along and then they both pull on their breaks and the one with out the anti-locking device skidded and went out of control.

moving water
2P

Seat belts.
Experiments.

This Experiment is to find out what happens to the person in a car when he has a car crash. (a) If he is not wearing a seat belt.

This test was done by a car with a dummy being crashed into a concrete block. A man in a different car controlled the car with the dummy in by long wire the let the wire go. And the car went crashing into the concrete block at about 30 miles an hour. If that had been a man not wearing a seat belt, he would have hurt, leg, head, face and chest injuries that could of been very serious, and may even be killed. If that had been a man wearing a seat belt, he would have not had such bad injuries, and would not have been killed.



Peter church 2 Purple
Safely on the Move - Some questions on the film

The film you have just seen was made for the Transport and Road Research Laboratory to show some of the work they do. In the discussion you have had with your teacher you will have had to think about many things to do with transport, and will know that the transport world is never static - it changes day by day and someone, some organisation has to prepare for that change; to help us understand and to educate us on how to cope with new situations. The Transport and Road Research Laboratory is such an organisation but, in order to solve its problems (problems to do with roads and road transport) it needs information. The film showed some ways by which it gets that information. How much can you remember? The questions which follow test your memory of the film and also your understanding of the issues it raises. They are not all about the film - some are about your own personal experiences, and some ask you to think about what you already know and can work out. Answer as many as you can as neatly as you can.

+++++

1. The film opened by showing a piece of motorway with a few cars travelling along it.
 - a) Can you remember which motorway? *M4*... b) While the car was travelling along, the narrator gave us some figures about road usage. Let's see what you can remember. The number of miles of road in this country is. *29,000* miles. The number of vehicles on the roads is... *12,000,000*. Every day *21* people are killed and *4,000* injured. c) In fact, the film was made in 1969 and there are many more vehicles on the roads now. What do you think will happen if this process continues?... *There will be more accidents where people are killed and injured*.....
 - d) Carry out a private survey of your own within your class. Answer the following questions.
 - i) Have your parents got a car? *yes*... Do they own more than one car? *No*....
 - ii) How many cars did they own in the year you were born?... *one*... (year = *1962*)
five years ago? *None*... (year = *1971*..)
 - iii) By asking around the class find out the following figures
Total number of cars owned by parents in year of birth... *26*.....
5 years ago... *23*.....
now... *3?*.....
Percentage increase of first figure over third figure... *1101*.....
2. The second picture introduced us to the Research Track at Crowthorne. a) Why can't experiments be made on public roads?... *There's too much money to close them down*.....
 - b) We saw lots of cars going round a junction. How did they know which way to turn?... *They were instructed by a man with arrow signals*.....
 - c) Which way were the cars turning which had to wait longest?... *Big cars*.....
 - d) There was a lot of congestion. What does this mean?... *A sort of traffic jam*.....
 - e) How many man hours are lost through congestion of traffic each day?... *2,000,000*.....
 - f) What does the above question mean?... *A waste of time*.....

Safely on the Move - Some questions about the film Sheet 2

- 2 g) What point about large cars and small cars was made by the film? Give figures if you can remember them..... *13*
- h) How were the results observed? Describe the mechanism used. (hint- mirror).....
.....-.....
3. The film went on to consider some aspects of braking, both on the Skid Pan and off it. Describe how they make vehicles skid on the Research Track... *They put water on the road to make cars skid.*
- b) What happens in a rear wheel skid?.... *I.t. spins round.*
- a front wheel skid?.... *It'll just stop.*
- c) A skid is caused by the brakes being locked on so the the wheels cannot revolve. What measure was proposed to prevent skidding?.....
- d) On the back of the Highway code book there is a diagram which shows how long it takes for cars going at various speeds to stop. The length is divided into 'thinking distance' and 'braking distance'. What do both these terms mean?.....
.....
.....
- e) How do you think the information for a diagram like that is obtained?.....
.....-.....
- f) Can you give two examples of stopping distances ?(there were two on the film).....
.....
- g) What is the only point of contact between the car and the road?.....
- h) From your answer to the last question what sort of research is being carried out to reduce stopping distances?.....
4. The film then showed some ways of studying collisions. Describe how the collision was carried out.....-.....
.....
.....
- b) How was the information about the effects of the collision collected?.....
.....
- c) What in particular did the film say that people are good at colliding with?.....
-d) How many people a year are killed in this way?.....
- e)How is it proposed to put this right?.....
- f) If you have ever been in a car accident describe what happened. If you haven't been in one personally describe one you have seen or read about.....
.....
.....
.....
.....
- g) How many people in your class have been in or seen a road accident?..... How many in your class?..... What percentage is the first figure of the second?.....
- h) Does this tell you anything about the frequency of accidents?.....

4.7 Module 6 - Computer Contact

4.7.1 Introduction to the module The contiguity of this body of teaching material in module 6 should in no way be reflected in the way it is included in the course. The module contains three very distinct and separate parts, each of them concerned in a different way with the use of the computer by the children, and each providing a means by which they may come into contact with the machine. Hence the title of the module, 'Computer Contact'. The design of the 'Information' course recognises and accepts the reality of the situation in schools, that computers or terminals are not going to be provided for many years to come. However, the ethos of the course as a practical demonstration of the nature and power of information and information processing in the modern and future worlds demands that children participating in the course be involved with the physical reality of the machine which has the greatest influence. The three parts of the module might correspond to the three terms of the school year, and it is recommended that one of these aspects per term is introduced to the children. Another difference with this module quite apart from its practical information processing content, is that it involves the teacher in much preparatory work not normally associated with class teaching; in seeking and establishing contacts who can provide the necessary equipment, in understanding some of the more technical aspects of information processing by computer (though not necessarily needing to progress beyond the operating characteristics of the actual machine used), in arranging visits to local installations, transport, insurance and cover, the course organiser is adding to the pressures already incumbent in the normal teaching environment. Nevertheless, it is believed that the rewards to be gained from such activities in the realising of educational objectives in the course, in the raising of motivation in the children and in the establishment of links with extra-school organisations, are well worthwhile. It may well be that such embryo links may already exist from some department in the school and need only to be fostered in a more formal sense, for the purposes of the course.

4.7.2 Lessons and Methods The lessons themselves are already well documented in the course notes for this module and it is not intended to repeat them here. For Part 1, the terminal session, the teaching notes on pages C/T/2 to C/T/19 contain suggestions for setting up and advising contacts, an outline of the lesson content and its objectives, recommendations for obtaining supplies of essential material

and suggestions for alternative lessons should this not be available. The notes are presented in non-technical language for the most part, but a short technical summary is also included in the last few pages (C/T/12 to C/T/14 inc). The pupil notes for this section are shown on pages C/P/1 to C/P/10 and comprise preparation information, exercises for completion during the terminal session, and follow-up exercises. The latter may be omitted if they are considered too difficult for the particular children doing this exercise, although some alternative debriefing activity should follow up the terminal session. The middle lesson, when the terminal is actually on site, and when the children will probably be demonstrated to in groups, has always provided a difficulty of knowing what to do with those who are not actually at the terminal. Pages C/P/3 to C/P/5 inclusive are provided for this situation. The actual number in each group round the terminal will of course depend on the number of the children in the class, the time available for the lesson and the length of the demonstration.

The teaching notes for Part 2, the HAIKU package, are presented on pages C/T/19 to 30, the majority of them being instructions on how to use the data sheets and program. There are many such teaching packages covering such diverse topics as pollution control, North Sea Oil exploration, the analysis of diets and so on, and some of them are more useful than others. The use of the computer as a teaching aid in this way is only justifiable if the content of the teaching material and its presentation to the children are such that it is difficult and time-consuming to teach in any other way. Some packages certainly do not meet these criteria, including some of those listed in pages C/T/26 to C/T/29 inc. The use of packages, including HAIKU as a particular example, has been discussed earlier (Chapter 1 part 1.1.3). HAIKU was chosen for this example for several reasons:

A) The majority of teachers testing the 'Information' course were teachers of English. Thus the choice of an English teaching package was more relevant to their particular background and experience.

B) The HAIKU package, if one accepts the fact that strict HAIKU are not necessarily produced, deals with a particularly difficult teaching problem in English; i.e. that of giving children a feel for words and syntax.

C) The program is relatively simple both in terms of running it on the computer and in understanding its educational aims.

D) Several installations, both local and national, are able to make it available to schools with only slight modification.

E) It offers to the English teacher three distinct elements of creative

writing; the choice of words and discussion of their meaning, the putting of the words into a syntactic framework, and the discriminatory activity of sorting good from bad after the computer has picked several HAIKU and printed them out.

F) From the child's point of view, there is no need to become involved with the program or the particular model it represents. It is simply a case of completing a predefined and prepared data sheet.

G) There is a progressive learning process, in that the child can expect to show an improvement over a period of time related to the facility with which he or she uses the vocabulary at his/her disposal and adapts to the needs of the program. In addition there is a ready-made follow-up and debriefing activity based on the output from the computer.

H) There is no shortage of examples to illustrate what is required and what is possible.

I) The computer plays a relatively minor role so that there is no conflict between what is English teaching and what is computing.

The pupil worksheets, C/P/11 to C/P/14 are merely examples of HAIKU produced for demonstration purposes and the data sheets which they need to fill in to produce their own HAIKU. It will be seen from the latter that the children are required to produce lists of words in blocks, the number of syllables in each, an order for printing out the words and a starting number for the random number generator. It is assumed that the first attempt to produce HAIKU in this way will not be highly successful in terms of quality, but that children will learn from their mistakes and inadequacies and, by the time the third run is complete, the children will be thinking words and syntax in a much more mature manner.

Part 3, which comprises one page of teaching notes (C/T/31), and one pupil worksheet (C/P/16), is an attempt to make the installation visit more meaningful to children. The class visit to a computer is a well-established ritual of many Computer Studies courses, and is also obviously a desirable activity in the 'Information' course, since it can act either as the culmination of a term of activity relating to the commodity processed by the machine, or as the precursor to much organised activity in the classroom relating to what was seen. Unfortunately, while the computer may have glamour as a symbol of modern progress, much of it portrayed and bastardised by an overimaginative treatment by the media, its physical appearance is often dull and uninspiring. It is not what the computer looks like which is important but what it is capable of doing and how. The computer is little more than a box, the system a series of boxes, to perform

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a function, and no matter how one may beautify it by flashing lights its real nature is hidden from view. The most interest comes from observing the speed with which the cards disappear into the card reader, or the line printer dispenses line upon line of printing. Thus the pupil worksheet is designed to prepare the pupil to ask the right questions, to understand what is happening, and distinguishes between the machine as a physical piece of equipment and the application which the machine is performing. If the children have at least an awareness of what is happening they will hopefully be more interested in what they see. The worksheet also has another function in warning the installation staff what they might expect to be asked, and may often dispel doubts there about the desirability of allowing children to see extremely expensive equipment.

4.7.3 Reactions - Part 1 This section may be taken in three separate parts which correspond to the three sections of the module. Part 1 has been taught as many times as the course itself, since both the author and the teachers concerned have always considered it to be an integral unit in teaching about information, not only as a motivator, but also as a practical demonstration of the capability of the computer for processing information. The program 'INFO' which was written by the author to show three sides of computer and terminal activity, information retrieval, arithmetic, and basic diagnostic logic, has undergone many changes during the testing of the course. This, however, is a technical point since the basic output of the machine, and its educational intention of illustrating to children what the three facets are, has not changed. Where a change in the program is important is in the designated follow-up lesson which uses the BASIC program itself to teach children how it works and to take away the sensation of magic from the terminal session itself. Only in one other respect has it affected the teaching of the module, and this was in the first session with Ray Cackett's class in December 1973, when the author didn't work out the program very correctly before the event. Ray makes allusion to the differences between the requirements for the first session and the second session on page 4.7.A1. This transcript, the recording for which was made in July 1974, covers the first three terminal demonstrations at Yateley. Also at Yateley, for which recorded material has not been obtained, were the December 1974 sessions with the classes of Ray, Sheila and Rosemary Trew. From Henry Beaufort school pages 4.7.A2 to 4.7.A6 deal with the reactions of Harry and Steve to the session held in late November 1974 while Jenny Leigh's class of fourth year pupils was introduced

to the terminal in February 1975 and page 4.7.A7 discusses the reaction of her class to the follow-up session.

The first terminal session at Yateley was a success as far as the children were concerned, but they saw nothing of the administrative mess which teacher and organiser became enmeshed in. The raw material of the first lesson was delivered on time, and the children received both 40 column mark sense cards and 40 column Port-a-punch cards together with a master card containing the codes they would need. Only the mark sense cards were to be used for input to the machine, the others being for practise purposes referring back to the lesson in module 4, which they had previously completed on cards and card readers. Ray also received a list of instructions on how to approach the lesson, but as was the case with all Ray's lessons at this period of course development, he had been asked to accomplish far too much in the time he had available, so that the cards to be used for input purposes had to be completed in break times and for home-work. Page 4.7.A1 outlines Ray's problems in this lesson, both in the need for visual support material for the children ('they could have done with some sort of visual help') and time ('an explanation of and the filling in of the mark sense cards is a double lesson'). However, Ray's class did produce what they were asked to produce, which is the data on mark sense cards shown on pages C/P/1 and 2, and it was produced, as requested, with commas between each item of data, not spaces as shown on those sheets.

At this time too the Hewlett-Packard mark-sense card reader had not been delivered to the University at Southampton, and so the cards had to be processed using the reader at the Centre for Science Education in Fulham. In the event it proved that the instructions given to Ray had been mistaken. The particular system used did not, for example, use commas as delimiters between data items, but spaces, so that much frantic rubbing out of pencil marks and rewriting of cards was performed. Another problem, which has also cropped up every time this particular session has been run in both the schools, was the extraordinarily large number of mistakes which the children had made in marking the cards; mistakes in interpreting the card codes, although it was obvious from the majority of the marks on the card they they did indeed know the code and how to mark the characters; failures to follow instructions, like leaving out commas or, later, omitting to include spaces between data items; carelessness in putting the marks in the right spaces; dirty fingermarks which were interpreted by the reader as pencil marks. All these are features which have consistently arisen whenever

children have been asked to complete the cards, however well and carefully they have been taught and no matter how much the rigourousness of the machine's requirements has been pointed out. On the ten occasions that this data preparation exercise has been carried out, only once has the number of completely correct records exceeded twenty per cent of the children completing the exercise. This is a difficult problem, since it involves the teacher/organiser/contact in much remedial work. It would be undesirable however to degenerate to the situation outlined by Harry on page 4.7.A5 in which he was doing the exercise by numbers, army-style. The children do in fact enjoy completing this exercise. It is a case of once the barrier has been broken down, once the insight into the codes on the cards has been gained, and this has happened with most of the children during the course of the exercise, they set to with a will, but unfortunately with less than sufficient care. Before the course had started at Yateley, the headmaster expressed the opinion that children should be brought face to face with the rigour of specific tasks which are required to be completed with care. This was one of his justifications for allowing the course to be tested at Yateley. It would seem from experience in these pilot tests with the one exercise which demands more care and attention to detail in order to cope with the inflexible demands of the machine, that he was correct in his diagnosis of the shortcomings of children. On the other hand, as Steve points out on page 4.7.A5, children who make mistakes tend to learn from them in this sort of exercise, and they certainly learn something about the computer. Since these tests the module has been rewritten, so that there are two lessons for card codes, and personal coded messages sent to friends in the first of these should at least point out to the children they they make mistakes when they do not exercise care.

However, after six or seven hours of working and experimenting at the Centre for Science Education, a paper tape was obtained which enabled the correct data to be entered from the terminal at Southampton. In effect, it would have taken less than a quarter of this time to type in the data from a sheet supplied by the children and to make the necessary amendments. Subsequent submissions of data for the terminal session were dealt with through the card reader and terminal at Southampton University School of Education. One of the most vivid lessons learned from these experiences with pupil-produced data is the amount of time involved in sorting it out and submitting it in processable form to the machine. A teacher, with all the pressure of other work on his hands, could expect to spend a minimum of two to three hours on this aspect alone, without adding the

time consumed by the setting up of the terminal session itself, the establishing of contacts etc. It is this aspect which is perhaps the most worrying.

As to the terminal session itself, there are many indicators of its effect on the children, many of them the result of observing them during the demonstration period. This was the lesson in which the course author came into the closest contact with the children. Because of his special status in the eyes of the children as the person who makes the computer do something for them, it would be easy to gain an unreal impression of the effectiveness of the course through the one session. But there is ample anecdotal evidence that the demonstration made a deep impression. For example there was the boy who had been difficult in class, and was in fact classed as an undesirable by many teachers and not a few colleagues, who having typed in his name and the date, obtained his message from the machine and wandered in a dream through the door and along the corridor, reading and rereading it until someone brought him back to life and reality again. To his mind the computer has spoken to him personally, and without any value judgement on his behaviour, his intelligence or his integrity. He was enthralled. This in fact is a similar phenomenon to that observed by Dr. Patrick Suppes of Stanford University in California, who has worked specifically on Computer-Assisted-Instruction programmes with disadvantaged children. In a film made by 'Aspekt' of Sweden, now unfortunately obsolete, entitled, 'Computer-Assisted Instruction', he relates how negro boys who are not noted for their intelligence or popularity really respond to instruction by the machine because they know that it is not going to make any value judgements about them, or respond to provocation no matter how they play up. The wide eyes and open mouths of the children as they observe the terminal type out a personal message for them without human operator, the vigour with which they enter into question and answer which tries to draw out of them what they are seeing and explain it, the alacrity with which they volunteer to approach the terminal to type in their names once the first brave pioneer has shown the way, the deviousness by which they try to include themselves on a later group so as to get a second look at the terminal, the willingness with which they give up dinnertimes and breaks on the 'day of the terminal' to be involved, are all indications of the powerful attraction of a first terminal session on children. As Harry points out on page 4.7.A5, 'They did enjoy punching out and getting out answers', and Steve later repeats his favourite aphorism of 'I do and I understand'.

There have indeed been few problems in the teaching section of this lesson,

although rather more in the technical department. The logistics of transferring a heavy terminal and all its ancillary equipment from one place to another, of wiring it up correctly and of making sure it operates are not easy to the novice.

All of these the problems were overcome without mishap, but sometimes with little time to spare. Another difficulty was the finding of a suitable room. On one occasion at Yateley the whole demonstration had been set up in the only suitable office on the previous evening ready for use early the following morning. Unfortunately, the Night School principal objected to the presence of a terminal in one corner of his office and took it all to pieces again the same evening, which entailed a frantic reassembly the following morning. The wholly inadequate telephone system in most schools (Yateley, a school of 2000 plus children widely scattered on a large campus, has two usable external lines; Henry Beaufort also has only two telephone lines) presents a problem, when one of the lines will be taken up by the terminal during the whole of the session. At both schools, the secretary was extremely loath to release a line, particularly since she was sometimes expected to do so at five minutes notice, a communications fault which could be laid at the door of several people, including the author. The lesson about the importance of secretaries in schools and the reluctance of Headmasters to have them upset was learned the hard way. Another bone of contention with Headmasters was the cost of the telephone line. On one occasion a directive had been sent out from the County Authority about the conservation of money especially with reference to the use of phones on the same day that a three hour terminal session was to take place. Understandably there was a query and the dilemma was only resolved after a telephone call to the County Authority. The other major problem was in the size of classes and the time available for each group demonstration. It is possible to spend as much as an hour explaining the terminal and demonstrating its capabilities and *modi operandi*, but in a situation in which fifty children have approximately 45 minutes to learn about this, the spending of time on voluminous explanations is not desirable. In attempting to cut out all the unnecessary frills while retaining the essential points, it was almost impossible to go below 12 minutes in demonstration mode. Thus for classes of this size, or as in one case, where there are two classes to share the same time period, the groups around the terminal have to be much larger than one would like, and the output message for each child has to be prepared in advance of the session. In the majority of cases, however, it was possible to allow each child the luxury of receiving his own message after having

typed in his own name. The system itself never failed us, although occasionally, especially at peak mid-morning times, the response was somewhat slow. This was not necessarily a bad thing since it allowed more time for explanation. Lastly this session was useful, and has been used, for introducing student teachersto children and to the role of the computer in the school. Three students from the Post-Graduate Certificate of Education course helped with the teaching of the terminal session at Henry Beaufort; they certainly enjoyed the experience and used it in their own teaching practise exercises during the following term.

It is in the follow-up sessions that the main area of criticism occurs. The transcript on pages 4.7.A2 to 4.7.A5 explains the problems experienced by Harry and Steve in this, but this may be tempered by the positive reaction from Jenny Leigh's class presented on page 4.7.A7. The follow-up sheets (C/P/6 to C/P/10) were in fact used only once at Yateley, by Ray Cackett with his less able group in the second year of teaching. Surprisingly, in view of his known feelings about the shortcomings of this group and the suspected difficulty of this exercise in program logic, Ray thought that the children did extremely well. He spoonfed them most of the time, but once he was sure that they had the right idea about the boxes on page 2 (sheet C/P/7) he left the children alone to complete them. Ray was not as concerned about the exercise as were Harry and Steve, and one suspects that this is once again a difference of temperament and experience. Harry expresses some abhorrence of the analytical type of exercise on page 4.7.A2, and this too has its roots in the type of mixed-ability group he and Steve teach at Henry Beaufort. In extolling the virtues of flow-charting (page 4.7.A3) he is trying to leave open a few options about what is actually done in the lesson rather than wishing to follow a predetermined set of actions and questions. 'Class teaching' is apparently considered anathema in the mixed-ability situation at Henry Beaufort, since Steve had to 'make a confession' that this is what he had indulged in, and perhaps here is another clue to the reasons for the difference of acceptability of some lessons than others between the two schools. 'Class teaching' at Yateley is the norm rather than the exception.

Confirmation of the negative reaction of some of the girls in Harry's class is worrying, since it is difficult to imagine what can be done about it once the germ has been allowed to flourish. Nevertheless Harry seems to have found a typically ingenious way of encouraging the children to complete the worksheets

in groups of four, and had these been working groups incorporating his 'weaker brethren' into each group, rather than friendship groups, some good may have come from the mixed-ability situation. Steve's worry about 'the low ability children tackling it because they get very distressed if they can't understand' (page 4.7.A3) shows an awareness of the problems of the low ability child, and is a valid criticism of structured material which cannot cater for all levels. However it is still considered necessary, after the heady wine of the terminal demonstration, to bring the children back to earth by explaining, in Harry's words, 'how the prestidigitation is actually performed', and maybe the better way with children of second year age would be to follow up the idea, contained on page 4.7.A5, of a role-playing exercise. Certainly, when the idea was mooted, both Harry and Steve became quite excited about it.

Neither Jenny nor her class had the same reservations about the follow-up exercises. Her children were not noted for their willingness and enthusiasm, especially where extra work was concerned, and it was with a tone of surprise that Jenny related how they had completed the sheets for homework voluntarily (page 4.7.A7). She was also a little surprised that they had found them so easy, since Jenny herself had spent some time the previous day trying to work through the sheets and to understand the concepts involved. It must be admitted that, in the short time that the terminal session took, the author was impressed with the depth of understanding these fourth year children showed, and this seemed to be at odds with the opinion of the staff of the school who taught them more regularly. Certainly the computer caught their imagination, but perhaps the lack was in concentration, since Jenny thought 'they had had enough of computers' by the end of this session.

In summary, then, this terminal demonstration has had the desired effect of motivating children to study the computer more closely, and of teaching them something of the capabilities of the machine which is used to store the information they have been hearing so much about in other modules. It has not done so without problems, and especially the data preparation session and the follow-up sessions have caused different types of reaction from children and teachers. The technical problems should have been mainly overcome by now, but there will still be considerable time required of the teacher in setting up the constituent parts of this part of module 6.

It has been taught to one class of brighter pupils by Sheila Oviatt-Ham at Yateley, and by Harry and Steve to their mixed-ability classes at Henry Beaufort. Sheila's reactions have not been recorded, but her class had only one return from the computer, since time and absence interfered with the scheduling of her course. Thus it is not a fair test of the program's effectiveness in teaching what it was meant to teach. The children, with a few exceptions, presented a random set of words. Some of them merely mixed random words up with the names of football teams, and of course what the computer produced were more sets of random words, presented randomly in groups of 17 syllables. Garbage in, garbage out. Some children did try to impose a syntax on the lists and were careful in their use of words and these obtained a good selection of sensible HAIKU, but the majority did not do this. Nevertheless the first batch of returns provided much food for thought and a basis on which to build a constructive and instructive second lesson; unfortunately during the next week Sheila was absent, and the end of term came after that. Even the feedback between teacher and author was severely curtailed, since the time arranged for interview and recording was taken away at short notice to fill up a gap in the temporary timetable for the day. In the three minutes left Sheila indicated that she was not impressed with the quality of the Haiku the children had received, nor with the idea of computer-produced Haiku, since she could herself make up better Haiku than any computer could. This was of course a view that was never in any dispute, but which leaves large gaps in understanding and in the purpose of the exercise to be explored.

Harry and Steve were, on the whole, more receptive to the package. Page 4.7.A8 describes how they prepared for the Haiku session, and pages 4.7.A9 to A11 concern their reactions after the second set of printouts had been obtained. In effect, the end of term again interfered with the schedule of lessons and there was no third attempt by the children to produce input for the program. In their preparation work, both Harry and Steve regarded the Haiku aspect of the exercise as being of less importance than that of producing a feel for English syntax and word choice. Harry, for example, says 'I'm more concerned with getting the kids to use vivid words and the 'mot juste', as it were, rather than just count syllables' while Steve, on a slightly different tack, found personal insights in the preparation of Haiku which led him to appreciate their worth with regard to parts of speech. ('We discovered - and very much discovered, I didn't realise this until I put the examples on the blackboard - that the groups also

contained nouns, verbs, gerunds, prepositions and what have you'- page 4.7.A8). In fact, Harry's first lesson on the actual production of words for processing into Haiku, the filling in of the data sheets, was observed by Maurice Hart and the author, and help was given in abundance to those children who were struggling. Without this help, it is doubtful if the lesson would have been completed and indeed some children had to take the sheets home to complete them. In Steve's class, and in Sheila's class earlier in the year, the filling in of the data sheets had to be completed for homework by almost all of the children. On the whole they were not averse to do this, their imagination having been caught, but it is a comment on the length of the lesson and something which will need to be examined a little more closely. Harry's idea, explained on page 4.7.A9 of having the children write out one complete Haiku before looking at alternative means of expression shows one way of overcoming several problems, and it certainly seems to have worked in this instance.

What happened behind the scenes is of some importance too, since the services of someone to organise the fetching and carrying of input and output between school and computer cannot always be relied on, and since the essential first contact between teacher and installation staff is not always an easy one to make. In the case of both schools, the installation staff at Southampton College of Technology were very cooperative in providing computer and punching facilities for the running of the program. In the Yateley case the author had to do the punching up of approximately 1500 cards prior to submission to the machine, a task which lasted some four hours, and which resulted in the commission of innumerable errors. On the second and subsequent occasions, the College Punched Card Operator was able to complete the punching more quickly and more accurately, although, as Harry's complaint on page 4.7.A9 points out, not completely error-free. On all occasions some tidying up of the data presented by the children had to be done. Harry's reference to 'rigging' on page 4.7.A10 concerns the altering of the number of syllables in words so that those children who had not completed all the data groups, and who could not therefore have had 17 syllables in any combination chosen by the computer, would at least have something printed out. In effect, this 'kidding' of the computer by giving it false information was a point which Harry intended to develop in his treatment. On another occasion the data boxes which specified the order of words to be chosen had been completed incorrectly by the children and these had to be put right. In some cases, the children had not apparently known the

difference between even and odd numbers and had not put a viable number in the last data box which starts off the random number generator. All these experiences seem to indicate that there is a case for examining the data sheets with a view to making them easier to complete by the children. Where there were spelling errors however these were retained as printed by the children, so that the teacher could work on this aspect of the feedback.

In the Henry Beaufort Haiku weeks, too, the author's car suffered one of its periodic refusals to go. Never is the lack of mobility more keenly felt than when there is a need to transport data from school to home to installation and back. In the event Harry had to pick up the first lot of feedback from the college. Lastly, on this subject of behind-scenes activity, there is a need for the installation staff at the computer centre to know the requirements of each program to be run. This is particularly difficult with package programs since there are often constraints which prevent them from working properly if the instructions are not strictly adhered to. In this package, each group of words has to be separated by a punched card containing an asterisk. This is straightforward enough but, if all groups have not been completed, and this was the case with most submissions by the children at Henry Beaufort, then the asterisk card should still be included for the empty groups of words. The installation staff at Southampton were not aware of this, the author's lack of transport meant that he was not there to point it out, and this is the reason why so many children in Harry's class 'got sold down the river' (page 4.7.A9).

Inevitably, the problem of when a Haiku is not a Haiku was discussed. The general consensus was that what the computer was producing were not for the most part strictly Haiku. However, as both Harry and Steve point out on page 4.7.A10 the children learned something valuable about structures in English by doing this exercise. As Harry states 'In some ways, being limited to this business of 17 syllables was a red herring', and his suggestion that it may be altered to an exercise in sentence structure is worth making. An interesting point about the role of the computer in this process was made by a 'shrewd young lady' in Harry's class, who had obviously given the matter some deep thought. She is right; indeed the computer plays a very minor part in this whole exercise, acting mainly as the motivator, the focus, for the activity. The real work is done by the children in all sections of the exercise. Nevertheless the computer's role in processing the children's work and in producing the raw material for further advances and discussion is an important one, and

it is intended to lend authority and stimulus for achievement and learning.

4.7.5 Reactions - part 3 The material for the visit to a computer installation was produced late in the course development, and has been used once, out of context, in a visit to the Transport and Road Research Laboratory by Sheila's class, and by Harry's and Steve's class in their visits to the Hampshire County Council machine at Winchester. There is unfortunately no written or recorded feedback on these visits since they took place at the end of the term, so that follow-up was not immediately possible. The children however enjoyed their visits and claimed to have learned something from them, even if it was the comment of a small section of girls from Henry Beaufort, who, after seeing the way the girls in the data preparation department operate, stated determinedly, 'We're not going to work there! ' The first visit, that of Sheila's class to Crowthorne, has already been described in part 4.6. of this chapter. As has been described the sheet C/P/16 caused little trouble to complete, and the installation staff were only too ready and willing to assist in this. Indeed some of them used it as a springboard for a much more sophisticated treatment of some of the topics it raises and, to the extent that the children were able to understand this after a very full schedule in the rest of the morning, it was useful. Some children, in spite of the pressing demands of time and stomach, refused to leave the computer centre until they had had every question answered, and it was only the promise that this would be done on the coach back to school that enticed them from the building.

Hampshire County Council allow a maximum of 16 visitors to their computer centre at any one time, and so both Harry's and Steve's classes had to be split up into two groups going on successive weeks. This meant four visits in all and by the time the last group arrived the two people concerned were quite unflustered by the questions they were asked. Another difficulty with these visits was the fact that the guides were not teachers and were accustomed to talking to young people of sixth form level and above. Thus on the first two occasions much of what they said, and the way it was explained, was well above the heads of the children. Indeed they commented on the differences in the children between the two weeks, the first week being an extremely silent affair, involving few questions from the children, and the imparting of the necessary information by the guides to boys and girls whose appreciation of its significance was somewhat lacking. In the second week, the children appeared

to be much more talkative and curious, but this was mainly because the guides had learned how to talk at their level, and the interaction was so much more pronounced. All visits however made the convincing point of the absolute need to prepare the way for visits of this sort with children of this age. A preparatory lesson is essential which outlines what the children might expect to see and the questions they might expect to be asking, using the question sheets during that previous week. This will eliminate the situation which occurred at Winchester in which children were given answers to questions they wouldn't have asked and signified very little. Indeed it has been stated in several parts of this thesis that one of the main objectives of the 'Information' course is to enable children to formulate the right questions so that they will be some of the way towards understanding the answers. These particular visits failed badly in this, because they were made in isolation, with no preparation and no follow-up.

Not all was failure, however. In spite of the apparent lack of comprehension there were some surprising insights from the children on the way home. One child, who had remained silent throughout the visit, who had watched impassively while the punch girls demonstrated their art, the machine operators explained the various units of the computer, and the guides outlined the things for which the computer was used, was heard to whisper to his friend on the bus home 'That was great wasn't it. I didn't realise how much the County Council does for us. Is that what our dads pay their rates for. I'm going to tell him about that.' And indeed there was no dissenting voice when the children were asked whether they had enjoyed the visit and whether they thought they had learned something. Harry and Steve were more lyrical about the possibilities of using the visit and the follow-up exercises which could stem from it. Since it was the last week of term, they did not have the opportunity to use their imaginations on this, but they made fairly frequent references back to the visit to illustrate points in lessons during the summer.

In summary then, a visit to a computer installation as a means of keeping computer contact is a very valuable exercise. However, if the visit is taken in isolation its value is greatly diminished and there must be a preparation lesson which enables the children to know why they are going, what they will expect to see there and to arouse their curiosity about the place before they leave. Equally, to obtain full benefit from the visit, there should be a full follow-up lesson which explains what they saw there, how it fitted in with their prior impressions, and which extracts from the visit those aspects pertaining to

the course being followed at the school. In addition it is useful to brief the installation staff about the course, the things the children will want to see and the aspects they will need to have explained. Often if they have little experience of showing children of younger age and lower ability level it is preferable to brief the staff on how to approach them. In the case of the Hampshire County Council, it was explained to the people concerned that one would get over more to the children by asking questions rather than by explaining points. No offence was taken and both sides enjoyed the visit all the more for finding the right approach in the end.

T. 1. 4. 2. 1.

Transcript of a conversation with Ray Cackett at Yateley
School in July 1974

- Background: This conversation took place at the end of the first year of teaching for Ray. The course had been given to two separate classes in two different terms and each time it ended with the terminal session described in module 6. The first experiment taught us a lot about the machine system used, and the requirements for entering data, and the program used, were altered considerably for the second occasion.
- Ray: Now we've got the preparation for the terminal session.
- NL: We've done that twice.
- Ray: I found this a bit confusing actually. As you know I didn't have enough time. They were very slow to understand what was required filling in the card. I had to go over it two or three times.
- NL: Was it the card code they couldn't interpret?
- Ray: They couldn't do that to start with.
- NL: So that's a teaching point anyway.
- Ray: That's a teaching point. Most of them got that once it had been explained. It suddenly dawned on them. They could have done with some sort of visual help. It's very difficult to explain how to fill in a card if you haven't got a live representation to point things out on.
- NL: An Overhead Projector transparency.
- Ray: That would be best I think. You can use colours on that. And maybe the teacher going through his own, perhaps doing the first card with them.
- NL: There is a different way of approach and that's for each child to put at the very top of the card what they intend to put in each column.
- Ray: Yes. They could do that.
- NL: Once they've done that, they wouldn't forget to include the spaces would they?
- Ray: Mm. You see an explanation and the filling in of the mark-sense cards is a double lesson. Mark sense cards they found easier than the Port-a-Punch cards. Another problem is that all the Port-a-Punch cards I've had have been different.
- NL: Yes, for the first lot we used one master card and the second had the codes written on them. Perhaps the first were easier.
- Ray: Obviously, I'd like to know the practical problems involved in producing the program from your point of view. This left-justified stuff I was on about - I wanted to help, and I was hindering obviously. I was mucking up what they produced.
- NL: As it happened the program didn't use those anyway. They were written before we knew how the program operated. It accepts spaces as delimiters rather than commas as we had it the first time.
- Ray: You produced a different sheet this time didn't you? From a practical point of view your worksheet about what happened before and after your go on the terminal (C/P/3 to C/P/5) referred to the old one and they got all confused

with that.

NL: Yes. I have altered that. What about the exercise afterwards? The one on the program itself. 'Some question sheets on the program'. They explained exactly what the program did and how it did it.

Ray: I'm not sure we did that one. We were short of time afterwards.

Transcript of a conversation with Harry Wright and Steve Ward at
Henry Beaufort School on 13.12.74

- Background: This conversation concerns that part of module 6 which demonstrates the functions of a computer terminal. It takes place two weeks after the terminal had been taken into the school. The first part relates to the follow-up sheets (C/P/6 to 9) and the second half deals with the whole exercise in more general terms.
- Harry: Can I voice a criticism? The papers I had didn't correspond to the program and so there were certain questions where the children were very confused, and I said in my hopeful way that they were overlooking something, and ended up more confused than the children.
- NL: Yes. Somehow the numbers didn't match up, did they?
- Harry: No. They needed quite a lot of help really. In fact, to be honest, I found on these four sheets (C/P/6 to 9) that some of the early questions were too difficult. They required an awful lot of help, and yet some of the last questions were the opposite - too easy.
- NL: Is that because they've got the idea by then?
- Harry: No. I think it was in the nature of the questions. Some of the later questions you had, where they were just completing sentences, where you'd given them the key words and they had to find the words that fitted, some of the brighter ones thought it was an insult to their intelligence. At the same time their intelligence had been severely tested and found wanting on page one.
- NL: Yes. It's a difficult exercise to do isn't it? To understand program logic when they've had no experience of it. I tried to lead them in gently at the very beginning.
- Harry: Speaking as an absolute tyro, although I could see in your program how you were trying to do different things, for a program to use as an exercise to show them a little bit about computer logic, it was too long.
- NL: The program was?
- Harry: Yes. I think a much shorter program where they could have seen the actual parts that made up the program would have been better.
- NL: Mm. We didn't look at all the program, only at selected bits of it as specified on the sheets. Also of course this was related to the previous week's exercise and I can't help the length of the program in that sense. One ray of hope is that I've now completely revamped the program as far as the documentation and appearance of it is concerned. I've put in comments frequently about what's happening and it's now in three distinct parts, with spaces in between so that it prints out like that, corresponding to the three lines and functions. It does it in the right order too.
- Harry: Yes. That was a difficulty. The basic principle of having to split the thing up into steps I think most of them could see very clearly, and in fact I think this emerged more clearly when we were doing flowcharts. In a sense a flowchart exercise is probably more valid than this insofar as it was requiring more than simply inspecting and it's a personal thing with me. I feel that synthetic exercises are always more valuable than analytical ones.

NL: Because you can beggar about with them and they're more open-ended?

Harry: Yes. A synthetic exercise is more open-ended because it allows the individual abilities of the child to be examined in greater depth, and an analytical exercise, where perfection is the greatest goal you can get, doesn't give those who could have done more a chance to prove it.

Steve: Yes, I'll go along with that. In the beginning when we were out by the March Hare talking about the whole scope of information, I thought that was very well geared to a mixed ability class. They did rather well. Now it's become much more advanced and the tasks are increasingly more difficult. Taking up Harry's point, I get very worried about the very low-ability children tackling it because they get very distressed if they can't understand. It's very difficult to manage really because one needs to spend an enormous amount of time explaining things in terrific detail, and the brightest of them - and in a normal mixed-ability situation, if you can define such a thing, at the moment one would aim and expect to spend more time explaining things to those who need it explaining - find themselves racing ahead and then coming along for something further. One just can't do that.

NL: Yes. What you're really saying is that the exercise is too difficult in the mixed-ability situation?

Harry: Yes. And I think in some ways it involves too great a depth. I've now got a very hard core amongst the girls who have now said they thoroughly dislike these worksheets, and they're fed up to the back teeth with computers. I think partly because of the last couple of weeks where I have leaned very heavily on your worksheets for the simple reason that I know too little to explain myself. I've been trying to - having said what I have said about synthesis and analysis - to analyse what's gone wrong with it for me, and I think it's the feeling that the depth of technique is too much. Kids of this age group are quite happy to accept that everything has to be done logically step by step, and that if you do things illogically you get your garbage in garbage out situation. But they were rather bemused by all the strange characters. I had to get for instance help from Ivor Woodfield to explain what the hash sign means. I'd got a reasonable idea but he genned me up a little more on this, and I think the £ and \$ signs in some programs. A little bit of that is interesting, but the whole program bemused them. They were bemused, I was confused.

NL: You wouldn't think it necessary then to go into this sort of detail on the follow-up?

Harry: No? By all means give them the program and have an explanation of the particular parts for the teacher to read up so that he can see and say 'Look at number 60, what's the first word?' - to do it as an oral exercise. On consideration now, if I was doing this again, I don't think I would let the kids loose on the sheets at all. I would first use the sheets for myself and go through them as an oral comprehension.

NL: Would it be possible to let the kids use the sheets, but don't let them loose on them as a written exercise, and if they wanted to do it, let them?

Harry: Yes. That would be better.

NL: At least they're making some sort of sense and have a hard copy as a summary. That also has the recommendation of where you've got the bright kids let them move, where you've got average or below then they need to be taken

by the hand.

Harry: Yes.

Steve: I'll make another confession at this point. That I just happened to do it by class teaching, from the marking of the cards onwards. I haven't been able to resolve how to do it any other way.

Harry: Well, last week I was doing it where the kids were, I suppose, in theory working individually, but in practise I had them in groups of four round a table. I told them to work as groups and if they got into difficulties to argue it out in the group before they came running to me.

NL: That didn't work then?

Harry: Well, yes. It worked insofar as it meant I didn't get besieged by 30 people all at the same time. I got besieged by one person from each group instead. And of course the weakest brethren - there was a tendency for the brighter ones, if you allowed them to work in friendship groups as I did, paired off, it's in human nature, - so we did have a few groups who contained a few 'sync characters' to be impolite, and they were really struggling. I got to the point where I could see a queue forming and I had to say 'Go and look at the next question', because it was holding up the whole works.

NL: Was it, to be specific, the problem on the second sheet where they had these boxes to fill in?

Harry: That caused a lot of problems, yes.

NL: Yes. I anticipated that that might cause problems. I don't think it was very well explained. We're using words like 'variables' that can put people off, but I couldn't think of an alternative word to use. As I say, I thought it might cause problems but it's a case of working at it until the idea clicks, and then it's easy. It's just a problem of getting through this barrier.

Harry: Yes. I mean I like the basic premise of one week it's all magic and marvellous, and the next week you show the conjurer's tricks and how the prestidigitation is actually performed to take out the magic.

NL: But it's going to have to be made much more specific?

Harry: Well, let's say the magic was taken out of it to such an extent that the group is very disillusioned.

NL: Did they actually complete the whole lot?

Harry: To be honest, I don't know.

NL: You see, the final denouement, so to speak, is where they read off from those boxes and write off their message, which should correspond with what they've got there.

Harry: We had 4 sheets, and by the end of the lesson the brighter group were half-way through the third sheet. And I suggested that people might like to carry on for half an hour for homework. So there will be some I'm sure who will have completed all the completable sections. But I don't know yet.

NL: It's too academic an exercise for some isn't it?

Harry: Yes. I think they're missing the creativity.

NL: Yes. I think you've voiced this criticism before. There's a shortage of creative work in the course as a whole and I'm concerned about it.

Harry: Coming back to my point about flowcharts as opposed to this. I think making a flowchart is a similar exercise to this, and yet it can be much more creative.

NL: Yes the flowcharting bit comes in another module and there we do explain how a flowchart works and then set them loose on their own - like taking a bath. And I think especially from your points of view as teachers of English you want more English topics.

Harry: Yes. In fact the last couple of weeks didn't fit into any kind of slot - it's not really maths, it's not really English.

NL: No. It's information - that's what the course is called. What about the terminal itself. Is that a valuable exercise to include in your theme syllabus? Would you have put it in or not?

Harry: Well, they enjoyed it. I think Steve will agree here. They did enjoy punching out and getting answers. I'm now looking at it from the point of view of this as a course which could be used generally in schools. There could well be schools which would find it difficult.

NL: Setting up a session like that you mean? Yes, I know that's a problem and I've made certain recommendations.

Steve: I think it boils down to the old chinese proverb 'I do and I understand'. When they're doing they're much happier than arguing, discussing, analysing, etc.

NL: Aren't they doing when they're filling in worksheets? In some ways the worksheet approach is doing rather than just talking about it.

Steve: Oh yes. But I think the practical aspects are those they tackle more happily and with greater enthusiasm, and I think achieve better results.

Harry: They have enjoyed collecting little bits. I mean, I didn't entirely break the code on the punched tape, but after observing it for a minute or two, I could see how the bits on the tape fitted in with what was on the card, and I decoded it myself what I thought was an end of card sign and a beginning of card sign. So it was just a case then of cutting off every two cards and presenting the tape to the children. I could see that certain characters formed certain patterns and they could see that themselves. I tried to point out these to them, and in fact some of them managed to work out the numbers I think.

NL: Did they enjoy that?

Harry: Yes, I think so, but they were taking time off from doing the worksheets. I think, as I've said, and still haven't done it, one could introduce the idea of Braille.

NL: I didn't want to spend too much time of coding methods. You've already done something in module 4 on card codes. I suppose it's a theme we could constantly refer back to.

Harry: I find kids are very interested in codes and ciphers. I always justify it in English because, coming back to GIGO, you do have to spell correctly.

NL: On the basis of the experience we've had with the terminal session, I have

altered these lessons quite a lot. The data preparation lesson is now two lessons, the first lesson is devoted to an explanation of codes and ciphers, encouraging them to write letters and messages to each other in the card codes or whatever. Having done that they have got used to using these cards and the following week can be wholly devoted to preparation for the terminal session.

Harry: Yes. I like that. At one point in the filling in of the cards we degenerated to the point where I said 'When I say 1 you pick up your pencil, on the command 2 you' and so on.

Steve: And even then some got it wrong. But there's a value in doing that. When the computer gets your name wrong and everyone else's right, you want to know why and that's useful. But there is a limit to what the computer can take in mistakes.

NL: Oh yes. They certainly learn something from making mistakes, probably more than they would if they get everything right. Getting back to this follow-up problem, do you think it would be a good idea to make it into a roleplaying situation. Each child takes a character or a letter or a bit string in the program and works out what is in it so that the final message comes out at the end? And is displayed? While the teacher acts as the controller of the session ie the program, and manipulates the characters according to the logic?

Harry: Oh yes. That sounds an interesting idea.

NL: That would make them look at it very closely. The main snag is that the teacher will have to know exactly what he's doing, otherwise complete chaos will reign.

Transcript of a conversation with Jenny Leigh at Henry
Beaufort School on 14.2.75

Background: Jenny had been teaching the information course to her 15 fourth year pupils from the beginning of the spring term 1975. After completing module 1, they were introduced to the terminal and this conversation concerns the post-terminal lesson when the children completed the sheets on how the 'Info' program worked.

NL: How did your lot go on then?

Jenny: Oh, they've done quite well.

NL: Did they enjoy the sheets?

Jenny: They filled all those in. They started off with that one session when Mrs. Dutton came in. Then we discussed it and how much they had enjoyed it, and it was very good, and I just gave a recap on what they'd been told. They were very good. Then I have them the sheets of the program and discussed them with them, and we worked our way through the first few questions. That was on the Friday wasn't it? And then as soon as we got to the program I left them to it on their own. I let them take the sheets home because they asked me if they could, and they worked it out on their own. They quite enjoyed that. I think it's better than a few lessons just filling in sheets. Then yesterday they brought them in and I went through them. They called out the answers they had and if they were different than the answer I had - and in some cases they were, because for example they had a different order against the squares. What they did in fact was to fill them in before they should have done - until they got to the next part of the questions - they made it difficult because it explained exactly what N or K stood for later; but they'd actually worked out that part of it on their own. Then they did a little bit of mathematics on how you worked out the birthday and that, and then there was a bit about working out the days and they understood the formula. And they had one lesson on that. But they think they know all the answers. They all got every one right except one. I think it had something to do with the number of days you've been born - $Z + Z$ + something else.

NL: How did you know the answers?

Jenny: Well, I spent a long time the previous day working out it all to be ready for them. But it wasn't any use my knowing all the answers.

NL: Did they express any desire to do some programming themselves?

Jenny: No, it hasn't arisen. But I think they had enough of actual work on the computer. I think they saw the work that had been done in the program - it was a fairly complicated thing and they worked it out quite well. Once they got the idea of instructions and information they managed to get to the bottom of it pretty quickly.

Transcript of a conversation with Harry Wright and Steve Ward
at Henry Beaufort School on 6.6.75

- Background: This conversation concerns the Haiku section of module 6. Harry has given one lesson Haiku to introduce the children to the poetry form, and is about to embark on a double lesson which will result in the making out of Haiku forms for processing by computer at the Southampton College of Technology. Steve has already produced some of these forms from his class.
- Harry: Yes, I've already read the notes, but I can't remember what I've done with them.
- NL: Have you got all the data sheets?
- Harry: Yes. I've got all the pupil's end but in thinking what I'm going to be doing this afternoon, it struck me in this that it's all a lot to do with sentence structure and I was wondering whether I'd missed something in the notes which brought out the structure of English.
- NL: There's certainly a lot there about syntax. Once you've created your lists of words you've got to think about how to put them together.
- Harry: What I've been doing so far with Haiku is that we've got over what a Haiku is and I've been having the kids write their own. I read them through quite a few translations - I haven't shown them yet the computer examples, I'm saving that up for this afternoon. In fact, yesterday, what I did was hand out a great pile of poetry book, of different kinds which are also well illustrated with coloured pictures. I suggested that they thumb through and when they saw a picture they liked, then to think of some association that the picture suggests. I spoke about Haikus looking at life under the microscope, that sort of thing. I've not worried too much about the computer and counting syllables accurately - I notice that the examples aren't always 5-7-5. I'm more concerned with getting the kids to use vivid words and the 'mot juste' as it were rather than just sit and count syllables all the time.
- Steve: We had a look at that yesterday. Actually we talked about what we were going to put in the boxes and from the examples that were given we discovered - and very much discovered, I didn't realise this till I put the examples on the blackboard - that the groups were not only on the same subject, houses, theatres, temples, etc. but there were also nouns, verbs, gerunds, prepositions and what have you. And these were two rules to be observed.
- NL: So there's the actual choosing of words and the putting into a syntactic framework. And then when you get them back there's the discrimination between good and bad and indifferent. I think they'll discover that if you try to do too much, like trying to express several ideas on one data sheet, you'll get so much rubbish out.
- Harry: Yes I think to some extent they've got to be guided a little bit as to what to put in.
- NL: Yes but whatever you put in you're going to get some rubbish out.
- Steve: A small point about that. The very last entry on page 2 says how many you want to be printed out.
- NL: Yes. 40. It'll print thousands if you ask it to, but 40 is a reasonable number for the discrimination exercise.

Transcript of a conversation with Harry Wright and Steve Ward
at Henry Beaufort School on 6.7.75

Background: This conversation is the second of two concerning the teaching of Haiku and running the programs for the children. It is mainly relevant to Harry's teaching and reactions.

NL: We've really only Haiku left to talk about now.

Harry: Yes. The first lot we did, some of the kids were a bit disappointed that they just got sold down the river. The computer just said 'Can't do'. I wonder whether I hadn't understood there, because it seems that if the computer couldn't find a combination that said 17 syllables, it just didn't play.

NL: No, it wouldn't. If it can't find 17 syllables it won't do it at all.

Harry: Even though I thought we had rigged some of them so that they would have 17 syllables?

NL: Yes. There are two things that can go wrong. Either there weren't 17 syllables or the people at the installation hadn't put the right number of special cards between each group. If there are gaps at the end you still put a special card in between the non-existent groups. Had I been mobile that week I could have gone along and inspected them and made sure.

Harry: You've not seen these then?

NL: I've not seen the first week's - you picked those up. I thought the second week's were good. Most of them came out except two. I thought they were quite good.

Harry: Well. I cheated a bit with these, because what I did this time, I said 'Make a basic Haiku. Don't try to think of lots of variations before you've got one worked out. Then see if you can find alternatives to the words you've used.' And in fact we spent about half the lesson again on linguistics or parts of speech. I still haven't convinced some of them that if you use a word like 'in' and you stick in words like 'has' and 'butterfly' into the same group you're going to make problems for yourself. In fact we tried doing a random group of words - about a dozen. Everybody in the class gave me a random word, the first that came into their heads. I stressed it could be any part of speech, so I got 'dogs' and 'in' and 'has'. I wrote the words down in 6 columns and tried to make sentences using one word from each column each time - any order but one from each column. And we ended up with all sorts of obscure things like 'black pigeons wanting gold-edge securities'. I think it's worth doing because it helps to bring home to them that a completely random selection of words doesn't offer you many opportunities to make English sentences, that you've got to have an underlying structure, and with this thing, the Haiku, if you didn't have an underlying structure before you started you were just going to make the computer chuck out piles of garbage. In fact restricting it to forty Haiku meant that there was a limited likelihood of making sense. I'm pleased to see mine making sense and came out quite well.

NL: Yes, they did. I think a lot of them came out quite well. In fact some of them were very funny. They seem to have inherited your sense of humour.

Harry: The only thing that worries me is that some of the errors are not spelling errors on the part of me or my kids. They're either punching errors or someone who did the cards can't spell.

NL: They punch what they think is in the data sheets. It might not be what is actually there or what is meant to be there.

Harry: For example, on mine 'verses' came out as 'versed'. If you look at the data sheet it's clear enough.

NL: Yes. As you saw in your visit to Hampshire, she punches so quickly that she's not thinking about it. It's not a conscious process.

Harry: I'm very pleased with the way some of them came out. Some are quite good ones. Whereas the last lot we had had only half a dozen groups that made sense. What I did because I got so few that were any use I got the children into groups and handed them round. So we had half a dozen groups and half a dozen reasonable sheets and they looked through those and passed them round. And we got quite a lot of discussion out of it.

NL: Yes I think you get more value out of the second run than the first because they learn a lot from the first run - as long as you point out where they are going wrong.

Harry: Yes. Again one of my shrewd young ladies said that we're putting so many restrictions on what we do - is it worth the effort? What is the computer doing?

NL: Yes. In the end the computer becomes an irrelevancy doesn't it?

Harry: Yes. I think some of them have already arrived at that decision.

NL: OK. If they're intelligent enough to arrive at that decision fairly early then that again is irrelevant. For the majority of kids, it will give them a feel for words and feel for structure and the need for structure. If it's done that it's done it in a way which is attractive for kids. It can be a very boring lesson, teaching English structure, can't it?

Harry: Oh yes. I think we got a lot about English structure out of it.

Steve: On a point of Haiku, I had the impression that a good Haiku had to have each line independent, in the sense that it could stand on its own, first, second, third.

NL: Each line of 5-7-5 you mean? That might be so in the original definition of Haiku. If you're sticking rigidly to that then these aren't Haiku. It doesn't do it in 5-7-5 format.

Harry: Very few are.

NL: I had a discussion with the English lecturer at Southampton University. He thought this was a very valuable exercise but certainly not an exercise in Haiku.

Steve: No. Certainly mine have learned a lot more about structure than Haiku. And it has the advantage of being quite small and manageable.

NL: Yes. Also, does it give the kids some feel for words and synonyms and things like that?

Harry: I think so.

NL: For instance you can, in the follow-up, go on to discuss the different shades of meaning in the words they use. Filthy and dirty and decrepit, etc. Did the kids get something valuable out of it? Would you have taught the lesson in this way given a choice of methods?

Harry: Yes. I think from the point of view of bringing home to the kids that structures in English are quite closely delineated, it was useful.

NL: But you had to modify your teaching to suit the method.

Harry: Yes. In some ways being limited to this business of 17 syllables was a red herring. Had we just said that they mustn't use more than ten words to catch a mood, set a scene, describe an incident as graphically as you can - that kills two birds with one stone. One's playing with the basic poetic spirit, and you're trying to create a skeleton sentence from which you can create as many alternatives as you wish.

- 4.8 Module 7 - Information on (Gas) Tap
 Module 8 - From Ignorance to Knowledge - and Back Again
 Module 9 - Individual/Group/Class Assignments

- 4.8.1 Introduction Modules 7, 8 and 9 have been grouped together into one part because they are the most recently written and have received little testing in the schools. Only two lessons from module 7 have actually been taught in the classroom situation; one lesson from module 8 has been taught and module 9 has not been attempted at all by any of the children. Thus this section will deal principally with the aims, methods and objectives of the lessons and the constraints in writing the modules.
- 4.8.2 Module 7 - Introduction The 'Gas' module, as module 7 was first known, was conceived at a Solent Area Computer Education Group visit to the Southern Gas Board in March of 1973 and partly written up in March of 1974. In some respects it is incomplete, since the highlight of the module was to be a manual simulation of the method by which the computer acts as communicator between the Sales Office, the Warehouse, the Fitter and the Meter Reader. The circumstances surrounding the obtaining of information and material and the lack of cooperation of higher management at the Southern Gas Board have already been described in chapter 2 (part 2.3.8)
- 4.8.3 Lessons and Methods As will be seen from pages G/T/2 to G/T/27 in volume 2, about 11 hours of teaching material has been culled from existing resources and it is perhaps no bad thing that the computer plays so little part in the module, since it has encouraged a wider approach to information to be examined. The first lesson approaches the topic through the Gas Account, which is, after all, the interface between the supplier and the consumer and the only real solid evidence at consumer level that a computer is involved somewhere in the process. But it is not the computer which is the real object of the examination in this exercise but the information which the Gas Bill contains. This may or may not be used to lead the children to an appreciation of the use of the machine as a necessary part of the process of creating the account. In effect, the pupil worksheets G/P/1 to G/P/6 inclusive do make this connection fairly obvious and there is scope for going into a great depth of detail if the teacher feels that the children are capable of sustaining concentration in such an exercise.

x 10, 40

If not there is enough material here to make the general point. A subsidiary but important aim of the lesson, which may take at least two hours if all the detail is covered and all the implications discussed, is to point out the impact of numbers in the world today using the gas account as an illustration of the way in which the computer has made their manipulation easier. Items such as VAT numbers, Post Office box numbers, telephone extensions, postal codes, are those things which we in the adult world take for granted because we have adapted to them. They are far from obviously understood by children, and there is opportunity to bring them to the attention of the children in this exercise. There is also the possibility of giving insights into the organisation of information by pursuing some of the more obvious but implicit aspects of the use of numbers. For example, why is a number so designated and what does it signify? How much has the recipient been taken into account if, for example, the number is vital and has to be committed to memory? Progress from this idea may ask questions about how many numbers refer to any individual - from National Health code to Driving Licence - and what are the possibilities of these becoming just one number? What are the dangers if this happens?

The second lesson in the Gas module moves right away from this close examination of the Gas Account, not only for variety of approach, but also because it takes children back to the source of the information in the Gas story; if there were no gas there would be no necessity for this huge information edifice to be set up. The 'Natural Gas for Britain' film used would most appropriately be used by a teacher of Geography, largely because such topics as drilling for Gas, the geology of the earth beneath the North Sea, and the routes and means of the distribution of Gas to various towns have come to be accepted as falling within the boundaries of that body of knowledge labelled Geography. But of course there are other, equally valid, aspects of the story which are not so labelled. The analysis of the Gas itself might conceivably be classified as Chemistry, the laying of pipelines is only understood as being Geography insofar as they go from one place to another - the laying is an engineering problem. The development of the Gas Industry could be described as History, the seismology of exploration could be a branch of Physics, and so on. In essence these are all information problems and this is one level at which the lesson and film might be approached and analysed. The more superficial level, and this is not necessarily a pejorative use of the word since class circumstances might encourage a more superficial approach, is to

show the film as an aspect of the commodity (Gas) which is the object of study, and to present that which is shown in the film as information of interest to this study.

Lesson 3 returns to the formula which has been proved successful in some cases of finding information from pamphlets, and in so doing of learning through discovery. Sheets G/P/7 to G/P/9 inclusive in volume 2 are used by the children in this process, but the major difference between these and the more conventional type of assignment sheets lies in the nature of some of the questions. For example, assignment 1, question 3, and assignment 3, question 4, encourage the child not to find answers but to find questions. The whole of assignment 5 has a similar aim. This is an attempt to involve the child in the decision making process of supplying the question, the information needed to supply an answer and the analysis of that information to formulate what the next question might be in a logical chain of events.

There are several reasons for including a lesson (4) on flowcharting in the 'Information' course. Firstly, the later parts of module 7 contain systems flowcharts covering a range of possibilities and the children need to have had experience of what a flowchart is and how it works to understand them. Secondly, and more importantly, flowcharting is an essential tool to the student of information. Not only does it make possible the understanding of the issues concerned in a particular problem in a clearly defined and stylised way, but it encourages the sorting out of logical wheat from unnecessary chaff, of essential information from the verbiage which often surrounds it, and to identify the points in the flow of information which might cause the most problems or weaken the links in the chain. Thirdly, there are a number of levels at which the flowcharting activity can be carried out. In this exercise the target level is not high, far from it, but of course it is up to the teacher to take the activity as far as he feels it would be needed. The teaching notes on pages G/T/10 to G/T/13 are quite full since they assume no knowledge of flowcharting on the part of the teacher. The Director's letter used as an example on page G/P/10 is an attempt to chart the progress of a letter written by a Director of Education and distributed through the schoolchildren to their parents. In this way the potential breakdown points in the system are illustrated and the place of the human being in the same system highlighted.

Lesson 5 tries to bring together some of the concepts learned in lessons 2 and 3, but gives them the extra dimension of information organisation and flow.

On the one hand, the teacher is using the diagram on sheet G/P/11 to show how information is linked and interactive in its usage, while on the other the ubiquitousness and depth of detail one could, if one were so involved, reach for is being brought out by the use of the information sheets G/P/12 to G/P/15. Thus this is a lesson about information in Gas rather than about any particular aspect of the Gas Industry.

Lesson 6, as has already been explained, has not yet been implemented and may be provided from elsewhere, but perhaps a short description of the intention will show how it is to be the centre-piece of the module. Briefly, the game will be both a role-playing situation and a simulation in which children act out the parts and processes of selling a gas appliance, fitting the appliance in the customer's house, and the meter-reader who receives his batch of forms from the computer department. Each part of the sequence will be guided by a 'controller' and children play the parts of salesman, warehouseman, fitter, customer, meter-reader and, most important, computer. The actual forms for each process would be used, so that children could act out the flow of information from human to computer to human to computer etc, thus showing the machine as a communications medium. Finally, having obtained the necessary information from the meter-reader, the children are referred back to lesson 1, in which a bill was made out using this information.

Lesson 7, which is fully described in the teaching notes on pages G/T/18 and 19 deals with the exceptions which occur to any information system and shows how they are incorporated into the wider system. The pupil worksheets G/P/16 to G/P/18 inclusive describe, in flowchart form, what happens if people move or are new or don't pay, and the teacher is able to use these either in conjunction with the question sheet G/P/19 or as visual aids in some other way.

Lastly, the film 'Flame of the Future' provides an excellent medium for summarising the work done in the module. It provides a different slant from usual since it concentrates on people rather than concepts, and this is helpful in describing the importance of human beings in the systems which use and communicate information. The film synopsis (page G/T/22) and the pupil worksheets (pages G/P/20 and 21) are constructed so that the teacher may use a preferred presentation method with the children. Thus module 7 as a whole attempts to give a picture of the Gas Industry through the information it handles, both from the point of view of the Gas Corporation as a searcher for, and provider and distributor of the commodity to which it owes its existence, and

the customer-regional board interaction which provides the ultimate reason for exploiting that commodity. In giving this picture, the module supplies particular emphasis to the information which is the essential focal point in the operation of the industry, and attempts to give a series of insights to the children about the place of information and the information processor in the scheme of things. In addition, the lessons are so devised that the teacher is given a flexibility of approach and choice of detail needed to cope with a wide variety of ages and levels of children.

4.8.4 Module 8 - Introduction The title of module 8 - 'From Ignorance to Knowledge and Back Again' - is descriptive of the philosophy of the module and of the course. Originally planned as 'Information in the Library', it quickly became apparent that this was insufficient to express the intention of illustrating how information proliferates, and how the discovery of one item of information can lead to insights into the enormous quantities around us, and the interaction of bodies of knowledge. In one way this module is a natural successor to module 1. Whereas the latter encourages children to discover and think about information in the environment in a fairly unstructured sort of way, module 8 attempts to give the subject some structure by discussing in a practical way the problems of classification and crossreferencing, the establishment of information storage and retrieval systems, and the distinctions which can be made between information types and needs. It does this with particular reference to the library since this is a place to which the children have access and with which many of them have some familiarity. If they have not, then this is an opportunity to give them this familiarity. The module was the last of all to be completed and has therefore not yet been subjected to any pilot testing. Some of the exercises using pupil worksheets take the Henry Beaufort School Library as a model, not because it is superior to most, but because it was the most convenient. The school library at Sandhurst Comprehensive School, whose headmaster, Mr. C. W. Dally, showed the author round and discussed far-ranging plans for storage and retrieval of resource material, would have offered much more scope for lessons covering a wider spectrum of possibilities. However, it was thought that the more realistic and practical approach would be to accept that school libraries tend to be less ambitious than this, if they exist in schools at all. The teaching material for the module was constructed around what is likely to be common

to the average school library, ie the storage of books of all types, the existence of some sort of retrieval system, usually based on the Dewey Decimal System, the notion of a booking out system and the problems surrounding these activities. In working through the conceptual problem by example to the methods used to solve it on a small scale in the school situation, and then in moving from this familiar situation into the unfamiliar and back into the conceptual area, but this time with reference to possible future systems covering a wider range of problems, there is scope for work at the practical, creative and imaginative levels.

4.8.5 Lessons and Methods But here again it is preferable to start from a knowledge base within the experience of the children. Thus the first lesson discusses with the children the sources of information which they know about but are not necessarily explicitly aware of. The lesson notes for this start on page L/T/5 in volume 2 and there is a list there of those sources which might be raised and discussed in the first session. Module 1 has had much influence on this first part, and uses the insights gained about input, processing and output of information in the excursion into the environment. This first lesson of module 8 is an attempt to bridge the gap between that unstructured personal activity and the formal process of finding out for themselves that which the children may need to know at any one time. It will be noted from the list that the variety of sources is made as wide as is appropriate in the child's real world. Finding out from people probably plays as much a part in the assimilation of information by a child as does finding out from those more easily identifiable aspects such as books and organisations.

The second part of topic 1, still concerned with bridging the gap and establishing the need, is an exercise illustrating the wrong way to go about retrieving information. To teach in this way is often frowned upon by educationists, but a consistent approach of all modules is first to emphasise the problem to the children, and there is in this instance an attempt to show children that the amount of information in the library is so enormous that some sort of classification process into generalised bodies of knowledge is necessary. The teaching notes for this lesson are on page L/T/6 and the question sheet, which referred to books held on the shelves of the Henry Beaufort school library, is numbered L/P/1. It will be seen that questions cover a very wide range of topic and that the name of the book from which the information was obtained is

required in order to emphasise the experience. In addition, a facility is made available to the children for recording the times of start and finish on the sheets. The teacher may wish to set up an experiment to illustrate whether the use of the index does save time and how much.

Topic 2, which concerns the organisation of information and knowledge, approaching each separate facet by discussion of the general problem and focussing in on a library example, is outlined in the teaching notes on pages L/T/6 to L/T/9 inclusive. The practical approach to the topic is shown in the number of pupil worksheets, from L/P/2 to L/P/18 inclusive, and the children will be expected to spend a lot of time actually in the library. It is not the intention here to reiterate the points made in the teaching notes but to explain why some lessons have been treated in some ways. For example, in the classifying and crossreferencing exercise, lesson (a) of topic 2, the use of record titles is an attempt to make use of what a large proportion of children find to be an enjoyable activity, largely because through it they can identify with the ambience of a teenage subculture. At the same time, the addition of records of many different types into the list on page L/P/2 makes them aware of the existence of the many faces of music, and of the problems of making classifications into different slots. The pace of change in the modern world makes many of the pop-style records out of date quickly, and it may be in the teachers interest to update the list from time to time. Change is perhaps a valuable teaching point to make and reference to the list will show how this is reflected in popular culture. Sheets L/P/3 to L/P/5 try to lead children gently through the problems and meanings of classification and crossreferencing by a series of exercises, and end by pointing out that this is simply one way in which the classification of information comes into our everyday lives and suggesting other areas in which this is true.

From there it is a natural step to study the means of classifying information and knowledge, and the ways in which it is done. The Dewey System was chosen to represent this since it is the one used in the vast majority of school libraries, and is one which may be familiar to most children. Sheets L/T/7 and 8 give the teacher a few suggestions about approach, and sheets L/P/6 to 9 inclusive contain exercises for the child to complete, together with diagrams which explain the system. All the way through the children are referred to the library shelves to find examples of the concepts they are learning. Perhaps, one of the problems with this and the next two exercises is that it is more

appropriate to the first year situation, when the operational characteristics of the school library are more often explained. Obviously, the effectiveness of this lesson in a later course is dependent upon the previous knowledge of the children.

Topic 2, lesson (c), 'Using the Catalogue', is best tackled by encouraging the children to actually use it. The worksheets on pages L/P/10 to L/P/14 however contain one or two interesting features, in that they attempt to draw on some of the previous experiences of the children. Also, the Case Studies on the last two of these sheets are representative of a wide number of types of information problem the children will come across during their school life, and as such, may be of help to teachers and children in many subjects. Case Study 4 for example was a particular problem of the Social Studies Teacher at Henry Beaufort school at the time when the module was being formulated, and it has been included in this form so that it could be made applicable to any subject and teacher. Exercises such as this may not only benefit the teacher, but can also be of great value to the child in understanding what is taught in a particular subject and why, and in motivating him or her to take a greater part in lessons. There are many information-type problems which frequently beset the teacher in the course of a professional life, and there is no reason why children should not participate and help in solving some of them to the benefit of everyone. Case Study 7 encourages interaction among the children, but the teacher will need to judge whether it would be a viable proposition to attempt the study or not. Thus, the lesson, which is ostensibly about the use of the catalogue in the school library, contains aspects of the subject which encourage examination from a variety of directions, a variety of approaches.

The second last lesson in this topic refers specifically to reference books, partly because facts are what most people associate with information, and factual information is to be found in reference books, but also because the subject offers a rich seam of exploration into the many different types of reference book, the problems of updating, the use of indexes and the special demands of the reference library on the time of the librarian. Sheets L/P/15 to L/P/18 contain a number of exercises on these aspects and on the use of the various reference books. Finally, 'booking out systems' is recommended as a useful lesson not only because it may help in the training of potential school librarians, and assist the process of lending and returning books from all the children, but also because, in the information sense, it has a lot to say

about systems, their design and the various subsystems which have to be taken into account in the larger information system. Page L/T/9 contains the teaching notes for this lesson, and the list in these notes suggests the various aspects of the topic which may be discussed. In the library particularly, this is the point at which books and people interface at a formal and negotiating level, the point at which the supplier meets the consumer, and this human aspect to booking out systems is one which can be emphasised.

Lastly, as with most of the modules in the information course, the point is reached when the children are taught how the aspects they have been studying can be processed in a different way using the power and speed of the computer. To put over these points, the story '1985 and All That' was written, (pages L/P/19 to 22). The story does not attempt to go into any detail about how the computer performs its function, but concentrates solely on its place in the school and in the library. It contains details of how the system, the school system in this case, has been changed because of the flexibility introduced. Thus the ideas of base-rooms rather than classrooms, of a choice of subjects, of the presentation of information about non-academic activities and of the choice of method of teaching in the school are products of the use of the computer rather than specific points about the machine. In the library description which forms the second half of the story, the concepts of personal profiles, of self-study carrels, of browsing through information, and of the use of display terminals are all extensions of those in use and under discussion in libraries today. Thus the story is a description of what is possible, and what some people, but by no means all people, consider to be desirable. Several schoolteachers within the author's acquaintance regard it as a horror story, but do not dispute its feasibility. The methods by which it is presented to the children may reflect the teacher's opinion but there is much opportunity for creative discussion and imaginative writing as a result of reading through one or many of the ideas expressed. Insofar as it describes the library in the latter half, this story has a place in module 8; insofar as it tells a story about the use of computers in a world of the future it could be included at the end of any of the modules.

To summarise, this module is about 'finding out' in many different ways and on many different aspects of the same topic. In addition the children are expected to find out how to find out, rather than to be told how to do so. But in the finding out they are confronted with further problems, problems of

change and updating, of systems and subsystems, of the sheer innumensity of information and knowledge and of the information explosion. And, hopefully, they are again brought face to face with their own ignorance, but not in any sort of pejorative sense. The North Country saying - 'the more we know, the more we know we don't know' - puts the ideal of the module in a much more succinct way. If some children have learned to be humble in the face of an abundance of information, and others have learned to come to terms with the inevitable ignorance of everyone in this situation, then the module will have achieved one of its objectives and cast justifiable doubt on the commonly accepted, but fatuous, nonsense of equating intelligence with the number of facts which have been stuffed into any one brain.

4.8.6 Module 9 - Introduction As has been emphasised before, the length of the 'Information' course, approximately 100 hours of teaching material, has precluded the use of strict statistical methods of measuring course effectiveness. Module 9 provides an opportunity for the child to put into practise some of the concepts learned in previous modules. At the same time it may provide some measure of achievement to the observer. In the previous modules methods of collection, storage and retrieval of information have been presented as examples of how people and organisations solve problems. Sometimes, as in module 6, these methods are strictly circumscribed around the needs of a particular requirement. Only in module 1 and to a much smaller degree in module 2 have the children been encouraged to deploy actively their imaginations in solving some of the problems of information processing at a machine level. Here, in module 9, they are expected to follow a problem through from beginning to end using the ideas which they have learned by studying how others do it. In this much more open-ended situation, a successful assignment might be construed as some measure of the effectiveness of the course in teaching children about information.

This would be true if the whole objective of the course were to teach about the processing of that information which it is appropriate to process by machine. But many other aspects of information have been mentioned in the course; the issue of personal information and its conversion to data, thus affecting its real significance; the misuse and abuse of the computer in industry and government; the 'information explosion' and its effects; the logical nature of the information processing method; the admixture of information elements in the environment;

all these and others have played an important part in the unfolding of the information story in this course. And so, if module 9 is to be judged as the means by which the child's success implies the course's success, this is only true with relation to that subset of the course which deals with the collection, storage and retrieval of data, and applicable only to the methods of form design, data entry and retrieval used by the child to demonstrate an awareness of how the problem might be solved. It does not test one of the essential objectives of creating a feeling for, a sensitivity to, the ambience of the world of information processing, and the larger world in which information is a most important part at all levels, the personal as well as the computer-produced. One would hope that the negative philosophy of using examinations to sort out sheep from goats, successes from failures, is not applied to this module, or indeed to any part of the course. Every module is a teaching situation whether or not one chooses to use it as an indicator of understanding. If a child is struggling, for whatever reason, whether he has been trying in the past or not, whether he has been lazy, or difficult or incapable, an essential attitude of the teacher is to give help where it is required. If, for example, the child does not know how to use an edge-punched card, he needs help and would hopefully get it. If, because of this, he completes the module successfully and gains the necessary insights into the method to make effective use of it, this is surely a benefit to both teacher and child.

The title of the module, 'Individual/Group/Class Information Assignments', is to give the teacher the flexibility of organisation which the class and teaching environment demand. One hopes however that it is written with the titular order of preference in mind, and if group work is essential, the groups should be as small as possible. Pages A/T/2 to A/T/5 contain suggestions for topics, and these include as wide a range of approach as possible. They are not all of the information collection, storage and retrieval progression in the formal sense. Some of them, suggestions 1) and j) for example, use work done in previous modules as a basis for further work, and one could well imagine a couple of children who had been fascinated by the 'bits and pieces' lesson of module 4 wishing to set up a permanent exhibition for others, and being willing to search for references to improve their knowledge of each piece. In fact this has been done at several schools who have received a box of bits and pieces from the IBM Schools and Colleges Computer Information Service, and the author has frequently been one of the sources of information. There are

occasions when such a project has not been successful, as in the case of Southampton College for Girls who obtained, in addition to their usual box of scrap bits and pieces, a large 8 feet by 6 feet by 3 feet fixed disk storage unit, one of only five in the country. The girls concerned soon came into conflict for their time with examination requirements, and when eventually they left the school the fixed disk white elephant remained behind. The enthusiastic teacher should beware of falling into this sort of trap with old or obsolete equipment which might suit an immediate purpose, but which takes up a lot of much-needed space in the future.

Another type of suggested assignment is based on social needs. Numbers g) and m) are examples in which the child or group of children are examining the information needs of people and designing a system which could actually be used. The town or village information system has obvious links with the many sources of information both in the school, from such departments as History or Geography, and out of it, from the Town Hall or the residents of the place. The willingness of older people to cooperate with the young on matters of history was illustrated in the activities of Sheila's classes in module 1 (page 4.2.9). And if the output from this activity is an assessment of need, rather than a satisfaction of it, then the information requirements of the assignment will have been realised. But, for the most part, the assignments concern the child in devising a way of collecting data, in recording or storing it on an information storage and retrieval medium such as an edge-punched card or computer, in demonstrating that the retrieval system works and in writing up results. Sheets A/T/7 to A/T/10 inclusive demonstrate one example of the type of study required. They are reproduced in the teachers notes not to set a standard, for this was sixth form work of a high standard which second formers could not hope to emulate, but to illustrate an approach. The Computer Science teacher at Royal Guildford Grammar School gave his permission for this questionnaire to be reproduced. In reading through it one can detect several instances where the Grammar School view of the world conflicts with reality, and this too is indicative of an information shortage, perhaps caused by living in a selected environment.

Initial help should not be completely withdrawn from the children. Sheet A/P/1 would be used as the basis for teacher's remarks at the beginning of the project, and one would expect the suggestions it contains to be given some fairly heavy emphasis. The sheet would also preferably be made available

individually to the children so that it can be used for reference when required. Three other sheets (A/P/2 to A/P/4) are supplied to help some children in particular information assignments, and the teacher can decide whether these are to be distributed or not. They are sufficiently generalised in the sense that they do not tell the child what to do and how to do it but hint at ideas he might consider on a particular topic.

It is regretted that no class in the pilot testing schools has been able to try out this module. This was principally because of lack of time, and a consequence of this being a module which fairly obviously comes at the end of the course, when time and staff are often short.

4.8.7 Reactions - module 7 Only three weeks in total has been spent in teaching this module at Yateley, all of them by Ray Cackett, and they covered lessons one and two. They were taught in April 1974 and there is no written or recorded feedback. Two weeks were spent on lesson a) when it was in a slightly different form than at present. Since the teaching, sheet G/P/6 has been added to the exercise to provide additional help not only for the child but also for the teacher. During the first of the two weeks, Ray spent much of the time teaching the Bloggins gas account, explaining the various points made in the teachers notes, and completing the worksheets on the Impact of Numbers (G/P/2). It is fair to point out that Ray had serious doubts about the impact of this lesson beforehand. He was uneasy about the amount of detail in the lesson, and the possibility of boring the children with facts which he personally did not find at all interesting or uplifting. He was also afraid that his dis-interest would show through to the children. In the event he was pleasantly surprised by this first lesson and the way in which the children seemed to enjoy a close attention to detail in the discovery of numbers and their meanings. In fact he found that it offered the opportunity of explaining some things about the world outside with which adults, but not always children are familiar, things such as VAT, Giro, and Post Office Boxes, and in which the children did in fact show an interest.

However, if he was pleased with that lesson, there was no cause for complacency in the next, which covered the rest of lesson a). He found that the children this week were much less inclined to settle down to the detail, mainly because the exercise they were asked to complete was much harder and they did not have the benefit of sheet G/P/6 at the time to help them sort it out. Ray found him-

self constantly besieged by children wanting to know how to answer particular questions and, as he said himself, he was not sure of the right answer anyway. It was a good example of lack of information leading to lack of decision, and the exercise was in fact never completed. Hopefully the alterations and additions to this section of the module will make it more accessible to children. What perhaps also is needed is to devote a section of this lesson to the establishing of the links between numbers and meanings which were discussed in the previous week.

In the following week the film was shown and discussed and shown again. Since this was a film which would normally be shown by a Geographer as part of a Geography lesson and since Ray was a teacher of Geography, it might have been expected that he would be more at home with this. Strangely enough he was not so, largely, he thinks, because the demands of the information course required different interpretations from those of a straight Geography treatment. For this reason he was probably more uneasy than he would have been if he were doing something completely alien to Geography teaching. Indeed he saw the link between the film and what he regarded as being the philosophy behind the information course to be somewhat tenuous, and a case of using a visual aid out of context. Such criticism is both serious and valid since, as there are no films which illustrate explicitly the ideas contained in 'Information', the normal procedure tends to be reversed, so that the film becomes the rationale, and the information extracted from it the rationalisation. This is not the happiest of circumstances.

In the absence of further testing, it is doubtful whether any conclusions can be drawn about this module, especially since it builds up to make further specific points about the Gas Industry and the role of information in it.

4.8.3 Reactions - module 8 If reactions to module 7 were sparse, those to module 8 are almost non-existent. In fact two teachers have considered it and tried it, Jenny Leigh at Henry Beaufort School and Ray Cackett at Yateley. Neither were able to get very far with it but for very different reasons. In Jenny's case, after completing the first topic, her class reminded her that they had been through a course in cataloguing and how to use the school library in their first year at secondary school and had no wish to do the same old thing. Very wisely, Jenny did not continue. In Ray's case, the use of the library was the main problem. At Yateley the library is in fact a community library serving

the needs of the school and the community outside the school. This would be normally no obstacle to the completion of the module, except that the only classroom adjoining the library building was big enough for only 20 children. Even so Ray was prepared to squash the children into that room, only to find that it was required for examinations, and the school administration system was not flexible enough to have another room assigned to this purpose. This, as has been implied in previous remarks, was a fairly typical situation. Yateley is a large school, its communications system is rudimentary and decisions, once made, are difficult to rescind. Concessions are hard won and often grudgingly given so that the battle is often conceded before the battle lines are drawn up. In fairness, the system by which requirements such as items of equipment, or concessionary treatment, or cover for the 'Information' course was communicated was often late in operation and vague in purpose, but one soon learned that anything which might disrupt the day-to-day timetable was resented, not always by the administrators but more often by the rest of the staff.

Predictably there were different reactions to the discussion about sources of information which opens the module. Jenny's class enjoyed the session and completed a list which showed an imaginative realisation of the possibilities. Hers, however, was a discussion-oriented class. Ray was teaching the lower-ability group at Yateley and found hard work in putting over the points. The children needed to be constantly prompted and there was little motivation to participate enthusiastically. Jenny's class also enjoyed the next session, in which they used sheet L/P/1 to discover information. Several of them wanted to use the index to answer the questions, and from this point it became obvious that the follow-up would be redundant, since they already knew the principles concerned. Nevertheless, the majority were enthusiastic enough to want to complete the sheet of questions outside of the normal lesson time. There was a more positive response from Ray's class in the cataloguing and cross-referencing lesson using the 'records' sheet L/P/2. Apart from some amusing questions about whether Kathleen Ferrier had recently made the charts, and which pop group John Williams belonged to, the children found the exercises within their capabilities, but they were unable to complete them in the course of one lesson. This created problems since there was not enough material to sustain another complete lesson, and the library room was unavailable but necessary for the next session. Thereafter, Ray's lessons

were either interrupted by the demands of the usual summer term activities, such as Sports Day and prizegiving, or his class was decimated by the calls of other activities. Since he taught 'Information' on a Wednesday afternoon, these disruptions tended to be more frequent.

Little can be said by way of summary. The few lessons in modules 7 and 8 which have been taught show a mixed reception, but neither the lessons nor the modules have received a trial under normal conditions.

4.9 Objectives and Achievements

4.9.1 Introduction In the preceding parts of this chapter the main concerns have been to describe the content and approach of each lesson and module in the 'Information' course, and to present and comment on the feedback obtained from teachers. The remaining parts of the chapter will take one step away from the lesson detail to examine the results obtained with reference to the course as a whole.

Objectives were formulated at the design stage of the course, but in discussing them here, at what may appear to be a late stage in the development of the thesis, one is acknowledging that they have been subject to change. The comments of the teachers involved, the changing status and purposes of the material, the dawning of new insights and awarenesses about the place of the subject in the curriculum have all played their part in this process. Other chapters have stressed the absence of a deliberate policy in this research of obtaining mathematical measurements of changes in behavioural characteristics, increases in factual knowledge or achievements of insight and intuition. The major concern has been with the teachability of the lessons and the reactions of teachers to subject matter and approach. This lack of statistical precision can be both the strength and the weakness of the research. Certainly in the matter of objectives its absence has served to add a little more flexibility to the overall content.

Nevertheless, there has always been a need for a series of global objectives and those presented on page 4.9.A1 were formulated before any part of the 'Information' course was written.

4.9.2 Objectives - prescribed and evolved In some courses objectives tend to evolve as a result of the type of material written and its effect on the teacher and the student. In others objectives are carefully written out beforehand and the material is deliberately structured and planned to satisfy them. In the 'Information' course there has been a little of both these approaches. The many hours of discussion with various people and the years of personal experience of the problem the course was meant to solve could not but be translated into objectives, however loosely they were expressed. Thus page 4.9.A1 is the result of a pre-course assessment of needs and general aims. The evolution aspect is connected with the need to satisfy the particular teachers involved in the project and to modify whatever was intended to suit their situations and experiences. For example, the involvement of so many English teachers in

the pilot tests has led to an underplaying of the role of the computer and more emphasis on the personal and creative aspects of information processing. There again, the development of teaching material is a two-way process. The developer must keep an open mind on content and the teacher must be prepared to make efforts to teach what might be unfamiliar material. Many insights into the problems of the teacher, into the strengths and weaknesses of teacher and class, into the nature of the project, into the methods by which things may be taught, occur during course development. The interaction of people and opinions modifies intentions, beliefs and attitudes in a period of two years, and, especially in a subject such as 'Information' which has a wide variety of interpretations, objectives need to be interpreted as general statements of intention. This is not to reduce them to a matter of consensus; the general requirements of the subject and the boundaries it encompasses have always been defined for the purposes of the project, but what has changed as a result of discussion and exchange of view is the means by which the objectives might be achieved and the placing of special emphasis on those aspects of greater importance to the teacher. As the last chapter has shown, especially at Henry Beaufort school, teachers have arrived at much the same conclusions by employing different methods. This constant modification of objectives by a process of feedback, analysis and change is the main reason why this discussion of objectives and their achievement needs to be included in this chapter rather than in chapter 2. The rest of this section will be concerned with discussing the prescriptions outlined on page 4.9.A1 and whether the results of the pilot tests has shown that they have been satisfied.

Objective number 1 is geared toward the material contained in module 1 and awareness, in this sense, means the means by which the child can articulate what he or she sees, feels, hears and smells all the waking time. The sheets of questions concerning information items in the environment (e.g. I/P/8) and the special study of one item (e.g. I/P/10) were means to that end, and the reaction of teachers and children to these exercises, and the response described in section 4.1 indicates that this, possibly more than any other, was an objective fully satisfied. Objectives 2 and 3 are also intended to result from module 1. All teachers have often indicated that they have referred back to the work done in module 1 to illustrate a point later in the course and thus, in this sense, number 2 may be said to be satisfied, while number 3 would be a direct result of the effectiveness of the follow-up lesson. One feels that, in this case, while the opportunity to articulate to children the meaning of what they have discovered

in the environment in terms of the interactions of information is written into the module, this was not always done satisfactorily by every teacher. In some cases this was because of a lack of experience in discussion techniques with children, but the main fault lies in the fact that the specific instances through which such insights might be given were not written into the module notes until a very late stage. While the teachers themselves, and possibly also many of the children, had an intuitive awareness of the fact of interaction, more guidance was needed in the notes to bring it into a more explicit form. This has now been provided, (volume 2 pages I/T/14 to I/T/16).

In many ways this discussion of what the children are intuitively aware of as a result of performing an exercise, and whether it is deemed desirable that they should actively demonstrate such awareness, either by articulating it in discussion or by completing a written exercise, is important to both the philosophy and approach of the course and to this matter of objectives. It is a matter of priorities in the teaching situation, of the selection from a wider spectrum of subject matter of those aspects which are more relevant than others. But the real question in this argument is 'relevant to whom?' In the type of exercise carried out in module 1, the child's perceptions and insights may be entirely different from those of the teacher, and the discussion may quickly become an exercise in leadership, in encouraging the child to express what is seen to be important to him, and in moulding that raw material into the points which the teacher wishes to establish in the child's mind. In this way, both parties share their insights and experiences to mutual benefit. In other cases the perceptions of the child are solely what matters. This is true of the very open-ended questions and problems faced in many of the exercises and activities in the course. Objectives under these circumstances are inclined to be vague and indeterminate, and intuitive awareness of the problem is a sufficient justification for doing the work. Objective 4 is an expression of such a situation. The activity of observation and asking questions about the environment creates an awareness of the need in some cases to have the questions answered. The teacher's art in this context is to turn the awareness into a desire, and the desire into a need, and then to skilfully link the need to the material which follows in the course, and which proposes ways of satisfying the need. The opening lessons in most modules set out to encourage the asking of questions and the discussion of problems in the particular context of the module is subject matter. In this sense they act as an extension of module 1. Module 2, for example, in presenting a

Case Study of an accident invites children to put themselves into the role of the Headmaster, and those teachers who taught the modules in numerical sequence have expressed satisfaction and enthusiasm with this order. It would seem that the stimulus created by the first module to ask questions about the environment has carried over into the asking of further questions about the school. But the module which best illustrates this process of answering needs, and which also has much bearing on objectives 5 and 11 also, is module 8, which uses the library and sources of information as its base. This is probably a more natural successor to module 1 in terms of continuing the process of stimulus, question and response, and would perhaps be better numbered 2, although the flexibility demands of modularity make this an academic point. In effect the numbering of the modules relates to the historical accident of the order in which they were written.

Objective 6 is badly worded. It takes the desirable attribute of teaching children the difference between fact and opinion, between first-hand knowledge and second-hand hearsay, of encouraging children to check their references and information sources before coming to a decision, much in the same way stated by objective 12, and the hope was that these could be incorporated into an exercise which would be within the capability of the children. One of the games in mind was 'Chinese Whispers' (it has a variety of names according to the part of the country it is played in), in which a message is whispered from person to person until, theoretically at least, the message has changed in word and meaning. In the event it has not been included although there are similar exercises in some modules which at least partly illustrate the point. For example, in module 3, children are asked to count up to a minute with their eyes closed and to estimate distances and directions which might establish their capacity for judging speeds, with reference to motor car accidents and evidence. When Ray did this at Yateley the point was quite forcibly made that much information and opinion is based on false assumptions, since most children were yards out in their distance estimations and more than 50% out in their time estimations. In module 3 again, the cautionary tale 'Computers Don't Argue', in which the computer takes mistaken information and expands the mistake into a nightmare, explains the dangers of using an inflexible information system. Unfortunately, with this, the story tended to be too advanced for Ray's below-average ability children. It is considered that the satisfaction of objective 6 therefore depends on the strengthening in the course of the concepts it is trying

to put over. The objective itself also needs to be rewritten.

Objective 7 is a major statement of intention and a personal interest of the author over a long period of time. The place of information and the computer as a link between subjects has been discussed earlier, in chapters 1 and 2. One of the major difficulties in realising this ideal is the reluctance of teachers to accept that course linking is possible or desirable; another is the question of how the point may be made explicit, or indeed whether it should be made so. Some of the module 8 Case Studies try to establish that information is a key concept in the library and that the library serves all subjects, thus implying that information is a commodity common to all subjects. Module 8 has not been taught, and one has to accept that, while this objective might be implicit in the design of the course, it is nowhere made obvious in unequivocal terms to the children. The difference between an integrated studies type of course, which tends to unite several subjects into one approach, and a 'common core' course, which the 'Information' course purports to be, is often misunderstood but nevertheless real. The whole point hinges on the degree to which one theme leads into the study of another either as a bi-product, a channel of investigation, or as a natural consequence, an essential part of the interaction of knowledge areas. It would be nice to think that the 'Information' course does in fact allow the global theme of information to be translated into pathways which allow another subject to make sense to the child, but this has by no means been proven. A means of strengthening this situation is proposed on pages 5.2.A1 to 5.2.A4 in which extensions and future course development are discussed.

The satisfaction of objective 8 is attempted in every module, with the exception perhaps of module 1. In the Headmaster Information System module, edge-punched cards provide the means of storing and retrieving information and practical exercises using these have been successfully completed at both the pilot test schools. In other modules, the computer is presented as the means of handling information. The practical exercise in module 6 has achieved conspicuous success and those teachers who have taught the more conceptual approaches in modules 3 and 5 have reported understanding, if not enthusiasm. Module 4, which is devoted to the computer as an object of study, has attracted a variety of responses. Success is not apparent with objective 14, since this requirement takes the subject of information handling into some of the possible areas in which it could occur. It quickly became apparent that this objective would not be achieved since the time consumed in researching the field and in

writing up the teaching notes would preclude many of the more worthy aspects of the course from being written. It was thus thought appropriate to ignore the implications of this and accept that the two methods discussed earlier would give sufficient insight into the problem to enable children to identify with it.

Objective 9 was written before the possibility of taking the terminal into a school had been considered. It is still appropriate for schools where the terminal session is not possible. In the event, and in the context of the pilot testing at Yateley and Henry Beaufort schools, the objective has been met handsomely, since the terminal session was a practical demonstration rather than a simulated one. The positive reactions to the actual terminal demonstration, rather than the more indeterminate ones to the preparation and follow-up, indicate that children 'did and understood'. Another opportunity to realise this objective is in the untested 'Gas Game' in module 7, and it is hoped that this, when it is ready, will act as a reminder and a reinforcement of the power and applications of the computer in everyday life.

Objective 10 relates to that ingredient in the 'Information' course which takes the subject matter further than the simple requirements of a Computer Studies course. It is a difficult point to make and page 4.9.A2 illustrates how the concept of information transcends the subset which is normally taught in schools. If the whole spectrum of information is considered, then there are so many different facets to the subject that classifying them into parcels of knowledge and labelling them, highlights the essential complexity of the classification process and the interaction of the parcels. One such label, which has been identified by label on page 4.9.A2, and which is subdivisible and crossreferenced from many other information sources, is 'that information which may be processed by the computer if someone deems it to be necessary and/or desirable to do so'. This aspect constitutes a major proportion of the course and corresponds to many of the needs of the teacher of Computer Studies. But this is by no means the only aspect of information which the child might be able to identify as a separate and comprehensible subset of the subject. There are issues of personal information, of that information which is not processed by any formal or mechanised method, of factual and opinionative information, of the difference between information and knowledge, between information and experience. These and others, while they may not be made so explicit, are nevertheless important features of the course. One example of this occurs in module 3, page P/P/1, in which the

children answer questions about their friends and learn how knowledge and information are not the same thing, and how information in a machine-storable form is not knowledge but data, devoid of connotation save that which a human being ascribes to it. The successful teaching of this, and there is evidence of such success, would be a satisfaction, too, of objective 16. The unnecessary (at this stage) diversion of how characters become 'bit-strings' in the machine avoids technical confusion and permits the teacher to explore other aspects of information thrown up by the exercise.

There is little evidence of the satisfaction of objectives 12 and 13 in the pilot tests. In the case of 13 this is not surprising since the point has not been included in the course as an important aspect of the subject matter. To be sure, children did appreciate in their module 1 studies that some information is more permanent than others, but of the machine situation, in which the real test of the system is the way in which updates and changes and abnormalities are coped with, there has been no explicit instruction. For objective 12 it was intended to include a series of closed room mysteries to demonstrate how a shortage of information often leads to erroneous guesses and assumptions, but these were omitted, partly because of the time factor, and partly because they might have excluded some children from intellectual participation. In fact, the Sherlock Holmes story in the same module employs the approach of 'observation, knowledge, deduction, action', which partly satisfies the wording of objective 12, but the story does nothing to emphasise the point. In that the essential meaning of the objective is to teach discrimination, a commodity often lacking in both children and adults, more needs to be included more explicitly on the topic.

So what have we achieved in terms of objectives so far? Of the 16 originally expressed objectives written before a word of the course found its way onto paper, 6 have been fully satisfied from the evidence supplied by the teachers. Another 5 have only been partially satisfied because of lack of time or lack of adequate material, 3 have not been satisfied at all because the sections of the course have not been taught, and the remaining 2 were abandoned during course development.

But the development of a course and the interaction of course requirements, people concerned with teaching it, and people of experience who are not teaching it, over a period of years throws up new objectives and ideas - 'evolved' objectives. The following might be included in that category, the figures in brackets

being the numbers of the modules which incorporate material intended to satisfy the objective:

17. To write material which can be taught by teachers of any discipline. (All)
18. To teach children that information can be misused as well as used (3) (4)
19. To show how the lives of the children are, and will continue to be, influenced by the presence and use of the computer. (All except 1 and 9)
20. To make the course as practical as possible and involve the children in exercises which put over the teaching matter in a participatory way. (All)
21. To show how the computer can be used as an aid in learning and teaching. (6) (4)
22. To bridge the perception gap between that information which is personal and accessible to the children and that which forms the raw material for an information system which may be outside their immediate experience. (All)

These are additional course objectives. There are, of course, many more minor ones relating to specific lessons or modules, and some of these have been discussed in other parts of this chapter. Three of the above, numbers 17, 20 and 21 are objectives which might concern the method of approach adopted by the course. The copiousness of the teachers notes bears some testimony to the degree with which explanation of the concepts and the methodology of the lessons have been seriously treated. But this matter of the approach and its effect on teachers and children is one which will be taken up in the next section; however, insofar as objective 21 involves practical work such as the Haiku in module 6, which has been well received at Henry Beaufort school, this may be said to have been achieved in the one case. It would have been an interesting and useful exercise to attempt several program packages relating to other subject areas but the demands of time have precluded this. Nevertheless, module 6 is constructed to provide a teaching framework within which activities of this kind can take place.

Objective 18 is a result of the demands of teachers at both schools to give a balanced view point of information processing, and the story 'Computers Don't Argue', mentioned earlier in this section, is one of the main means used in the course to illustrate the fallibility of information systems. The story has not really had an adequate trial under classroom conditions, having been taught only once to below-average children who had difficulty in understanding it. Nor has the later part of module 4, which raises questions on the social implications

of handling information on a large scale, been fully tested. Thus the objective, though worthy, remains unachieved in the limited experience of the pilot tests. Objective 19 has a potentially wider exposure. In module 2, the implications of holding the childrens' records on easily retrievable files may be discussed between teacher and children, in module 3 current and future uses of computers in police work are taught, in module 4 a whole session, or series of sessions, is devoted to applications and implications, and so on. While the evidence in some cases has been that teachers of English have shied away from the computer side of the subject matter, where the topic has been put over by story or anecdote there have been fewer qualms, and the frequency of teaching this concept together with an on the whole positive response, seems to indicate some appreciation by the children of this very important fact.

Objective 22 is perhaps the most important and most difficult objective of all to achieve. It describes, too, that quality which is most elusive in many teaching situations, and even where insights and interests in the unfamiliar arise from working through familiar experiences, the moment at which this happens is almost impossible to record. Certainly the mechanism of recorded interviews cannot recapture the spark of understanding, the motivational force which permits the child to step out of his own ego for a while. In the course most modules attempt to teach both that information which is personal and recognisable in human terms to the child, and also that which forms the basis of an information system outside the child's immediate experience. The first 3 lessons of module 3, dealing as they do with the essentially personal information world of friends, television and Sherlock Holmes contrast with later lessons which teach about the Police National Computer, the hardware used in communications - based information systems and Computer Fraud and Embezzlement. The attempt to bridge the understanding and motivation gap is made by means of Case Studies, the Crime Story and the beat simulation. Module 7 tries to approach the problem more directly by presenting the Gas Bill as the interface between human being and information more immediately, and then branching out into the Gas Industry as an object of study. The cycle is complete at the end when the Gas Game reiterates similar concepts in a different way and uses systems flowcharts to answer human 'what-if' questions. Again module 8 uses the story '1985 and All That' to bridge the gap between the child's conception of a school and its purpose, and the needs of the school for an information system which serves the needs of the child.

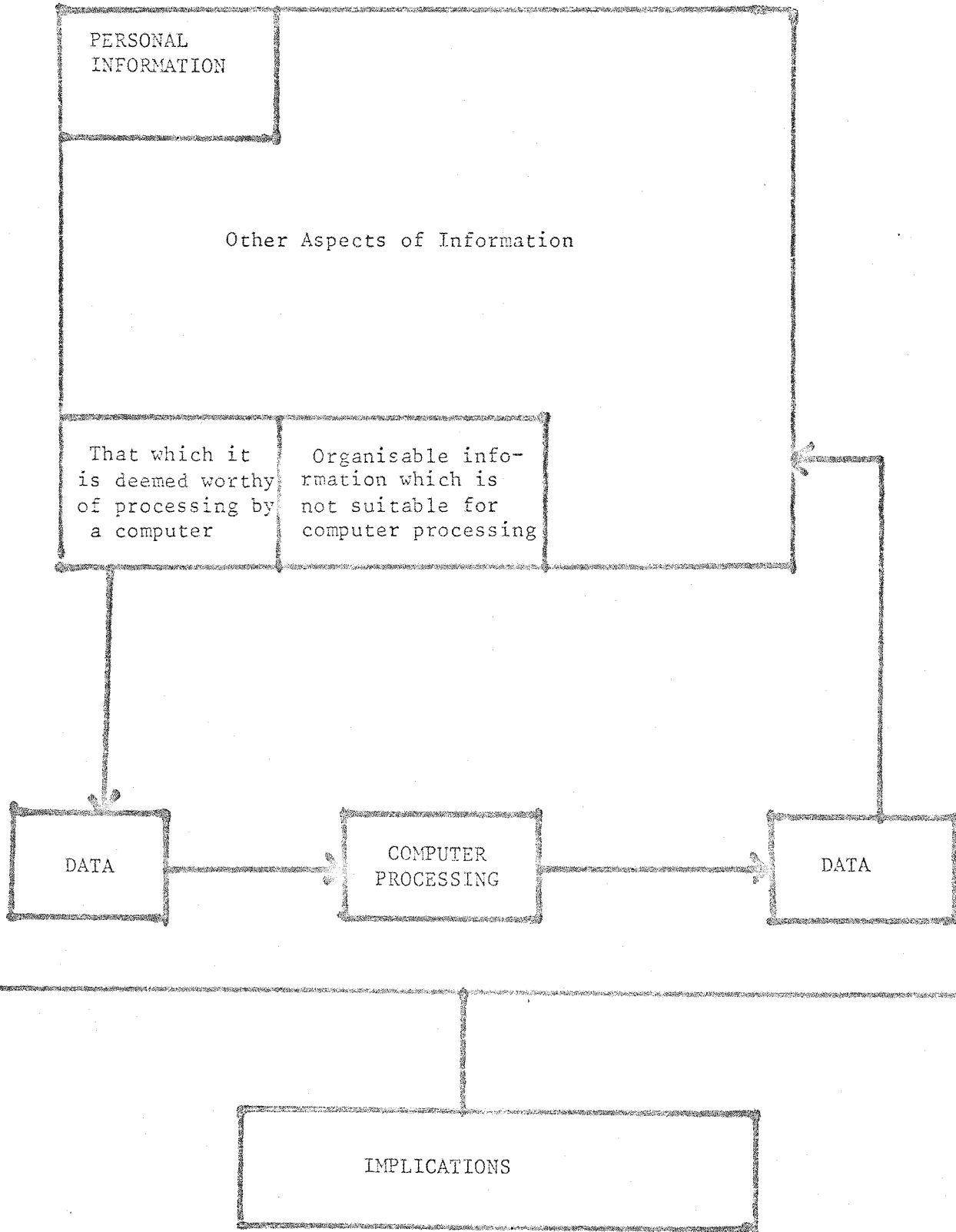
Many of these stories, anecdotes, simulations and Case Studies have been the most popular aspects of the course. This is encouraging, but whether they have provoked an 'imagination leap' into the impact of external information systems on the child's personal world is not proven from the evidence supplied. Certainly, one can point to specific interactions recorded in the conversations, particularly in the more spontaneous actions and work of Sheila's classes. The designing of traffic systems for a town and the questioning of passers-by on the street corner might be examples of personal intuitions leading to an intellectual activity which appreciates the problem. But it is also true that Sheila's classes were, on the whole, of an intellectual disposition to begin with. There is little evidence from elsewhere in the pilot tests of a similar global view of the information problem being taken by either teachers or children, even though there is ample evidence of small personal insights occurring frequently. It must be asked, too, whether, bearing in mind the small scale of the pilot testing situation and the low frequency with which most modules have been taught, one is entitled to pass meaningful judgements on the achievement of such an important and far-reaching objective. Perhaps the same thing might be said about all objectives discussed in this section. In any event, if the teachers have found the material teachable, if children and teachers have gained some personal insights about the nature and place of information, and if the content of the course has been regarded as a worthwhile object of study, as much of the feedback seems to show, the major purpose of the exercise has been successful. Only a larger study involving more teachers, children and schools would be sufficient to test adequately objectives in detail.

OBJECTIVES:

To create Teaching Material which:-

1. Makes the pupil more aware of the environment in which he/she lives and the informational aspects associated with it.
2. Acts as a basis for further study along the many pathways of information which such a study opens up.
3. Gives the pupil an understanding of the meaning of information and a feel for the interaction of knowledge.
4. Creates a need in the pupil to have those questions answered which arise as a result of the project.
5. Leads the pupil to sources of information in several fields and teaches the general principles involved in using such sources.
6. Teaches the pupil to distinguish between information which has been derived as a result of observation and that which is the result of the processing of observed information.
7. Links the various subjects within the school curriculum by treating information as a commodity fundamental to all of them.
8. Introduces the pupil to the way by which information may be recorded, stored, processed and retrieved manually and mechanically.
9. Simulates the data collection, data entry, data checking, data manipulation and data output functions of an information system.
10. Distinguishes between various types of information and establishes in which context a particular piece or type of information may be relevant.
11. Induces an inquisitive approach to the environment, promotes curiosity into cause and effect and stimulates a demand for the information needed to solve simple problems.
12. Points out that the reaching of a valid decision on most topics should result from a study of the informational variables and their interaction.
13. Teaches the difference between permanent, semi-permanent and transitory information and the need for the constant monitoring of changes within an information system.
14. Discusses ways and means of holding and storing information and the relative merits of each.
15. Presents information in its rawest form as symbols or 'bit strings' in a machine such as a computer and discusses the inferences and connotations it acquires in the course of being made presentable for communication.
16. Discusses the difference between 'neutral' and 'loaded' information and the use which people may make of both types.

INFORMATION



The 'Information' approach to the study of the place and effects of the computer in our everyday lives.

4.10 The Material and the Method

Comments have been made in the previous sections about the methods by which the 'Information' course sets out to teach the subject matter it contains. The lesson by lesson descriptions are comprehensively presented there in terms of what they were expected to achieve and the recommended means of achievement. Thus it is the purpose of this section to reflect on the variables which affected the classroom situations in the pilot studies, and hence the reactions of children and teachers to the subject matter and approach.

4.10.1 Format of Presentation The material presented to the teacher took the form of teaching notes, pupil worksheets and visual aids, and these are distinguished in the modules by the second letter in the page number - T for Teaching Notes, P for Pupil Worksheets and V for Visual Aids. This arrangement has seemed to be satisfactory as far as all the teachers in the pilot studies are concerned. There has been neither complaint nor criticism nor hesitation in identifying that which was for whom, largely owing, no doubt, to the presence of the author at every stage of teaching development.

4.10.2 Teaching Notes Teaching notes must have two main functions in the situation of testing unfamiliar material. They must serve to educate teachers in the subject matter of the lesson if it is likely that they will be deficient in this respect; they must also advise and recommend ways by which this subject matter may be put over to the children. In this course the first is very much subservient to the second, since the method recommended in many cases is to use the experience and often dormant logical capabilities of the children and to elicit from them what the essential points are. In some places, notably in module 4, there are notes which attempt to teach the teacher facts with which they may not be familiar, and it is not perhaps surprising that it is exactly these lessons which have caused the greatest problems, especially at Henry Beaufort school. For the most part, however, the teaching notes in their present form have been more acceptable to teachers at Henry Beaufort than to those at Yateley school, not only because they make it possible to modify the approach according to the perceived need, but also because of the more child-centred ethos of the school and the mixed-ability situation within it. There are of course many other factors involved with the acceptability of notes and approaches. The willingness and/or the ability of staff to prepare thoroughly,

the personality of the teacher, the ability to involve children in discussion, the standard and experience of the children, are some of the variables which create a successful course from recommendations in teaching notes.

This is not to disparage the valid criticisms by the Yateley teachers. Jackie Lord found them long and copious and repetitive, and they are. She also found that many of the recommendations and the tone and tenor of the approach was far removed from the way she liked to operate with classes of the calibre she was expected to teach. She spent many long hours re-assembling her thoughts and actions to make modifications within her beliefs, so that almost every lesson became very similar in style to the next. One can criticise this eschewment of the discursive and the varied and this insistence on applying a similar formula to all lessons - not more than ten minutes introductory talking and the rest must be written or design work - as an indication of inflexibility of approach. Indeed, this was the author's first reaction, but one must also take into account the difficult nature and low ability of the children she was teaching, the fact that her difficulties were compounded by having to take over in mid-course, with no previous knowledge and no personal commitment, from a teacher with well-known discipline problems, and the extremely well-constructed and valuable contributions she made to the course in suggesting alternative ways of teaching a subject. To her first criticism about the loquaciousness of the teaching notes there is no defence, and of the need for a summary which she also expressed and was echoed by Ray Cackett, there is no doubt. Experience at Yateley has thus proved that a course developer, when writing teaching notes, cannot hope to cover all possible teaching situations in his recommendations, and is in some cases guilty of teaching grandmother to suck eggs. However, on the positive side, there is the general satisfaction of the majority of teachers with the notes as they are, and the knowledge that they liked the ideas put forward and the suggestions for passing them on to the children.

- 4.10.3 The Pupil Worksheets There is nothing new about worksheets. They have been used for many years to put into lessons and courses a more inherent structure, to act as a reinforcement to concepts and facts learned and discoveries made, to act as a record of work completed, to inject a practical content into an essentially discursive or descriptive lesson, and/or to simply keep children occupied. Nor is there a great deal of difficulty in constructing them, provided that, as in this case, one attempts to use imagination in promoting a

mix of the factual, the opinionative and the active. The rationale and methods of use for the worksheets in the 'Information' course have already been discussed in previous chapters. Reactions to the use of the worksheets has been mixed in both schools, and analysis is further complicated by a lack of agreement as to which were and which were not worthwhile in the classroom situations. For example, the first worksheet in module 3 'How much do you know about your friend?' (sheet P/P/1) was well-received at Yateley by both Ray's and Sheila's classes - indeed it is mentioned frequently by the pupils on pages 4.4.A16 to 4.4.A21 as being one of the highlights of the course. But, also at Yateley, Jackie Lord, working with the same class type as Ray, was not enamoured and used the alternative method suggested originally by Harry Wright at Henry Beaufort of showing a 'Wanted' poster. Nor did Harry use this sheet at all, while Steve Ward used both methods, first the sheet and then the poster, and found both to be satisfactory. In another example of this dichotomy of view, Jenny Leigh at Henry Beaufort, found the follow-up sheets to the terminal session (C/P/6 to C/P/10) admirable for her purposes and a great motivator of her children, while Harry had severe criticisms (page 4.7A) and Steve did not dare use them. On the one occasion that he used the sheets, Ray found them manageable, even with less able children, but not exciting. In the light of such diverse reactions it is difficult to make valid assessments about the value or otherwise of these pupil worksheets.

There are other considerations too. Maurice Hart, in his evaluation of the course (pages 4.10A1 to 4.10A9), was enthusiastic about the way in which the worksheets lend cohesion and structure, but very critical of the format of some of them in that they are closely typed and difficult to follow in some cases. Similar criticism came from both Ray and Jackie at Yateley. Ray was vehemently opposed to lists of questions in the quantities contained in many of these worksheets, and Jackie found them too difficult for her children. She was not however, unlike Ray, who was philosophically opposed to the use of worksheets in this form, averse to the concept and indeed would have liked to see more of them, provided that they were of a standard which her classes could use. This question of usability by the children is obviously the crucial one. The ideal situation would be to construct worksheets in parallel, so that the teacher could choose according to the ability level of the class, and to spread out the questions on each sheet so that they do not present to formidable a hurdle to children at first glance. This would have entailed the spending of a

considerable proportion of time, which was not available, and in addition would have greatly enlarged the aspect of the course to the prospective teacher. Its five hundred plus pages already constitute a daunting prospect. It is a difficult problem. The hard-pressed teacher has little time to draw up special worksheets for lessons which will probably comprise a minority of his timetable, and it is in the continuing development of the course and the exchange of materials that the best hope lies.

One aspect of pupil worksheets which gives cause for concern is the possibility of child-resistance, such as that reported by Harry. In this particular case it was connected with signs of computer-resistance in some girls, but it has much to do with the attitude of the teacher and the way these are presented to the child. Sheila at first had similar problems but she was able to sort these out by disabusing the children of the idea that they were in any way tests of knowledge or performance and by presenting them as records of work which, gathered together, form a picture of the whole project. Ray made the telling observation that the attitude of the teacher will get through to the child whichever way he tries to hide it and this is probably true. In Harry's case, his expressed preference for the synthetic rather than the analytic, for the open-ended discussion rather than the closed system, had an obvious effect on his attitude to worksheets. He would use them in the particular places where he thought they were appropriate but in the majority of cases he would prefer to employ other means of putting over concepts and ideas and indeed both he and Steve did so in the later weeks of the course. This is of course entirely as it should be. Nowhere in the course has it been stated that all the worksheets should be used or that none of them should be modified. Indeed, several suggestions are made about the many different ways in which worksheets can be used, if they are used at all.

To summarise, it must be accepted that there are worksheets in the course which are inadequate for particular teachers and classroom situations. But the teacher always has the last word in their use, and to refuse to employ a particular worksheet because it does not conform to a specific requirement, or because of a personal dislike of the medium or whatever, is entirely within the spirit of the course.

4.10.4 The Visual Material Visuals have caused little problem in terms of availability during the pilot tests. Those films and pamphlets which were needed at a particular time have always been available. But the total provision of visual

material for the course is low and there is a real need to develop more. Some of the material which has been written into the course, for example the Gas Game in module 7, the Transport and Road Research Laboratory slides in module 5 and the Yateley Crime in module 3, are still in the planning stage. Others, which have been included, such as the films in module 1, are not entirely suitable, sometimes because they contain extraneous material inappropriate to the point at issue, sometimes because they strike the wrong level. Yet others, such as the 'Computers Don't Argue' slide/tape sequence, and some of the module 4 pamphlets are appropriate in some circumstances but not in others, usually based on the ability of the children to comprehend the message they are trying to put over. Another problem has already occurred in that some pamphlets which have been well-used and popular have become obsolete, and this of course renders the worksheet which goes with them obsolete too. At least this is one indication of the fast-changing field of information processing. There is a real need to look at the provision of visual material very closely, and pages 4.10.A10 to 4.10.A13 have some words to say on this.

4.10.5 Modularity Associated with the presentation of the course material to teachers in its physical form are the concepts inherent in its design. Modularity has been a popular concept in course design for many years, not always with perfect understanding of what it entails. One must examine what the advantage is that modularity brings to a course and then relate this to the pilot study situations at Yateley and Henry Beaufort.

Theoretically at least, modularity means flexibility, in course terms the ability to choose which module or indeed which part of which module shall be taught next. There are undoubtedly, in the structure of the 'Information' course, many opportunities for such flitting about between lessons and modules. Module 6 offers a good example of this, and it is the teacher's prerogative to exploit this aspect as desired. But this does not mean total flexibility. Module 1 is, by its nature and content, an obvious candidate for the first lessons, since it lays down concepts and guidelines from which the course progresses. But if, of course, a totally different slant is desired by the teacher, it would be quite acceptable to start from another place. Module 9, too, draws upon the experiences gained in learning about information handling facilities and methods in other modules, and there are lessons within the modules which are evident follow-ons from work done in the previous week.

In the testing situation, the schools have taken advantage of the flexibility offered by a modular course. At both schools teachers were able to choose, in consultation with the author, the order in which they wanted to teach modules. There were obviously constraints in this situation since the author's need was to test as much as he could of the course including the modifications he had made to it, and teachers often tended to accept his recommendations without enquiry. There was rather less moving about unconsecutively from lesson to lesson, and this is consistent with the thematic approach adopted by the English teachers at Henry Beaufort, in which they preferred to explore possibilities rather than follow through a predetermined sequence of learning events. The evidence for the success of this approach lay in the eventual irrelevance of the timetable drawn up for them and the extensions to the material generated by the teachers themselves according to their analysis of the desires of the children.

At Yateley, there has been a slightly different situation. The order in which modules were taught varied considerably from class to class and there was a quite severe selection of individual lessons from within the modules to suit the particular strength and background of the teacher. Thus Sheila taught those aspects of module 3, for example, which reflected her interests as an English specialist, the Sherlock Holmes Story, the Z-Cars script, the Crime Story, the 'Computers Don't Argue' tape/slide demonstration. Ray, on the other hand, as a Geographer, but in this situation as a teacher of the more overt aspects of information processing, concentrated more on the knowledge/information interaction, the use of the computer in police work and the Case Studies. In both establishments modularity was used and found to be effective, a view which is shared by the teachers with their different requirements from the course. What will perhaps be even more valuable in the future is the ability to add on modules as the subject demands, either those with a local flavour as recommended in the course introduction (module 0) or those with a more global attribute as outlined on pages 5.2.A1 to 5.2.A4.

- 4.10.6 Administration of the course The pilot testing of this course in the two schools has been atypical in one important respect, in that the teachers have had the services of someone to administer and advise them for the lessons they were to teach. This covered many things and took a lot of time, time which the teacher in the ordinary school situation would have to invest personally. The drawing up of timetables for each term, the working out of the worksheets etc.

which would be needed for each teacher week by week, the duplicating and supplying of class sets, the briefing and debriefing sessions held at least fortnightly and sometimes weekly, the running of programs and administering of arrangements for terminal sessions and visits, the sorting out of problems and creating of enthusiasms, these all have taken many hours of planning, preparation and drudgery from the shoulders of the teachers. In a sense, this is the point at which many pilot tests of this sort need to examine whether or not the teacher would be able to withstand the other pressures on his time to carry these through on his own. In reflecting upon this problem it is difficult to measure the commitment/benefit ratio of introducing new courses. The establishment of new courses and ideas inevitably takes its toll of the teacher's time, and the worthwhileness of the experiment can be seen only in terms of the teacher's commitment to it. The impetus for such change may come from many different sources, from a change in the structure of a school organisation, from the realisation of a long-felt need, from within the experience of the teacher concerned. Inertia of lesson content year by year is a well-known phenomenon in schools; lessons tend to be taught from one year to the next in the same way by the same teacher and it is the exceptional teacher who sees the need and invests the time to change the way things are done and the things which are done. The existence of an external advisor and administrator solely for the purposes of introducing new material, to do all the donkey work involved, must be an important factor in overcoming that inertia, but of course this is a luxury which cannot be afforded in education except in the exceptional circumstances of a research project like this. In attempting to assess whether or not the experiment would have been carried out at Yateley and Henry Beaufort under different conditions which demanded more of the teacher one is guessing, but educatedly, from a knowledge of the personalities and methods of choice. At Yateley, there was a top-down situation in which the Headmaster saw the need and tried to persuade the teachers to satisfy that need. Naturally he was not so crude as to attempt to use any teacher who happened to be free, and chose wisely those teachers whom he thought might be interested in such a development. Nevertheless there was always the impression that this was an imposed activity and that certainly some of the teachers were never wholly convinced. In the second year, information was timetabled into the second year curriculum not only to fill a gap caused by lack of craft facilities but to be taught by teachers who were available at the time and no matter how much the teachers concerned

did put in the effort, the personal commitment seemed to be, with some exceptions, essentially lacking.

At Henry Beaufort the initial enthusiasm came from the staff who were to teach the course and one had the converse situation of having to disappoint some teachers who wanted to make the commitment because of timetabling difficulties. Harry's memorandum to the HMI, a copy of which is unfortunately not available tells the story of how this came about and one feels that Henry Beaufort would have proceeded, albeit perhaps in a modified way, with the course irrespective of advisory facilities. These impressions are reinforced when one looks at the situation in the 1975/6 school year, when there is no longer the author to guide and administer. At Henry Beaufort the course is continuing with three classes involved and a residue of interest from other members of staff. At Yateley, the course is not being operated at all. In some ways this could be interpreted as a failure of the course to persuade those who have taught it to continue, but as has been pointed out earlier, there have been many lessons which have been received very positively by both teachers and staff there and one needs to examine whether there are other factors at work in this abandonment. One such might be the loss of Sheila, who has moved on to another school, and who probably saw more clearly than any what the course was trying to achieve; another might be the emergent interest of the mathematics staff in Computer Studies courses which prompts the Headmaster to believe that his original intention is being satisfied elsewhere in the school. It is interesting, in view of many things which have been said in all chapters about the relationship of computing to mathematics, that the mathematics staff have shown little interest in the 'Information' course throughout the two years of its trial at Yateley.

4.10.7 Other conclusions There are many other aspects to the testing of a course and some of those which follow will come as no surprise to observers of the educational scene. Firstly, the commitment of the teacher to the material is seen as being an all-important prerequisite to success. This is, of course, true for all courses, not only for the 'Information' course. The personality of the teacher, the relationship established with the pupils, the extent to which a variety of methods can be employed in a variety of situations, the ability to compromise, to modify and to extemporise when required to do so, have all contributed to the success or otherwise of individual lessons and to the continuity

of the course. The 'Information' course, perhaps more than others, relies heavily on the teachers ability to put over unfamiliar concepts in an interesting way, and hence on the teacher's own perception of the objectives of the course. It employs essentially an approach which encourages the building-up of insights, and those concepts which have been forced have often been found to build up most resistance. In these tests we have been fortunate enough to be able to study a variety of commitments, of teaching styles and of ability levels in the children. The most consistent successes have occurred with the brighter classes - this again is true of most teaching materials. But some conspicuous achievements in understanding have also been made by children of lower ability, especially in the more activity-centred lessons. Visits out, even if only to the corner of the road, terminal sessions and simulations/games have, again not surprisingly, proved popular with all children, and there is scope for the inclusion of more of these. Also there have been evidences of resistance by some of the brighter children, as witness Harry's group of girls, in spite of his total commitment and experienced and imaginative handling of the material.

The importance of teacher attitude is epitomised by the contrasts between Ray's first and second years. In the first year, he was in on the development of the course from the beginning, teaching higher ability level pupils with whom he felt more at home, on a termly basis. In the second year he was under considerable pressure to concentrate on additional Geography examination classes, to develop and teach an 'A' level Economics course, and was teaching 'Information' to a colour band class for whom his expectations were low. He became correspondingly disillusioned with both the class and the material and spent little time in preparation. Not unnaturally his expectations were realised. In the situation where the greater commitment and modification to the material was more than ever required, he was unable to find the time to devote to it. This is unfortunately the type of situation which can occur frequently in the best of schools and by the best of teachers, and there is no advantage to be gained in blaming the circumstances - the material must make allowances for them.

Thus one's second conclusion must be that the course as it now exists needs improvement in many respects. Some of these have been outlined earlier in this chapter and other extensions are proposed on pages 5.2.A1 to 5.2.A4. However the exact nature of the improvements has not really been defined in these tests. The question to which an answer must be given is whether the pilot testing situation was ever likely to give definitive opinions about the fitness

of this material for use in schools. In the author's own opinion the results obtained have been inconclusive at best, contradictory at worst. The size of the sample, eight classes and three teachers at Yateley, and three classes and three teachers at Henry Beaufort, was as big as the researcher could cope with in the time available, and indeed as big as the University reproduction facilities and money available could tolerate during a period of impending financial crisis. But it was not big enough to give an adequate testing to all lessons and all modules, bearing in mind that there is more than a hundred hours of teaching material in the course. As has been seen, some modules were not taught at all and others received only a sketchy treatment. Some lessons have been taught once, some twice by different teachers and others more than that, but only in the cases of the whole of module 1 and the first part of module 6 does the author consider that justice has been done to the lessons in terms of exposure, experimentation and definitive analysis. It is worth pointing out that module 1 is also the one module which has been extensively rewritten because of the great amount of feedback obtained. Hopefully the further tests going on in Nottinghamshire, and proposed for other parts of the world will provide more feedback for analysis by others, and a more global view of the achievements and potentialities of the course.

A REPORT ON "INFORMATION"

Maurice Hart

June 1975

Section Headings:

1. Overall Summary
2. The Course and how it was investigated
3. Discussion under teaching variable headings
4. Module analysis, portability
5. Further Recommendations

1. Overall Summary

1. The information course was examined for its suitability for use with second year secondary children. The criteria used were to do with both content and teachability. Also considered were the possibilities for future development.

1.2 In my view this course achieves a considerable breakthrough in terms of content for three reasons:

1.21 It pinpoints the finding, classification and use of information as fundamental and all-purpose (so relating to many other school subjects).

1.22 It introduces aspects of computer usage in a meaningful and thought provoking way.

1.23 It involves children with the world outside school by carefully structured activities suitable for the age group.

I also think that the course design makes it fairly easy to teach, although some modification is needed here, both in terms of teacher support and in follow-up pupil material.

1.3 Publication in its present form I would judge to be unwise. Partly because although it does fill a need, that need is probably not obvious to potential customers, and partly because a lot of work is needed to make the course into a readily adaptable package. The next stage would appear to me to be a pilot scheme or schemes, with as much publicity as possible, and the involvement of teams of teachers to modify and test the course.

2. The Course and how it was investigated

- 2.1 The course is written in 9 modules all of which are separate entities, although there are inter-relationships brought out within the material. Module 1 really needs to be taught first but after that any order will do. A basic minimum set to make any sense of the course would be 3 or possibly 4 modules. There are copious teachers' notes and the suggested approach in the classroom is usually through a situation/teachers introduction followed by extensive worksheets for the pupils to complete.
- 2.2 Some second years in two comprehensive schools have participated in the trials of the course so far. In one school it seems that the bulk of the work was done with higher ability groups of boys while the girls were engaged elsewhere. In the other school the course was given to mixed ability groups of boys and girls during their English lessons. It was the second of these that I visited. At the school I talked to two of the teachers and some of the children involved. I also watched a class being taught a session out of module 6. In addition to this, Norman Longworth and I talked about the course for several hours.
- 2.3 While it is obvious that course content and the success of its classroom application are related, they do form convenient divisions as a starting point for discussion. It is my intention to consider the second of these first.
- 2.4 As a basis for investigating the teaching aspect, I defined some classroom variables. I then looked at how they were catered for in the design of the material and how they affected the operation of the course in school. I defined the variables as follows:-
- 2.41 Ability of children
 - 2.42 Knowledge and attitude of the teacher
 - 2.43 Normal teaching method of the teacher
 - 2.44 Sex of the pupils
 - 2.45 Ethos of the school
 - 2.46 Attitude of the parents
 - 2.47 Other
- After visiting the school it became evident that under 2.47 should be included "Subject heading under which the course is taught".
- 2.5 In the next section, I propose to make comments under the headings of each of these defined areas. It is interesting to note that in a document entitled "Opportunities and Suggestions for Further Development" - Norman Longworth has also made comments under some of these headings.

3. Discussion under teaching variable headings

3.1 Ability of children

The course as it is written does cater for lower ability children in several ways, for example:-

- 3.11 The modules are not sequential; there is no need to have fully covered or understood one before doing the next.
- 3.12 The starting situations are usually simple (with the possible exception of module 4)
- 3.13 There are some cases where the worksheets have been modified to allow for methods of follow up other than writing, e.g. drawing (module 3).

In contrast however the worksheets are extensive, closely typed and certainly difficult to follow for any child with reading difficulties. There was evidence both of the success of the basic enterprise and also the need of modification of the worksheets. Note the before and after comment of low ability girls that I worked with ^{in the beginning} ~~and~~. Also from teachers and children, there were comments on the tedium of dealing with long worksheets. In fact some of the brighter children showed me worksheets on which they had written nothing (on module 4)

My suggestion here would be to make the questions on the worksheets not sequential and to break them up into smaller units, with perhaps a core of two or three questions per lesson on one sheet of paper which all children should work through. Other questions with different methods of completion should be put onto separate cards or sheets of paper. Some of these should allow for open-ended or creative work.

3.2 Knowledge and attitude of the teacher

The notes for the teacher are very extensive and are carefully written in order to encourage them to adapt and order the material as they see fit. The teachers in the main agreed with this, but did comment that preparation was time consuming and that some of the things they were asked to do frightened them because of their lack of computer experience. They also commented that marking worksheets and completing topics was not easy, thus there tended to be a lack of rounding off on the course. In discussion it was noted that a second run through would certainly be easier and a short prior in-service course would have been helpful.

The lesson I saw was to prepare the Haiku sheets as part of Module 6. This was taught by a very good teacher who conveyed the spirit well but who was evidently groping a little with the technicalities of the process. It was evident that in other hands the lesson could have produced useless results.

In my view if this course is to be taught successfully, then the teachers will need a prior in-service course in order to be confident. They will also need the materials provided as an easily useable package. They will probably not have time to modify worksheets etc., especially as this is only likely to be a small part of their teaching commitment. The teacher's notes are good as they stand and if pupils materials are modified as suggested in 3.1 this should make marking easier and help towards giving a sense of completion.

3.3 Teaching Methods

As stated previously the course operates mainly by a situation/discussion element followed by pupils completing worksheets. This format is fairly common in secondary schools and is unlikely to cause difficulty. The variations come in some of the situations, e.g. out of school visits, films, "exploration" where the teacher knows as little as the children. If instruction is usually very formal and the children are not expected to depart from their text books, then teachers using this course could find some difficulty. At the other extreme if the children's work is normally all individualised then it might be difficult to fit the initial introductions into context. There was no evidence of either of these but Norman Longworth said that some teachers had adapted the material to suit their own methods, for example - by class discussion of question by question instead of giving out the worksheets.

3.4 Sex of Pupils

There was some evidence that the girls were less motivated than the boys whenever the material was associated directly with the computer. A small minority of girls became very anti, even to the extent of not co-operating on a visit. Module 4 seemed to cause the greatest difficulty here and could perhaps be modified partly with this factor in mind.

3.5 Ethos of the School

In a way this ties in with 3.3, the course is modern in its approach in that it takes children out of the classroom and invites their participation at several different levels in an informal manner. It may be that if a school has a rigid overall structure and approach to relationships, then this course is unlikely to succeed. There is some evidence for this, in that in the first school mentioned in 2.2, the children are banded by ability. At that school, the course was taught to groups of boys in the top ability band and apparently only one group was allowed on a course visit, arranged for all of them, because the others had been "naughty". Norman Longworth commented that he would be unhappy to try the course with lower ability groups in that school.

3.6 Attitude of Parents

The fact that the course is new and different means that it is bound to be discussed with parents and that children's attitudes will be affected by parental reaction. In the school I visited, there was some difficulty (mentioned by the teachers and the children) because parental expectation in terms of what the children ought to be doing in their English lessons had not been fulfilled. On the other hand, there was approval for the course in its own context. This is certainly a factor which needs to be considered in planning the children's work, especially any that is likely to be taken home to complete.

3.7 Subject heading under which the course is taught

This could not only lead to non-fulfilment of pupil expectation as indicated in 3.6, but also to a substantial modification of content and feedback. For example, the English teachers did in fact give up trying to teach Module 4, turned the case studies in module 3, lesson 5, into drama sessions and made creative writing a major part of the children's work.

4. Module analysis, portability

4.1 In this section, I intend to try to make a brief analysis of the modules, mostly in terms of what will be needed to teach them in another area, away also from the support that Norman Longworth gives. Some of the worksheets relate to each school's locality and some are geared to IBM hardware and could be altered in order to describe peripherals that the children themselves will be seeing and using.

4.2 The table below gives some indication of the size of the problem. It envisages direct reproduction of all the non-local worksheets and alteration of those with a local context. The numbers in columns 3 and 4 are sides of A4 incorporated in the worksheets and other material which needs a copy for each pupil.

Col. No:	1	2	3	4
	Module	Recommended number of lessons	Pupil material in sides of A4	
			Non-local	Local
	1	4	10	9
	2	4	7	0
	3	10	25	3
	4	5	15	5
	5	9	33	0
	6	8	16	0
	7	9	13	0
	8	3 (topics)	23	0
	9	0	0	0
	Totals:	52	142	17

4.3 Notes and comments on Modules

- 4.31 Module 1: This module is reported as being very successful. It is very largely local and needs the school to do quite a lot of preparatory work.
- 4.32 Module 3: As written this needs only slight modification. It may be that it should be put more into a local context by contact with local police.
- 4.33 Module 4: This was reported as being the least successful although that may have been partly due to the context in which it was taught. There is a lot of difficult detail in this module and it does seem that this could be reduced without altering the objectives.

- 4.34 Module 6: This module involves the pupils in actually using a computer. Some software will have to be written or adapted for any new system used. This module also needs a lot of support in terms of data preparation and computer time.
- 4.35 Module 9: This is a pupil project and so does not need any worksheets.

5. Further Recommendations

- 5.1 Many comprehensive schools are adopting mixed ability teaching with an element of inter-disciplinary or project work in the first two years. This Course should fit well into that kind of framework, giving an added stimulus to second year pupils. In this context as well, it would fulfil parent and pupil expectation.
- 5.2 If this is seen as the proper place for the Course and if it is to be taught on a wide scale then it has emerged that four points need to be considered as follows:-
- 5.21 Teachers will need in-service training to cope with some aspects (3.2)
 - 5.22 The Course should come as an easily adaptable package (3.2)
 - 5.23 Pupils activities need to be re-structured to give more variation in quantity and type of feedback (3.1)
 - 5.24 Computer support in both hardware and software terms must be readily available (4.34)
- 5.3 It may be that the best method of operation of the Course is to think in terms of groups of schools working together with a section of a Local Education Authority or a College, with the necessary facilities. My reasons for thinking this are as follows:-
- 5.31 Required support as mentioned in 5.24 would be available
 - 5.32 Visits to local establishments and follow up materials for the pupils could be arranged collectively
 - 5.33 Help with reproduction of materials, etc., could be given by the Educational Technology Department
 - 5.34 In-service training would be easy to arrange

CHAPTER 5

Reflections on the 'Information' Course

5.1 Course Exposure

Chapter 4 has described the lessons and modules of the 'Information' course and reported on the reactions of teachers to them. The last two sections of the chapter examined the objectives and discussed the extent to which they have been achieved, and tried to make an evaluation of the material contained in the course and the methods by which the material was introduced to the children. It is the purpose of this chapter to step right away once again from the details of the course, the pilot testing situation and the feedback, and to reflect upon some of the educational questions which the experience of carrying out this research has unearthed. In this exercise one is re-examining the assertions, assessments and commitments expressed in chapter 1 about the place of the computer in education. However, this re-examination is now carried out in the light of the existence of the 'Information' course and the fact of its exposure to teachers.

Some doubts about the quantity and quality of this exposure have been stated in the two previous sections (4.9 and 4.10). However, although this thesis quite rightly deals with the situation set up exclusively for the research project, there are a number of other exposures to be considered in other parts of the country. For example the author has lectured at teachers' courses in the East and West Midlands, Birmingham, Norwich, London, Liverpool and Manchester. The audiences have almost without exception comprised teachers of Mathematics and/or Computer Studies, and the range of response has been quite surprising. The purposes for which the course was allegedly written have in general been approved of, and the interest shown has varied from polite interest to burning enthusiasm. The main thesis of the author's argument, that computing is a social, rather than a mathematical, science, has occasionally been challenged, sometimes ignored, but more often accepted. The mathematical mind, as has been mooted in a previous generalisation, is not noted for taking kindly to some of the essential open-endedness inherent in a study of the applications and implications of the computer. Many of the reservations expressed at meetings have centred firstly on the desirability of expecting mathematicians to become social scientists and secondly on the opinion that definitions of information in this course go much too far for the needs of computer education. This is true if the course is only concerned with teaching within the accepted definition of computer education. As has

been expressed earlier, and will be expanded later, the 'Information' course in the author's mind has higher pretensions.

One interesting postscript to this discussion of course exposure by lecture concerns the follow-up to a meeting in Norwich in February, 1976. Sheet 5.1.A1 and 5.1.A2 are transcripts of written correspondence between Mr. Arthur Gallant, Head of Mathematics Department at Keswick Hall College of Education, (who was at the lecture) and Mr. Roy Whittaker, Head of Education Department, (who was not present and obtained his information from discussions with Arthur Gallant and from the paper reproduced on pages 5.1.A4 to 5.1.A10). The statement of Mr. Whittaker is a strange mixture of acute and genuine personal insights and experiences into the subject from a different viewpoint, misconceptions based on the limitations of communicating ideas, and a certain arrogance which questions the ability of non-specialists in education to have valid ideas on ethical questions. The latter point has been dealt with by Arthur Gallant and the other points raised in the statement have been replied to by the author. The main purpose of showing this correspondence has not been to highlight the thoughts expressed in it, although these too are interesting and apposite, but to illustrate how the exposure of the 'Information' course philosophy and material by lecture can generate interest and grow into a wider forum for discussion.

Another method of acquainting people with the concepts of the 'Information' course has been by publishing articles in magazines. The journals in which such articles written by the author have appeared to date are (i) the National Computing Centre house magazine 'Interface', (ii) the quarterly publications, 'Computer Education', 'Schools Technology' and 'International World of Computer Education', (iii) a number of local newssheets with a more limited circulation, usually corresponding with Computer Education Groups, and (iv) British Computer Society Schools Committee papers, in particular a recent up-date of a paper first produced in 1970 entitled 'Computer Education for All'. Disappointingly, no feedback has been generated from these articles and papers, which may be as much a reflection on the standard of the articles as on the enthusiasm of the readership. More formal papers have been presented at the Imperial College 'Computing in Schools' conference, 1975, and at the International Federation for Information Processing quinquennial conference, 'Informatique et Enseignement', held at Marseilles in September, 1975. The latter paper is presented on pages 5.1.A4 to 5.1.A10. Activity

as a result of the latter conference has been considerable. Interest from Computer Education groups in other countries was aroused and long discussions were held about the feasibility of the information approach in their own environments. This interest has reached the point of positive interaction and concurrent pilot studies of the 'Information' course independent from author participation are being carried out in the U.S.A., Canada, Tasmania and Scotland, as well as in Nottinghamshire which is running in-service courses for teachers as a preliminary exercise to introducing the course into the schools.

It is also in conversation with interested individuals that exposure of the concepts of the course has received much encouragement. Page 5.1.A3 is a letter written by Mr. John Turnbull, Head of Educational Applications at the National Computing Centre. Mrs. Barbara Dutton, formerly HMI with special responsibilities for Computer Education at the Department of Education and Science has also written in similar vein to the author's career manager at IBM. While these offer some hope that one has been working along the right lines, it is in the greater number of private conversations with teachers and administrators from many parts of the education service that the most encouragement has come. From the limited information about the course that they were able to gather during the sort of wide-ranging discussion which must inevitably take place with such a subject, they were all courteous, mostly very enthusiastic and mostly in full agreement with the aims and purposes of the course. The principal regret on both sides was that a copy of the course could not be left with them, and of course there were many reasons for this situation.

There has therefore been a high exposure of the ethos of the course, outside of the pilot test, to groups and individuals in the United Kingdom and beyond. But this of course is not sufficient. People expressing a positive reaction to the ideas behind the course are not in a position to make detailed and informed judgements about content and method. Such brief exposure to others may be good for the ego of the author and an assurance that he is generally working in the right direction, but it is not evidence of success. Only classroom experience with children can produce this or report a lack of it. And so we are back to the original worry about the size of the sample in the 'Information' project. Has the exposure of the course to eight teachers and 200 children at Yateley and Henry Beaufort schools given any definitive

information about its efficiency, its viability or its acceptability? As was stated in section 4.10 the author's answer to this question is negative. But to the question of what would constitute a fair test of these things the answer would at the moment have to be agnostic, indecisive. Module 1 has been taught at least ten times - it has been found to be teachable, enjoyable to children and to offer meaningful insights to both teachers and children. It has still to be proved effective in modifying childrens' attitudes to information and its place in the world about them. Module 2 has been taught only thrice - in all cases it has passed the test of teachability and enjoyability. It has not been proved that school is any more meaningful to the children as a result of their new vision of it as a mass of information systems. But there is a great deal in our education system that we have to take on trust anyway. Teachers must rely to a large extent on their own intuition as to whether or not their message is heard and seen to be heard.

If there is a single meaningful message from this exercise in exposing children and teachers to information it is that some teachers have appreciated the need to acquaint children with concepts of personal and/or mechanical information processing as an important part of the modern world and were able to use parts of the course as a vehicle for doing this. Whether this is meaningful or not is doubtful.

"It seems to me that he makes his problem more difficult than it need be. "Study the information rather than the tool" he says. Now I can see why he should be concerned to see this. It is disastrously easy to become concerned with transistorised circuits and machine speeds! But I can't help thinking that 'information V tool' is a false antithesis. Aren't you really concerned with how information can be processed? I get the feeling from this article that information is somehow 'given'. I am by no means a subjectivist but I am sufficient of a psychologist not to espouse naive realism either. In his street corner example one has the impression that he is unaware, or at least neglects the fact, that we are active in our perception. To some extent we, or 'society', determine how we will categorise experience; what in fact, we see.

If we take perceptual considerations further we may well wish to claim that the senses are devices for keeping information out rather than letting it in. They are limited in what they can cope with or process - in fact this is a central phenomena, i.e. in the brain.

Computers can help extend human capacity. They can search for pattern. These arguments, to quite an extent, support him because it follows that what is important is the ability to ask the computer the right questions.

A more serious concern that I have is that Dr. Longworth's article by appearing to treat information as given apparently implies that if we have a big enough computer we can solve any problem. It seems to me that the calculation of stresses in a bridge is a problem admirably suited to solution by computer; the question as to whether or not one should cane a boy is not capable of solution in such a way. That type of question is one which has at least an ethical element. I suppose what worries me most about some computer educators is their willingness to encompass ethical questions as part of their concern. In other words I sometimes have difficulty in getting clear what computer education is not about."

Roy Whittaker (Keswick Hall - Head of Education Dept.)

1.3.76

2.3.76

Roy

Thank you for your note which is being transmitted, unabridged, to Norman Longworth.

Your last paragraph worries me as your thoughts behind it seem to have worried you! Since when have computer educators been concerned with ethical problems? Since when have scientists been concerned with ethical problems? Since when have psychologists been concerned with ethical problems? and why not? Is it your prerogative? Should we just get on with teaching the good news of mathematics, or the computer, and leave psychologists to have the only say? I thought we were moving toward an 'integrated' way! Scientists 'invented' the means to develop the atom bomb. Should they now never deal with the deeper issues?

I find the assertion, even so, a strange one. It is a very serious misunderstanding of the way ethical principles impinge on the 'computer educator' (your phrase) ideas. 'We' are concerned about the effect of the computers' advance in society we are developing fast in this field we believe more should be done to use it in problems where it can be used to ease our economic problems - trained manpower problems - information explosion problems - you name it possibly the computer could be used to help. Unless we have people educated and aware of the dangers (social and ethical) it could develop as the atom bomb. Certainly without knowledge and understanding we have seen very big social problems arising. Perhaps you have no experience of these difficulties!

I have passed a copy of this to Norman also!

Arthur

Dear Captain Trechman,

Thank you for your letter dated 17th February, 1975, concerning the 'Information Course' under development by Norman Longworth. As you suggested, we have discussed the completion of the final draft with Norman and a postponement of handover until the 1st April, 1975 is acceptable to us.

I should like to take this opportunity of adding that we are most impressed with the quality of the material which we have seen. Norman has approached the work with a thoroughness which does him credit and he has been at pains to ensure the educational validity of each module.

Clearly this is a vital area of education and the course could pave the way to an extension of the ideas. In view of this, I hope that IBM will seize any opportunity available to enable Norman to be involved in further development.

Yours sincerely,

J.J. TURNBULL

Head of Educational
Applications Sector.

A COURSE ON 'INFORMATION' FOR THE SECONDARY SCHOOL

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A COURSE ON 'INFORMATION' FOR THE SECONDARY SCHOOL

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This paper describes a course on 'Information' developed for 12-14 year old children in British Secondary Schools. It teaches children how information is an essential part of organised human activity - in the school, the home, in Government and in Industry - and presents this concept by studying the information needs of a variety of organisations. It contains practical ideas on information collection, analysis, storage, retrieval and communication, using the computer and other means of processing information as reinforcement. In its wider context, the course relates to the wider environment in which information is handled and is thus intended for teachers from a large variety of disciplines.

Biographical Note: After spending nine years in teaching, seven of them as Head of Geography in 5 British Secondary Schools, Norman Longworth joined the Education Development Department of the United Kingdom Limited in 1967. He spent three years developing computer courses for the company and was then appointed Education Affairs Officer, liaising between schools, colleges and mainly in the field of Computer Education. Between 1972 and 1974 he was seconded to the University of Southampton, where he worked as a Research Fellow with Mr M D Meredith, Tutor in Informatics. There, he developed the course on 'Information' described below and supervised its testing in two Hampshire schools.

1. INTRODUCTION

Go to any street corner, as children do at the beginning of their 'Information' course. Observe information around you - the houses (numbered), the shops (named), the sewage grids with maker's name inscribed on them, the telegraph poles (numbered), the H signs informing you where the nearest electricity mains supply is, how deep, the Water Company signs containing company name, usually out of date, the GP's signs - all the coded evidences of man's occupation of the natural landscape. Here is information in abundance, with leads into a variety of subjects, a variety of questions.

Go to any Post Office. Pick up and study the complexity of forms - to enable you to license a car, to claim subsistence allowance, to pay for a television license, to register a parcel, to buy a Postal Order - all demanding information, many of them vague and ill-written, most of them recently redesigned to fit into the rigid complexities of some computer system.

Think of the personal information about each child held by the Headmaster of his school, as children do on the 'Information' course. Information about names, addresses, dates of birth, parental occupation and (horror) social grade, examination results, medical history etc, etc. Think of the people connected with the running of the school - cleaners, caretakers, teachers, librarians, children of all levels and ages, inspectors, governors, Education Authority Officers of many types etc. Think of the problems of the school which are mainly information problems - timetabling, staff absences, truancy, statistics on attainment, school meals, school buildings, school stock, books and stationery. Explain why the Headmaster Information System often is in chaos. Explain how, by using aids to the better storage and retrieval of information,

perhaps even a computer, it may be improved. Complete an edge-punched card exercise which demonstrates to the children (and perhaps even the Headmaster) how information can be recorded, stored and retrieved - give them a practical exercise to do for themselves and encourage them to think creatively on the best use of the method to make maximum use of the holes. Generalise into the components and needs of any information system.

What has just been described comprises one module of an 'Information' course being tried out in two Hampshire schools. In this module children are encouraged to involve themselves in an information problem from an environment with which they are familiar. Through various exercises which split up the problem into its component parts they discuss and analyse, and go some way toward devising a solution. The module takes about six weeks of teaching time at one hour per week and is divided up into convenient teaching periods.

2. THE BRITISH SCENE

Describing the richness and diversity of the state of Computer Education in Britain is rather like describing the richness and diversity of a course on such a wide and perhaps indefinite topic as 'information'. Historically, the subject has been taught by enthusiasts from many different regions who have developed their own approaches, followed their own motivations and used their own sources. Only in Scotland has there been direction from centralised agencies with status, and it is fair to say that the preponderance of mathematicians interested in teaching about computers has led to a corresponding preponderance of hardware and programming oriented courses in schools.

In Britain, too, one must take into account the way by which the 'system' has affected the means

A COURSE ON 'INFORMATION' FOR THE SECONDARY SCHOOL

which innovations are accepted into it. Again it is generally true that many British Secondary schools are highly examination oriented, often because of parental pressure, and that, because of this, curriculum changes are imbued with all the speed of a retired schoolmaster walking backwards. Nevertheless, Computer Education has made some headway, provided in some cases that it is confined to those topics which are more easily examined. There are, of course, many other reasons for this comparatively primitive state of the art. Notwithstanding the undoubted enthusiasm of the mathematicians who have been instrumental in introducing computer courses, and without whom there would be a true darkness, there is a dearth of teachers, particularly those in other disciplines, with the necessary background and insight into the subject and its ramifications. Mathematicians, in general, are not notable for a sympathetic understanding of the vaguenesses and colliness of social implications, nor are teachers of the Humanities intensely devoted to the manipulation of digits which they imagine competing to comprise. Of course I am maligning many able teachers in saying this, but am also merely stating what conversations in many schools have implied.

And so, these and other circumstances have, in some sense, fashioned the 'Information' course into a social contract between the 'system' as it operates and the needs of the subject for a new and different approach. The course is aimed at second year 12-14 year olds since examination pressures have not, at this age, begun to bite. It is so designed that teachers, or one teacher alone, without any computer knowledge and with no background of any subject specialisation, may understand and present the concepts and ideas it contains. It is modular in construction so that teachers may have the flexibility of choosing what to teach and when to teach it. It is open-ended enough to allow additions to be made, either on the basis of new and more sophisticated techniques which may be made available to the school or from the viewpoint that some teachers may wish to follow up the ideas further than they are taken in the text. Lastly, it is suitable as a basis for a more detailed study of the computer as a machine in later years, and thus fits well into the existing methods by which Computer Education is taught.

3. WHY 'INFORMATION'?

All this presupposes that a course so created is worthwhile and meaningful, and that its content fulfils a specific need not only in Computer, but also in General Education. The course which this paper describes is called 'Information' - not information handling, information processing, or informatics, or any title which may denude the word of its connotations, although, of course elements of these constitute a major emphasis of the course. It is so called because information is the stuff by which all organised human activity - whether it be in the home, in the school, in Government or in Industry - is established

and successfully maintained. People collect it, analyse it, store it, process it, retrieve and communicate it as the computer does. Sometimes they do it consciously, as when they are buying a house or deciding to change a job; mostly they do it unconsciously, as when watching a television set or riding on a bus. Information is crucial to the making of decisions, correct ones or mistaken ones. It is ubiquitous, whether we choose, or choose not, to ignore it. There are two major reasons why I think it is necessary to make a point of teaching it to children in a formal sense at this point in man's development. Both of them are related to the computer.

Firstly, the position in which men, women and children find themselves today, in which they are able to choose what they personally need in terms of information, is an important watershed in the development of society, and has been created to a large extent by man's relatively recent ability to store, process and make available large quantities of information. The so-called information explosion is a direct result of our new-found prowess in allowing various sets of information to come together, feed upon themselves and create new sets of information.

Secondly, in this situation there is the need to train and educate people to organise logically systems of facts and ideas. In this sense they would be simulating, either actually or conceptually, the way in which the computer works, and the person would thereby become the analogy to the machine. The solicitor is not expected to know the details of every case in legal history; he is expected to have a reference point from which he may refer to the relevant source and precedent. In other words, the ability of people to index will, in the future, be more important than the ability to remember the body of information which the index represents.

The social implications of the computer are thus carried into the schoolroom and into the everyday lives of people without being made explicit. The education of children in information is not perhaps a new concept, but it is more crucially relevant in the modern world than at any time in the past.

4. 'INFORMATION' COURSE CONTENT

There is obviously neither the time nor space to describe a one-year course on 'Information' here, and so I propose to describe one of the modules quite fully and make reference to several others. The study of information in its total organisational environment lends itself to a variety of treatments within a variety of topics. It cannot be pretended that this course deals with all aspects of information - to attempt to do so would be an impossible task. Nevertheless, within the nine modules of the course, there is emphasis on those aspects of information which bring out the role of the information processor, usually the computer, and a progression from the collection and analysis of information to its retrieval

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d dissemination. In many cases, the environment which the information is found is fully described so that the problems, and the way in which they have been solved, can be put into its full context.

For example, Module 5, which deals with the work of the Transport and Road Research Laboratory at Crowthorne in Berkshire, spends some time at its outset in establishing its geographical location, and in getting the children to identify with the place and objectives of the place, as well as giving them some idea of its physical layout. In these exercises, maps supplied by the Laboratory itself are used, and figure 1 shows an example of how these maps may be used to service worksheets. In the course there are many such sheets and in the interests of space conservation I have cut some of the figures short.

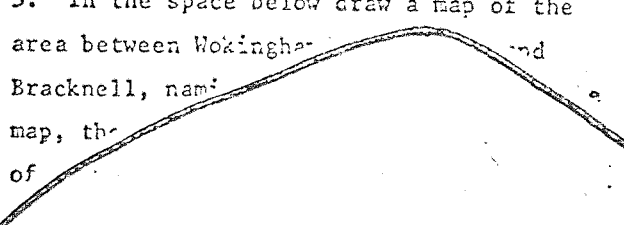
The object of the geographical exercise is to ensure that the children are not discussing an abstract information concept, but a real place which they could, if they had the opportunity, go to visit. Indeed, children at the school in Yateley, where the pilot scheme in teaching this course was first carried out, did in fact make this visit and came away so much the more knowledgeable for it, although the real work which puts it into perspective as an organisation relying on information for its existence comes later as a follow-up.

The existence of a Film Library at the Laboratory also helps to put over points which are more laboriously made without this medium, and a whole host of descriptive pamphlets describing all aspects of the Laboratory and its work have helped to make the place real and assisted the creation of teaching material.

Let's Find TRRL - A Homing in problem
Sheet 2

3. On a route map or from a Road Atlas of England do the following. Imagine you are making a visit to TRRL from your home town. Trace the route you would take which is also the most direct. Fill in the boxes below which road numbers you would travel along and the main towns you would pass through.

5. In the space below draw a map of the area between Wokingham and Bracknell, naming the main roads, the railway, the river, and the names of the villages and towns.



4. Look at the map of the area around the Road Research Laboratory and answer the following questions.

a) Mark in the way you would approach it from home.

b) Name the four towns nearest to the Laboratory

c) Which is the nearest railway station?

d) Which Road forms the South-East boundary?

e) What are the figures for the population of the map?

Figure 1 Part of a pupil worksheet which illustrates the way by which children are encouraged to 'home in' on the organisation they are studying before getting down to the information problem of the organisation

Having established that there is real purpose in the work at Crowthorne, the Module goes on to describe the Research Track, the experiments carried out on it, and the way in which information is gathered through these, for processing into communicable results. Naturally, the computer plays an important part in this and there are slides of the machine and its peripherals

which lead the child (and the teacher) through the various processes involved in handling information. We are less concerned in this with how the machine accomplishes its task than with the fact of establishing it as a tool for doing jobs of this type, although there is some material for perhaps more mature students on the special tabulating language used there.

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Also in this module, which comprises about ten hours work, is a study of the ability of forms to describe events - this is a recurring theme in several other modules, with the intention of expressing the importance of good form design in information collection. The form Stats 19, used by the police to describe traffic accidents, is looked at very closely, and a practical exercise set up to see if children can reconstruct an

an accident from the coded information on the form. This example of creativity from code often receives an enthusiastic response from children, particularly if the accident is a gory one, and also gives them a good insight into the planning which goes into such a mundane activity as designing a form - an insight which they themselves will indulge in in Module 9. Figure 3 below shows some of the questions used with Stats 19.

Accidents and Car Safety

Sheet 3

10. What you have just done is to draw a picture of an accident, but in figures rather than lines and shapes. There is a very good way of showing how this is done, and that is to reverse the process. On page R/C/ Sheet 3 you will find a completed Stats 19. It describes a different sort of accident than the one you have just studied. If the form is a good one, we can test our theory about drawing figure pictures by drawing in the space on the left hand side below a map of this accident.

Fairly obviously a map does not tell us everything about what happened and we need words to complete the picture. On the lines below complete your description of the accident by writing down what you think happened. (This might be called a word picture).

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

11. The Stats 19 forms are sent to Hemel Hempstead in Hertfordshire. (Remember how many accidents in a day?). Here they are collected together and a larger picture needs to be drawn. In fact lots of pictures are needed by various people such as: How many accidents involving children under 10 happened this week, this month or this year? How many motor cycle accidents last year? What proportion was this of all accidents? The list of questions is almost endless. See if you can prove it by asking three questions yourself. Look at Stats 19 if you are out of ideas.

a) _____

b) _____

c) _____

12. Suppose _____

12. Supposing you were the person responsible for receiving all the Stats 19 s every day. There are some hundreds. Your boss comes in and says, "The ministry rang up just now. There's a panic on. He wants to know how many vehicles with defective tyres were involved in a week - cars only, driven by people over 65 years of age. What would you have to do to find that out?"

Figure 3. One of four worksheets used in conjunction with a film on Accidents and the Stats 19 form used to describe traffic accidents by the police. TRRL also use this as data.

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Further follow up on the impact of the machine is one and the children are invited to examine how this type of work could be accomplished without the services it offers, extending outwards into an emphasis of its importance in the pattern of man's society in the late twentieth century.

As in the Headmaster Information Module, the loose ends are gathered up into a summary of how the information collection and subsequent processes have played their part in justifying the existence of the Laboratory. Figure 2 below shows part of a pupil worksheet designed to facilitate this summary.

What we have learned about TRRL and Information

You have spent some weeks studying the Transport and Road Research Laboratory as part of your research into information. You have seen that information plays a very large part in the reasons why the Laboratory exists at all, and this, of course is common to all organisations. These last questions will help to summarise what you have learned over the weeks and remember the more important bits. See if you can remember the answers without looking at your notes, and then finish off the ones you couldn't answer by looking back over them.

+++++

1. Information Analysis - defining the problem.

a) The Laboratory looks at all aspects of problems on the roads (and rail). On the lines below list three problems which people may be concerned about on road traffic.

i) _____

ii) _____

iii) _____

2. Information collection. To collect information TRRL sets up its own experiments.

a) Where does it do this? _____ b) What does it do experiments on?

(3 things) i) _____ ii) _____

iii) _____ c) Sometimes it gets information from outside. Which form describes accident statistics? _____ Where is it filled

in? _____ Which unit of TRRL goes out to check on accidents?

_____ Where are the forms sent to? _____

3. Information Preparation. What are the details on the form first transferred to?

_____. After they have arrived at TRRL they are then transferred to magnetic tape. Why? _____

How do you think information collected on the Research would be held? _____

_____ Why does information have to be prepared at all? _____

4. Information Input. Which machine is the information prepared for? _____

Another word describes information which has been put into the machine. _____

5. Information Processing. Which language is used to process accident statistics in the machine? _____ How is it translated into a language which the

machine can understand? _____

Which two parts of the machine do the actual processing of information? _____

6. Information

be

the machine make the information

Figure 2. A summary work sheet drawing together the threads of the information process at Transport and Road Research Laboratory.

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On the last few pages I have described sketchily one of the modules in the 'Information Course, the philosophy behind it, and some of the ideas contained in it. Imaginative treatment along these lines can be put into the activities of any organisation near to most schools, and the introduction to the course does in fact contain suggestions for teachers on how to develop modules on local industries in this way. However, to give a taste of just one module does not bring out the full flavour of the course - just as important as its content is the way in which the ideas are put over, and in the Transport and Road Research Laboratory module a combination of films, slides, pupil worksheets, reference pamphlets, mapwork, visits and discussion sessions is used. In other modules, these are augmented by practical computing exercises, tape/filmstrip lessons, stories, role-playing exercises, case studies and playreading sessions.

A list of the modules and a brief resume of their content follows in figure 4. In this you will see that the range of types of organisation is wide, and this offers the flexibility of offering a corresponding wide range of subtopics within each module. For example, in module 7 there is included not only a manual simulation of the Gas Board's method of selling, fitting, meter-reading and billing, in which the children take on the respective identities of salesman, customer, computer, letter etc filling in the forms which pass from one department to another, but also a section on flowcharting, which will enable them to understand the systems flowcharts which formalise the flow of information within the Gas Board computer system. Also, within the Police Work Module, there are exercises which attempt to teach the difference between information and knowledge, the use of television as a police spectator sport (what proportion of television time is taken up by series concerning police work and detection?), and the often inherent unreality and irrelevance to the way in which real policemen go about their business. These introductions are followed up by the way in which the computer does help today, and could help in the future, followed by a cautionary tale about the misuse of computers.

Module 1 - Introduction to information. The school environment and the information to be found there. The development of man's knowledge and his capability for storing it.

Module 2 - A Headmaster Information System (described in chapter 1).

Module 3 - Information in Police Work and the Law. The police on television. Case Studies. Sherlock Holmes and knowledge v deduction. Police National Computer. Local computer uses and equipment. Misuse of computers.

Module 4 - The Engineering aspect of Computers. - The input-processing-output cycle (related to physical demonstration pieces). The development over the last 20 years. Technology.

Module 5 - The Transport and Road Research Laboratory (described in chapter 4)

Module 6 - Computer Contact. - suggestions and exercises for obtaining access to and using a terminal. Information recording, processing and retrieval exercise by terminal. Using batch facilities, suggestions for the teacher and exercises. (eg Haiku)

Module 7 - Information on (Gas) Tap. The Gas Boards Organisation. Information about Natural Gas. Flowcharting. Simulation Game.

Module 8 - Information in the Library. From books, referring to indexes, booking systems. Computers in the Library. Keeping track.

Module 9 - Individual Information Assignments.

Figure 4. A list of the modules in the information course.

5. THE PILOT STUDY

At the present time the 'Information' course is being tested in two schools in the South of England. Serious monitoring has been taking place for a relatively short time, and it is too early by far to assess its impact on either the teachers or the children concerned. There are two interesting points about these trials; firstly, the six teachers concerned are not mathematicians but specialists in English, Geography and General Studies. Secondly, there is an interesting mix of pupils comprising single-sex classes, mixed-sex classes, bright groups, below average groups, and mixed-ability groups. In addition to the second-year pupils who comprise the majority, there is also a trial group of fourth-years. In the latter class, as in all classes, the teacher is encouraged to use his or her own style, to use the teacher's notes (which are copious) but to make no concessions to them, and to make suggestions and observations in conversation with me after the lesson. These conversations are tape-recorded, and the recommendations made are acted upon before the module is taught again. It is also intended to telerecord a couple of lessons, and hopefully these will be available for showing at the conference, as, of course, will the teaching material in the modules.

Already, valuable information is coming in. Information is a two-way process, and one of the most cogent points made on the course to the children is that the ability to ask the right questions is as important as the ability to find the right answers. So it is with the course monitoring. Inevitably, much of the feedback is the subjective response of the teacher and taught. But there are also several types of personal response pattern to such a subject as information, from the intuitive feel exemplified in successive flashes of insight to the hard grinding acquisition of knowledge by real effort. I do not think that it matters which way children appreciate the things we are trying to teach them in this course, as long as, at the end, they know that they have taken part in something which, for them, was a worthwhile experience. I hope to have more concrete evidence at the conference.

5.2 So where do we stand?

For one who has been closely involved in what proved to be a hectic and exciting venture in curriculum development, it is not an easy task to put the project into a fish tank as it were to view it from the outside. The requirements of such a reflective exercise would however seem to fall under two main headings.

- a) As a result of carrying out the project how have the ideas, attitudes and outlooks of the author been affected and changed?
- b) Where does the future lie, not only for the 'Information' course but also for curriculum development in its particular educational area?

The answers to these questions will be the concern of the remainder of this chapter.

5.2.1 Changes in ideas, attitudes and outlooks

Over a period of two years the effects of discursive interaction between researcher and teachers and the provocation of new ideas and approaches are bound to affect attitudes. Some of these may refer to the relative merits of different teaching approaches, some may question the value of inclusion of certain subject matter, while yet others may involve the interpretation of a particular exercise. But these are relatively trivial matters when compared to the constant self-questioning about the purpose of lessons, and exercises in relation to the overall ethos of a course. In the mundane activity of producing lessons for others to teach, it is easy to lose sight of why they are being taught at all, so that they become no more than strategies for distraction. Occasionally one encounters the situation in which a basic tenet of belief is seriously under siege. An example of this is the place of the computer in the 'Information' course. In many places in the 'Information' course the computer has a privileged place. Many of the modules focus in on the machine as the processor of the type of information they describe, and the machine is presented to the children in a variety of guises; as an object which can be used or misused, as a storage medium for information in many different areas; as the progenitor of the 'information explosion', or as a tool for use by human beings with problems to solve. This emphasis on the computer is not surprising in view of the background of the author and his appreciation of the role of the computer in present-day society. One is

merely passing on personal insights and a strong conviction of their importance both now and in the children's future. However, in reflecting about the 'Information' course in its present form, there is a need to re-examine original assumptions about the relationship between the computer and information, and to ask whether the major purpose of the course, that of filling a gap in the 'Computer Education' spectrum, is still relevant.

Various indicators may point the way toward a balanced viewpoint about the course as it may be seen by the prospective teacher. The first is that most of the teachers who have taken part in the pilot tests have never regarded 'Information' as a branch of 'Computer Education' anyway. If they had, their initial interest would perhaps have been rather less enthusiastic. As teachers of their own specialisations, not steeped in the mysteries, mythologies and mathematics of the computer, they adopted the layman's mental posture to the machine. They were pragmatic enough to teach what they saw as being worth teaching in the context of what they saw to be their own situation. They had, naturally enough at first, vague anxieties about the lack of topicality and relevance of much of the school curriculum, and saw that this might be a cause of pupil unrest. They could see, or were convinced by the argument put to them, that the way in which information is handled is a major determinant of the way in which people live, work and communicate, and will be increasingly important to the quality of life in the future. They, like the media, saw the computer as an important factor in this process. But, one feels, from interpreting much of what was left unsaid, that frequent reference to the computer sometimes became, as far as they were concerned, a hindrance rather than a help, and that the flow from one set of topics to another set which dealt with the computer was not always a natural one. They saw how the computer was used to focus in on the solving of problems, but one occasionally had the impression that the computer received such attention because the man who wrote it worked for a computer manufacturer, and that this was his bit of propaganda for them.

Because of the earlier perception of the course as a branch of 'Computer Education', it may be that the computer has been forced gratuitously into some of the modules, but later perceptions and reflections have provoked a radical revision of the role of the course and its place in the curriculum. Instead of the 'Information' course filling a gap, the antithesis has come about - 'Computer Education' has become a part of the 'Information' course. Nowhere is this

more apparent than in module 1 in which the vast quantity, the complex interactions and the minute details of the information scene are shown to the children to exist, and then, somewhere in the discussion period after this practical exercise, the computer is perhaps mentioned as one tool which can help us sort out some of this information - not all of it, some of it, and only that which is relevant to the solving of a particular problem. The composition of the teaching material for the course also brings out the subservience of a knowledge of the computer's capabilities, applications and implications to the overriding ethos of the 'Information' course. All the eleven lessons of module 3 are concerned with giving a perspective on information. In only five of these does the computer feature. In module 5, the role of the computer is made explicit in three of the ten lessons, and in module 2, it does not feature at all.

Thus the course attempts to give a broader view of the world of information in which the computer plays its part, but it can by no means represent the whole. In presenting it in this way one has become conscious of a redirection in the emphasis of the course. In Chapter 1 the merits of 'Computer Education for All' and the claims of Computer Education to exist as a subject area in its own right were discussed. Experience in the pilot testing of the 'Information' course leads one to modify the arguments in both these areas. The main drawbacks to the concept of Computer Education for All have always been the lack of facilities in schools and the shortage of teachers qualified to teach the subject. Computer Education as a subject in its own right has suffered from too close an identification with mathematics and an outlook too rigidly controlled by the mechanisms of the machine. The 'Information' course has, to some extent, succeeded in providing a solution to many of these problems; it has tried to show that computing facilities in schools are not absolutely necessary and that teachers of other subjects can easily adapt to and teach concepts in 'Information' without special training; it has attempted to take the subject out of mathematics and put it firmly into the social sciences, and it has tried to introduce new perspectives and different viewpoints into the syllabus consistent with this approach. But it has not done this within the narrow requirements of the original specifications. Instead it has tried to turn the philosophy around and provided 'Information' as a framework in which Computer Education, and much else besides, can operate. Further, it has needed to add dimensions associated with general teaching problems, methods

of approach and attitude generation. As a result of carrying out the project a course has been developed which has transcended its originally conceived boundaries and restraints, and has prompted a revision of emphasis from 'Computer Education' to 'Information Education'.

If this was a major shift in attitude, the consequences of broadening the syllabus area have produced new outlooks on teaching methods. The possibility of using drama as a vehicle for establishing insights had not, outside of the often more rigidly-defined role-playing activity, occurred to the author as a viable means of approach. The expertise of Steve Ward in this field opened up new vistas and new possibilities for making the subject matter more attractive to a wider range of teaching styles and ability levels. Similarly, the more liberal interpretation of the concept of 'Information' has expanded the areas of education in which its concepts are applicable. Originally, as has been discussed earlier, the course was written for second year children, but these were restraints imposed by the rigidities of the examination and timetabling systems, and the approaches adopted were modifiable to suit the age group and ability level of the children taking part. There is no reason why, given the right approach and a certain pruning of content, children at Junior school or students at Training College should not be taught 'Information'. There is of course a danger that, if a course is made over-flexible, it becomes vacuous, long-winded and pointless. The modular structure of the 'Information' course which permits selection of lessons reduces the chances of this happening, but cannot, unfortunately, cater for wrong selection by teachers. Already there have been signs of this in Nottinghamshire where the second set of author-independent pilot tests of the course are being carried out. Because the majority of involved teachers are mathematically biased, and have previously taught Computer Studies for GCE/CSE examinations, they have espoused module 4 as a bear detects honey. Their comments on the module have been very complimentary as the quotations from the interim report (page 5.2.A6) shows: 'It is interesting that many people who teach Computer Studies as a CSE option have hailed module 4 as being far better than any other approach to how it works'. But this is not what is required. What is important in the author's mind and implicit in the design of the course is the extension of the knowledge of 'Information' as a quite separate philosophical idea, a means of breaking down existing structures and an imposition of a new, more unified replacement. The place of the computer has, as has been discussed, become

increasingly irrelevant; the use of modularity to be over-selective can be as great a danger in a course as can be inflexibility of approach. Indeed, in this case it leads one to ask the question whether module 4 should have been included at all. Certainly Harry and Steve at Henry Beaufort school would have done so but not for reasons of potential course abuse. The interesting paradox in their case is that they would have used the modularity to select out, and this in one sense is another form of potential for abuse. The answer, distasteful though it may be, is to accept that advantages often have their associated drawbacks, that the reality of the educational situation is that teachers will misuse, as well as use, the material at their disposal, and that it is far better to accept the possibility of this than to offer an inflexible and often unacceptable series of lessons which gives little scope for modification of either content or approach.

The carrying out of this project, too, has made one very aware of the need to keep up to date with developments over a wide range of subject areas. The author's connections with the Southern Science and Technology Forum, an area organisation concerned with the development of Science and Technology teaching in schools, have led to observation and discussion of similar agonisations and problems in this area. The need for a wider vision of Science and Technology, the potential of the subject as a symbol of the modern age, the concomitant need for social awareness to temper the excesses of the technological world, are all in a similar curriculum melting pot to that of Computer Education. In this field too, 'Information' education might be able to offer an exploratory basis for the development of meaningful basic subject matter, and those concerned with extensions to the course need to be aware of possibilities. Similar questions are being asked in many subject areas, basic questions which address the problem of its existence in the curriculum, the limits of its applicability to the child's education, the choices of what and what not to teach. Subjects such as Geography, History, English and Religious Education are beginning to feel the effects of the 'Information' explosion and the changing manners and mores of education which are its symptoms. Children have always questioned the content of that which is taught to them in schools - they have not always received a satisfactory answer. Proliferation of accessible knowledge tends to make these answers less satisfactory than ever.

However, to suggest that this 'Information' course is the answer to such

problems would be both pretentious and misleading. It is patently not so. But there are aspects of its approach, content and philosophy which might be of interest to subject teachers from many disciplines if it were possible to acquaint them with the ideas it contains. Here, of course, lies a most difficult problem. Organisations such as Department of Education and Science and Schools Council which have the necessary breadth of interest and influence to recommend the approach to the organisations which might make something of it, are themselves overwhelmed by a surfeit of information and demands. It is an interesting irony that the problem which the course addresses might itself be the cause of a lack of action from those who may be interested in spreading awareness of the same problem.

5.2.2 The future - Where next for 'Information'?

There can be no doubt of the interest which the 'Information' course has aroused among the people to whom it has been explained. The long list of acknowledgements in the foreword to this thesis contains reference to those who have given the course serious enough attention to read through much of the material and to pronounce a preliminary satisfaction with its aims, scope, approach and content. There are, in addition, literally hundreds of teachers who have expressed an interest in, and a desire to try, the material. Mainly these are teachers of Computer Studies who have sensed that their subject lacks a broad enough base as was discussed in chapter 1. Quite naturally, they see the course in those terms too - as a gap-filling exercise in the computing syllabus. It is intriguing and exciting that expressions of interest are coming from administrators, advisors and teachers alike, and this augurs well for the success of the project in the future. However as has been discussed earlier in this chapter, this apparent euphoria might be premature. The course has by no means been fully tried and tested, and it would be wrong to give it any sort of seal of approval on the results of this research alone. There is also the wider implication to be considered of the course as a link between subjects, as an exercise in making sense of the curriculum, as a social science orientation, all of them still ideas in theory, rather than lessons or modules in fact. These aspects could very well be lost if the course were to be adopted solely by teachers of Computer Studies, the great majority of whom are also teachers of mathematics.

The copyright for the course now lies in the hands of the National Computing

Centre. It will be their decision whether or not to publish, how much modification is required, in which form it can be published and how much it will cost, and in the present financial situation it is a difficult decision to make. Schools have little money, publication costs money, modifications cost money and there may be a limited market. Currently the National Computing Centre are carrying out author-independent trials in Nottinghamshire, for whom Maurice Hart has made assessments (pages 4.10.A1 to 4.10.A6, and page 5.2.A6). Also, as a result of the interest generated at the International Federation for Information Processing conference in Marseilles, it is planned to have it tested in four other English speaking countries plus Switzerland. Presumably, interest there would broaden the potential market and create a greater cost justification for publication of the course. But in these places too, interest is being mainly shown by teachers of Computer Studies, and precisely the same dangers apply as in Britain. In Nottinghamshire it is true, one third of the second year curriculum in Secondary schools is devoted to what they call 'Integrated Studies', and it is perhaps under this umbrella that a more appropriate future for the 'Information' course lies. As an indication of current interest in this idea, at a Saturday morning meeting organised so that the author could explain the 'Information' Course to interested parties in Nottinghamshire, of the 50 teachers who gave up their time voluntarily to attend, 49 were mathematicians.

Attempts are also being made to interest the Department of Education and Science in the hope that a wider subject matter might provoke a response from HMI's who have been concerned to examine schemes for common core studies in schools. No response has been received to date. And so the course continues in an on-going trial mode until some decision is possible. As for the improvements and modifications necessary, the author's thoughts are laid out on pages 5.2.A1 to 5.2.A5, which also contain ideas about marketing and monitoring.

Irrespective of whether or not the 'Information' course is published or whether or not the ideas and concepts are followed through by others in the future, this has been a valuable exercise for at least seven people in opening mental doors and in achieving more global perspectives. Thanks must be expressed outside of the formal acknowledgement to those who have listened, argued, cooperated, criticised and inspired. Thus to Jenny, Harry and Steve of Henry Beaufort School, to Sheila, Rosemary, Jackie and Ray at

Yateley, go my sincere thanks. Without you, little of this would have had any meaning at all.

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The 'Information' Project

Opportunities and suggestions for further development.

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1. Improvement of existing course.
2. Development of new modules.
3. Monitoring and availability.
4. Approximate cost of developing a module.

1. Improvement of existing course.
 - a) For less able children. The course is broadly aimed at second year children and the subject matter is, with a few exceptions, suitable for all ability levels. However, the treatment of the subject matter demands differing techniques of teaching according to the ability of the child. Whereas a high ability child can concentrate for fairly long periods on a particular topic, the less able should not be required to do this for periods of longer than ten minutes. There is therefore a need for these children (and for the teachers who teach them) for:
 - i) Development of single worksheets simply expressed, without too detailed a subject matter and easily completed. Within a period of one hour several of these may be needed.
 - ii) Amendment of some existing worksheets to cater for the less able child.
 - iii) Development of more visual material which puts over the concepts clearly and simply.
 - iv) Development of other material which requires the less able to express themselves and their ideas by means other than using words eg drawing pictures, maps and plans, playing games and interpreting symbols.
 - v) Rewriting of the more discursive lessons into teaching blocks which include provision for smaller interactive sessions of teaching, discussion and self expression.
 - b) For the teacher. The teaching notes in the course are copious and designed to encourage the timid, reassure the uncertain and allow flexibility to the confident. New concepts, or those that are likely to be unknown points of fact or procedure, are incorporated into the childrens' worksheets with reference to the appropriate source - thus the teacher is seen as an instigator and advisor rather than a purveyor of factual knowledge. There are, however two areas which might be improved.
 - i) Because they are copious, they often tend to be verbose - this

is fine for the first-time teacher or the one who needs to hold hands tightly with the teaching material. For others it may be a liability. A lesson summary for each teaching period would be useful - this would give only the information which needs to be taught and a recommended order. Teachers would then have the choice as to which notes they use.

- ii) Flexibility of approach is emphasised as a desirable quality in all modules. Perhaps more guidance might be given more explicitly in the form of alternative ideas for putting over the same concept.
- c) General. The following points have arisen as a result of the monitoring already completed at Yateley and Henry Beaufort schools. Some improvements have already been incorporated.
 - i) Use of worksheets. The main method of individual work on the part of the children is the worksheet which the child completes and then retains as a record of his/her accomplishment. In some lessons several of these are handed out - and the children tend to feel that this is overdone. Alternative ways of encouraging follow-up work should be explored.
 - ii) Lack of creative work. This may be an extension of, and an answer to, point i) above. Particularly in English lessons of which this course has formed the major part, there is a need to encourage children to write creatively. Some suggestions have already been incorporated into some modules, but there is a need to scrutinise other parts of the course where opportunities for creative follow-up are possible.
 - iii) Activity lessons. These lessons such as the visit to a corner and the policeman's beat, in which the children are encouraged to leave the four walls of the classroom, are very popular and perhaps more lessons of this type should be incorporated.
 - iv) Computer Contact. The terminal session is likewise extremely well received by teacher and children. Consideration should be given to extending these into areas beyond the simple retrieval of personal information.

2. Development of new modules:

The modules already developed cover a wide range of organisations and concepts. However, consideration might be given to the development of further modules along the following lines.

- a) One of the stated objectives of the course is to make the school curriculum more meaningful to the child. In its present form this is only achieved in the 'informational' sense ie as an aid to the more efficient understanding of what subject matter is taught. The origin and purpose of this subject matter is not included. Modules on the traditional school subjects would be a valuable addition to the range. These would not deal with subject matter in the sense of detailed factual knowledge required but would cover such items as:
 - the scope and boundaries of the subject
 - the classification of the subject into its constituent interest areas

the common sources of information within the subject
 its interaction with and relationship to other subjects
 the types of information source and common artifacts of the
 subject (eg Geography - maps, atlases, books, globes etc)
 why we learn the subject and its relevance to the world in which
 we live
 etc, etc.

- b) A wider range of modules would cover a wider field of human activity. Some suggestions for further modules in an information course follow. What would distinguish them from the Case Studies published already would be the emphasis on 'information' in the topic covered.

Information on the (a) farm. Information in a Containerport
 (Soton)

3. Monitoring and availability of course

- a) Monitoring. At the present time the course has been monitored in two schools of widely differing backgrounds and with conflicting philosophies. Future monitoring should take into account the following factors:

the ability level of the children to whom it is taught
 the age of the children to whom it is taught
 the subject area in which it is taught
 the subject area of the teacher who teaches it
 the type of school in which it is taught
 the motivation of the teacher who teaches it
 whether the whole course is taught or a part of it
 the possibility of 'team teaching'
 the length of time taken to teach it
 the number of lessons devoted to it and their duration
 the way in which the material is presented to the teacher.

From these it can be seen that a wide range of combinations is possible, and of course the more differing situations which can be set up for monitoring purposes the better. However, the information obtained so far and the advanced state of development of the course may obviate any large scale alterations being necessary.

- b) Methods of monitoring. The following are suggested ways of obtaining feedback from the schools. There are two main difficulties here - teachers have many other responsibilities and pressures and are not reliable for completing forms unless these are of the very simplest; also the evidence obtained must by its nature be subjective both from the point of view of the teachers comments and your interpretation of them.

a form designed for the teacher to complete

a form designed for the children to complete
tape-recorded interviews with the teacher
tape-recorded interviews with the children
videotapes of classroom session(s) or visits
photographs of significant events
a special summary lesson asking the children to record their
opinions
taperecord a lesson
curriculum embedded testing
marking selected worksheets from the course

- c) Availability. The question of how the course should be made generally available to teachers presents some problems. There are three main aspects to the material

teaching notes

Pupil handouts

Visual aids eg tapes, slides, demonstration pieces, etc.

The first is relatively easy, since it can be made into a book. However, a further problem arises in considering whether modules should be made available singly or as a complete course.

I suggest that the following courses of action be considered as a starting objective.

- i) Teaching notes are produced as separate booklets for each module
- ii) Modules are offered separately for sale as complete entities which include the relevant visual aids and pupil handouts for the module.
- iii) Pupil handouts are put singly into a tear-off pad - teachers will then have the opportunity of reproducing the correct number they need for each lesson and effecting economies as they see fit.
- iv) A pricing policy is adopted which equalises the prices of modules irrespective of the number of 'extras' needed.

An alternative consideration which I do not recommend is to hold the visual aids in teachers centres - the tendency with this policy is for them to act as dust-gatherers.

4. Approximate cost of developing a module

For this certain assumptions have to be made based upon experience to date of length and visual aid requirements. These are

Assume the teaching length to be approximately eight weeks at one hour per week.

Assume that $2\frac{1}{2}$ sets of slides are required (total 35 slides)

Assume that $1\frac{1}{2}$ five inch tapes are required

Assume that any films needed are available on free loan (but with the acquisition of Teaching Media into Education more ambitious schemes on specialist subjects may be mounted, say 1 per 2 modules).

Assume Art Work for 15 to 20 slides

Assume 40 sheets of paper per module, duplicated x 20

Assume childrens' worksheets for a class of 30 amount to 20 per module (i.e. 20 x 30)

Assume typing time needed approximately 40 typist-hours

Assume travelling miles averages 30 miles per school week with one visit per week over development time

These can be costed out on current rates, but since many of them change rapidly I have not attempted to put any figure at this time.

These are costings for module development, not for monitoring.

I have not tried to estimate demand for the course when it is complete.

Copy of interim report by Maurice Hart

In-service course in Nottingham including the use of information.

The main aims of this in service exercise were twofold, first to increase teachers expertise in the use of BASIC including the use of marked cards on the Clifton system, second to act as a working party to study 'Information' and how it could be implemented locally. Two other subsidiary aims were to try programming and other activities with their own pupils and to report back results, also to look for some aspect of school administration that could be handled by suitable computer programs. Thirteen of the fifteen teachers on the course taught Maths as their main school subject.

The timetable for the course was one complete day's work at Clifton which was mainly programming followed by ten Weds. afternoons 1500-1730 hours with 1½ hours programming plus 'tutorial' discussion followed by 1 hour of group discussion on aspects of 'Information'.

The teachers were given modules to read before the specified session and the timetable for the first half of the course was as follows:-

- Week 1 The philosophy of the course, Mod 1
- Week 2 View the Question Tree, The Information Machine, discuss their suitability and the relevant question sheets
- Week 3 Look at the hardware for Mod 4 and slides produced at Clifton, several suggestions made about producing suitable slides
- Week 4 Look at pamphlets associated with Mod 4, introduction of HAIKU from Mod 6.
- Week 5 Discuss Mod 2 and its relevance to individual situations.

In the next five weeks it is planned to look at the Police module, the Gas module and to examine a particular location to produce questions as in Mod 1. A terminal exercise as in Mod 6 will also be implemented.

In general the teachers were mostly involved with their own programming, but still seemed impressed with 'Information' and felt able to teach it, even though it largely portrayed a different mode of teaching compared to their own field of Mathematics. Particular examples of this were the use of case studies and choice of words for HAIKUS.

Work in schools so far has been spasmodic. One school has operated Mod 4 in full with 4th years doing a CSE option and reports considerable success. HAIKU has been tried in several schools. A quote from an English department in one was "I didn't think the Maths. department could come up with anything so imaginative". It is interesting that many people who teach computer studies as a CSE option have hailed Mod 4 as being far better than any other approach to 'how it works!'. The breakthrough of one or more big schools opting to teach the whole course as it stands still hasn't come, but we have hopes for next Sept.

Specific points that have arisen are - HAIKU has been adapted to be produced on the Clifton system, a BASIC package is on the way - use of 'medical data for Mods 2 and 6 not thought suitable suggestions so far are TV likes and dislikes and a register of pen-pal suitability - some IBM pamphlets not available, but the idea of this kind of pupil follow-up work much appreciated - photocopying of worksheets

etc. not seen as a problem, certainly any publication should include this modern reality - local IBM and police contacted but no concrete result as yet, local GAS men on strike at the moment.

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