DOCUMENT RESUME

ED 301 710 CE 051 484

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TITLE Criteria for Good Practice in Computer and Information Technology in the Youth Training Scheme. Publication No. 3.
INSTITUTION Centre for Research in Youth and Further Education, Surrey (England).; Roehampton Inst. of Higher Education (England)., Surrey Univ. (England).
SPONS AGENCY Manpower Services Commission, London (England).
PUB DATE Dec 87
NOTE 126p.; For related documents, see CE 051 482-485.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS *Computer Science; Curriculum Development; Educational Policy; Educational Practices; *Evaluation Criteria; Foreign Countries; *Information Science; *Job Training; Off the Job Training; Postsecondary Education; Program Content; Secondary Education; Student Certification; *Technical Education; Vocational Education
IDENTIFIERS *United Kingdom; *Youth Training Scheme

ABSTRACT

A study examined the role of computer and information technology (CIT) instruction in the Youth Training Scheme (YTS). A number of successful local YTS training schemes and initiatives are identified and analyzed in the first part of this report. This process resulted in the formulation of specific policy recommendations that are spelled out in the second part of this report and concern the role of CIT in YTS programs and practices for conducting CIT training. It was determined that the overall purpose of CIT in the YTS should be to develop an information technology capability in each trainee. Because vocational relevance can be a powerful motivator, CIT training in YTS activities should emphasize the practical applications of information technology. The precise content and level of the CIT component of YTS should focus on trainees' prior interests, their YTS experience and its context, and the type of CIT qualifications being sought. The existing position of CIT as a component of transferable core skills should be maintained, and programs should be encouraged to develop an overall approach to CIT training that includes both off- and on-the-job training. (Appendixes include discussions of relevant activities for industries with apparently little use of CIT and development of training resources, case studies of the delivery of the CIT training, and a position paper supporting the adoption of a broad view of information technology training.) (MN)

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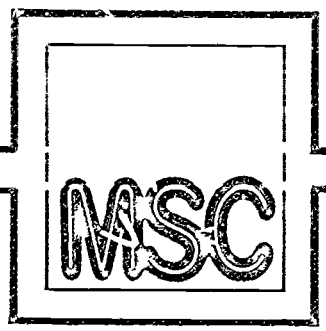
RESEARCH IN YOUTH AND FURTHER EDUCATION

CRITERIA FOR GOOD PRACTICE IN COMPUTER AND INFORMATION TECHNOLOGY IN THE YOUTH TRAINING SCHEME

Alan Brown and Julian Mills



PUBLICATION NO. 3

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C O N T E N T S

READERS GUIDE

This document is divided into two parts. These are further sub-divided into sections to provide different routes through for readers.

The first part is discursive and deliberately sets out to facilitate a fairly open discussion about CIT in YTS. In Part two we `come off the fence' and make an assessment of the direction we believe CIT in YTS should take. The advantage of this split is that the first part can contribute to the development of CIT in YTS, **irrespective** of **particular** policy decisions. That is, the criteria for good practice are generally applicable. By contrast, the second part is a plea for how we believe CIT in YTS **should** develop. As such it is a contribution to the debate about policy itself.

The significance of this separation for readers is that Part One can continue to be used as a coherent body of ideas in support of the development of good practice : it can be used as a source of reference for a number of years. Whereas the time horizon for the relevance of Part Two is much shorter. If CIT develops in the way we suggest and the recommendations are implemented, then much more specific guidance will be issued - to be complemented with an active dissemination strategy. In that case, with the underlying ideas more readily available and a commitment to implement them, then Part Two will perhaps retain interrest only insofar as people are interested in the origination of the ideas and policy.

If, however, the provision of CIT in YTS is not radically overhauled, then Part Two would be of historical interest only : as documentary evidence of a `lost opportunity' -a failure to conceive of the development of an `IT capability' as an essential component of occupational competence for **all** young people. The argument for that proposition is of course the substance of Part Two.

GUIDE TO PART ONE

The first section: "Policy and support for good practice"

This provides a discussion of the policy implications for good practice in CIT, presenting the arguments without recourse to the detailed technical computer considerations.

The second section: "Technical and practical considerations"

This provides for more detailed discussion of the practical and technical CIT issues divided into four such sections:

1 Use of CIT at work
2 CIT off job training
3 Trainer Support
4 Equipment and programs

These sub sections are designed to be "free standing", in the sense that they cover all of the relevant material. This does, however, result in a degree of repetition and overlap between sections.

The final section:

This consists of a series of appendices that represent what might be called "raw" data and observations, and, hopefully, provide the reader with some insight into our reasoning processes.

Appendix 1: Relevant activities for industries with aparently little use for CIT.

Appendix 2: Development of training resources: worked examples.

Appendix 3: Two case studies of delivery of the CIT training component in YTS.

Appendix 4: Issues and opinions: Collected opinions on Good Practice.

GUIDE TO PART TWO

Policy Recommendations:

This section outlines our recommendations and proposals for the development of CIT in YTS. It has been organized on a text and commentary basis, such that recommendations and rproposals can be given in the text, while further detail and supporting evidence are given in the commentary. This gives the general reader the opportunity to follow the recommendations, with just an outline of the supporting arguments; while at the same time, those interested in the detail can have the opportunity to examine our arguments more closely.

The recommendations relate to the following areas:

- Aims
- Design and Content
- Development and Dissemination

The recommendations relating to a fourth area (Standards, Accreditation and Progression) are presented for the sake of completeness, but as this is the subject of a separate report (Report 4) further details are not given here.

Appendix: Support for the adoption of a `broad view' to IT training; the development of an `IT capability'

Finally, because the adoption of a broad approach to CIT education and training is fundamental to the strategy underlying our recommendations, arguments in support of this view are presented at greater length in this Appendix.

A INTRODUCTION:

This report is the third in the series of information papers produced as an outcome of a research project looking at Computer and Information Technology (CIT) in the Youth Training Scheme (YTS). The information and opinions for this report were gathered during a series of interviews about "good practice" conducted with trainers, scheme managers and workplace supervisors from June 1986 to September 1987. As with all of the information series papers, this report aims to contribute to the debate about CIT education and training, and the authors would welcome comment on the issues raised in this report.

This document aims to present a synthesis of the views and opinions of CIT practitioners in the field. In common with most educational and training areas, it is not possible (or desirable) to express a prescriptive or algorithmic process that will guarantee "good practice" on all occasions and in all circumstances. In place of this we are able to offer pragmatic and empirical advice that we hope will provide a sound basis for decisions made about CIT training practice by trainers and managers.

One of the major questions that should be addressed is concerned with the overall reason for maintaining a CIT element in YTS training. A common analogy given for IT training is that with the ownership of car driving skills: with a limited number of eminent people who have chauffeurs (1), a larger class of owner/drivers, and a mass of people whose motorised transport is under the control of bus companies (2). To chase the analogy still further, the present trend in the use of computers is for a growing class of "owner/drivers", who need flexible and direct control of their own processing (3). These users would not be "builders

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1 People who nevertheless need to be able to give clear instructions about destinations and routes, as well as having to bear in mind that the pursuit of competitive markets might involve travel over terrain unsuitable for limousines but accessible by motorbike.

2 These people are often not in a position to negotiate routes, timetables or destinations. This is left to transport experts.

3 A recent NCC survey projects that data processing staff will decrease by 23% 1986-91 as more departments move towards "online" data entry. In the same period, network and support staff are projected to increase by 81%

of roads" but would probably need the services of a department that combined the roles of "traffic policemen" and "automobile association" (4).

The ever reducing cost of computers and software will tend to expand the cost effective use of computers to ma y more industries, to a wide section of the work force. The driving force for this process would be the traditional business need to increase flexibility and effectiveness and so be better fitted to survive competition. There are two major, training related, reservations:

- the strategic implementation, by a company, of the wide use of computer systems without adequate consultation and training would lead only to problems (5).

- the cost of training and staff development would often be seen as a prohibitive barrier (6).

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4 "Companies now want end-user support personnel who can liaise with the user departments almost like internal consultants. These people will provide guidelines for users and hold their hands. They won't actually build the systems, but they will be the prime interface between the user and the development teams" R.Firth, NCC, Computing, October 1987

5 Examples:

The supermarket chain had installed a system for stock and warehouse control for all of its branches, based around previous year's consumption figures. Late in March, store managers became puzzled and then irate as huge stocks of goods were delivered to their stores. Nobody had told the computer that Easter was a moveable feast.

A dairy farmer had installed an animal feed "stock" control system. When the stock of items fell below a preset minimum level, orders for goods were automatically printed out by the system. These were collected by the farm secretary and given to the farmer for signature (usually at the end of a long day). Nobody had told the computer that the unit of order for feed had been incorrectly entered as 1 Kg instead of 50 Kg.

6 As a rough estimate, commercial adult training in the use of common PC packages is often over £150 per adult per day. This training is often not in the context of the program/systems eventual use by departments. YTS CIT training is comparatively cheap, the most expensive training found came to roughly £200 per day for a group of fifteen trainees and two trainers.

That computers will make an ever increasing impact is, therefore, a consequence of economic factors as much under the average citizens control as an approaching ice-age. A factor of great importance to many educators and trainers is the amelioration of the preceived tyranny that widespread computer systems might bring. The social "Big Brother" implications have often been recounted, so we will look instead at the commercial ones: from the examples given above, how much time and money would have been saved if someone had looked at some computer output and said "Wait a minute! Someone has given this stupid machine the wrong information ..."

On the contrary, if you happen to complain about the output from a computer (for example to a credit card company or a bank) it is common to get the answer "if it is on the computer it must be right." This, then, is the root of the tyranny; the citizens belief that computer systems are not susceptible to human fallibility and are beyond human criticism. This belief can be broken through by the exposure of the working population to the familiar use of computer systems, enabling them to develop confidence and capability, and practical knowledge of the fallibility and weak links in the system. Workers who are, therefore, qualified to participate in the negotiations about changes in working practices: adopting neither an unthinking acceptance nor an uncritical opposition.

That CIT is not always immediately applicable and/or highly visible in some industries has led some practitioners to doubt whether their trainees should have any CIT training. Counter arguments and examples of relevant CIT activities in a number of such industries are given in Appendix 1.

A fuller, more developed argument about the need for CIT in YTS, and the importance of developing the `IT capability' of every trainee is given in Part Two of this report. The remainder of Part One will focus upon "good practice" in CIT in YTS.

"Good practice" is taken here to cover three major elements:

- Effective training: which will include considerations of the resources, the means by which training takes place,the methods used and the standards of performance.

- Suitable content: how the content of a course might be `tailored' to match the trainees current and future industrial and domestic needs. Cognisance also has to be taken of the trainees prior learning and experience in CIT.

- Support policies: these are taken to cover the provision of resources, course and staff development to facilitate effective training.

A hidden, but important, aim for `separatist, CIT training in YTS should be that if the policy and process is successful, it will become progressively integrated with vocational training. The CIT-related competences of occupational users/operators would be subsumed in their "normal" training. This constrains the provision of CIT courses away from those that concentrate exclusively on computer centred topics and towards those that concentrate on the use of practical applications. This means that the experience, training and use of computers by trainees should be as integrated as possible with normal work activities.

- This means that CIT experience ought not to be treated as a separate and isolated provision, nor treated as an insular expertise.

- Off job provision of CIT ought to reinforce and establish the development of vocational skill, knowledge, effectiveness and enterprise.

- Skill and exposure to CIT at the normal place of work ought to be recognised and developed. Such exposure should provide part of the foundation of the off job training.

YTS trainees, in general, are destined to be **users** of Information Technology systems established and supported by other professionals.

- This means that the major thrust of their training ought to be within the framework of competences that involve the processing and communication of data.

- Information processing is rarely a simple process of transcription of data from paper to computer, or vice versa. It will generally involve some degree of resolution of ambiguity, irregularity and error.

- The processing skills that trainees are exposed to ought to involve an element that concerns the resolution of such problems and irregularities (simulated for training purposes) in the **context** of the trainees occupation and calling upon the trainees specialised occupational knowledge (7).

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7 "Training to use microcomputers in offices: a survey", (MSC R & D series 38, January 1987) found that a highly favoured mode of training for departmental operators involved the user in "problem solving" exercises supervised by an experienced user.

Once the basic capability to process effectively given data has been attained, tasks that develop more sophisticated skills should be introduced:

- Tasks that rely on the collection and processing of (workplace) data as a case study of particular computer applications.

- Tasks that rely on trainees working co-operatively and effectively in a team to produce some form of result to a given deadline.

It should also be recognised that good practice is rarely sustained if it is not supported by established scheme and national policies. These could include:

- national and local policies that identify and recognise sites of good practice in CIT training

- scheme policies that support and recognise good practice

- participation in wider resource and support groups.

In addition to our discussions of good practice contained in the text, we would also like to draw readers attention to Appendix 4, where a range of comments are quoted directly from other participants without comment or interpretation from ourselves. Remember also that Part One of this report is intended to stimulate **debate**: it is intended as a `working document' for the field. As such we draw no conclusions, that is left to Part Two.

B POLICY AND SUPPORT FOR GOOD PRACTICE

1 The scope of CIT policy

A key requirement of any scheme's CIT policy is that it provides the foundation for good practice in CIT. It should enable the development of an effective CIT training provision closely matched to the industrial and personal needs of the individual trainees.

In practice, this will require a synthesis of separate CIT elements. The overall policy for the scheme might, therefore, consist of a set of individual policies to cover areas such as:

- initial assessment of trainee's previous CIT exposure and achievement
- recording CIT competence that occurs as part of normal working
- negotiation of access to CIT and IT competences at the workplace
- scheduling of groups to facilitate industrial relevance for CIT
- provision of a pattern of certification to suit the abilities and needs of individual trainees
- provision of a structure for the review and development of policies, staffing, course content and course effectiveness.

These are likely to be bolstered by other policies to take into account local factors (such as participation in support groups, liaison with schools, liaison with industrial support and training groups).

2 Support :the key role of the manager

The role of the manager is seen as central to the provision of long term "good practice". The manager is here taken to be the person with responsiblity for resources, staff recruitment and development as well as course development.

In the short term it may be possible for a scheme to provide good training practice that is not inherent in the training arrangements, but is "owned" by good practitioners within the scheme. Without policies for support and recognition for the good work, however, the good practice goes when the good

practitioner leaves (8).

It has been noted that the loss of CIT trainers is not usually a problem where the scheme manager is a competent and regular CIT user. In this case, the manager is able to develop, recognise (and reward) good CIT trainers as well as to provide a wider basis for CIT competence to be acquired by trainers in other non-CIT areas. Schemes of this types are often net providers of CIT training to other schemes, which serves to enhance their commercial viability.

In the case that the CIT provision is external (i.e. FE or private CIT training) the manager's competence in CIT enables the negotiation of content, level, industrial relevance, certification etc appropriate to the needs of the trainees as perceived by the trainer. Several umbrella scheme managers have commented that these negotiations are difficult unless the FE YTS coordinator also has access to someone with CIT competence. This can often require the FE CIT tutor to be present for the discussions concerning the provision of CIT.

The knowledge of CIT, therefore enables a provision of training that repatriates the training element concerned with computers into the mainstream of the training provision, rather than having it as a remote and unresponsive block.

This is not to say that CIT training can **never** be successfully provided as an external provision, but that the provision ought not to be regarded as a recondite and closed domain but that it should be susceptible to the same process of negotiation and specification as any other training.

3 CIT competences at the workplace.

It is necessary to negotiate (and recognise) the CIT competences that can be realistically overtaken by the trainee in on and off job training and during work activities.

Regular users: For trainees who are regular users of CIT,

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8 This process has been remarked on by the LANAC report, 1984; by the ACL project Northern co-ordinator and has been a recurring theme of our research.

One manager of an ITec explained: "In training and education the high pay goes to those with the longest service. Many computer trainers are young, so the lure of more money and a company car is very strong."
The provision of specialist CIT trainers will become increasingly difficult, as they often have the same scarce combination of skills as "user/system support specialists."

many tasks that occur as part of his or her work can be identified by the workplace supervisor and CIT trainer as having an inherent "training value" that can be credited towards attainment of one or more competences. The performance of these activities could be observed by the usual workplace supervisor as part of the normal supervisory duties.

Casual or non-users: If the trainee is not a regular user, access to some of the CIT applications which are available at the work placement ought to be arranged. Access may be limited to a demonstration, but it has proved possible for some placement providers to make some practical data-processing work "in the computer room" available to all of their trainees.

Many schemes have trainees who regularly use computerised tills, bar code readers, organizers; sometimes without appreciating their significance for CIT. It is often the case that many of the normal workplace tasks peformed by trainees have some kind of CIT training value, they are often so familiar to them that they are unaware of their CIT nature.

Even where there is no specific CIT application available at the work placement, there is usually an application of Information Technology (taken here to mean information systems not making use of computers). This provides scope for "work based projects" in CIT, where the work placement supervisor (usually in connivance with the CIT tutor) initiates (and receives a report from) an investigation, project, or activity from one, or more usefully of a group of trainees working co-operatively together (9).

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9 It would be possible to use these as the basis for investigations of the ways that CIT might be applied to "solve" an information problem. These "investigation" tasks, with a CIT perspective, can often be prompted by a question :

How can we keep track of clients who owe us money?
How do we know how many left-handed-widgets to order this month?
Why do we waste so many bricks,mortar,sand etc?
Can your blasted computer show me how I can cut more gingerbread men from my pastry? (Jackets from cloth, roof felt from roll etc)
What would be the best way to plough that headland?
Why do we end up with so many pallets stacked up in the store?
Why can't we have a written cleaning schedule for the kitchen?

Most people can make up investigations like these, others can be developed from quiet discussions between the CIT tutor and the supervisor at the placement. One problem with this approach is that it is very easy to come up with very difficult problems, much beyond the capabilities of the trainees. (Could you use your computer to work out the fastest route to the town centre?)

4 Industrial perspective in CIT training

Computers are general purpose "tools" that have application in almost every field of human endeavour. In the commercial world they are generally applied to the processing of information; either in the form of text, numbers or as "records". These numbers, text and records are directly related to the nature of the commercial enterprise and any productive use of computers will be within the context of this type of information. For this reason (but amongst others), the most valuable and valid practical CIT activity on a course will be the use of computer programs to process data that is in the context of the industry of the trainee.

In practical terms, the training reinforces, and makes use of, an industrial "vocabulary" which is familiar, common ground for the trainees. This provides opportunities to integrate CIT training and activities with training in other skill areas. This can have major implications for the trainee's motivation but, more importantly, it takes the focus of activity away from details of the computer and program themselves and puts it into relevant context of industrial applications.

The nature of the "relevant industrial application" is not always clear: clerical workers in a shoe factory? Canteen workers in seed merchant? The criterion should be that the training should refelect and reinforce the industrial concepts and vocabulary appropriate to the future area of employment of the trainee. While it is often desirable to establish such links with an industrial context, it may not always be appropriate to do so. A fuller discussion of this issue is given later in this report.

The emphasis on the trainee as a **user** of computer systems is important; this classification would tend to preclude activities that are more appropriate to **programmers** and **office system analyst** roles. So activities that start with "write a computer program that ..." and then go on to specify

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Feasible investigations will have some elements of data collection, recording of information, interviewing people, possibly letter writing and telephone techniques, as well as co-operation and group skills. The outcome ought to be some form of wordprocessed report to the placement supervisor.(This can help give the project more importance and credibility in the eyes of the trainee.)

FESC produced a series of CIT work based projects in 1986: a free listing, together with information about subsequent work on work based learning, is available from FESC, Coombe Lodge, Blagdon, Bristol BS18 6RG.

an industrial scenario are not appropriate to ordinary YTS trainees, and the industrial relevance of such tasks is specious.

However, after the "core" information skills have been covered, it may then be appropriate to arrange for the trainees to tackle more sophisticated tasks, appropriate to analytical staff, such as setting up a simple database or an information system from a specification and providing a report on the design.

When the manager is arranging CIT courses (either "in house" or externally provided), he or she should have available the training plan for the course; which should include example tasks and print out from them. The print out and planned activities should be seen to reflect realistic practical use of computers in the context of the industry of the trainees. There are occasions when this will not be appropriate, e.g. sometimes the trainer feels that some "entertainment" is required after a long, difficult task. The trainer feels that the trainees are not motivated by their chosen industry and that other areas are more fruitful. The justification for these would be included in the plan.

Groups of trainees from a mixture of industrial backgrounds present a difficult problem as they may require several training plans, one for each industry. This often nappens when courses for trainees from an "umbrella" scheme are set up. To overcome this problem, some FE colleges set up a series of CIT courses each biased to particular industries and available to scheme managers for "in fill".

It is often the case that the process required to develop valid industrial contexts is time consuming and allowance (including time) should be made for such development. [This theme is taken up again in Section C 2.6. See also APpendix 3.]. Professional CIT trainers are well able to fulfil the analytical and installation roles to provide such resources; non-specialist CIT trainers, who are nonetheless expert in their occupation, will have more difficulty with the technical and analytical side, but are able to provide material that is generally industrially valid. There would, presumably, be no great difficulty for the professional CIT trainers in a college to develop "industrially relevant" courses for a group of trainees that were all from the same industry.

5 Certification: Accrediting Achievement

The whole area of standards, accreditation and progression is probably the key to the establishment of `good practice' in CIT in YTS, on a widespread rather than a partial basis. Certainly one of the conclusions of our previous report "Survey of current practice in CIT in YTS" identified that

"attempts to use an external qualification could often be seen as a touchstone of seriousness of intent about CIT". Given the central importance of this area, the whole of Report 4 is devoted to this issue (part two of this report also outlines our recommendations on accreditation and progression). What follows then are just a few general comments about certification, for more detailed arguments and discussion of the merits of different approaches to accreditation and progression the reader is referred to Report 4.

In the context of this report, it will be assumed that trainees IT-related achievement will be accredited either in vocational qualifications (with an embedded CIT component) or else `specialist' CIT qualifications. However, use of external qualifications should not be used as a means to deliver CIT training in a mechanical way - it will still be necessary to review and reflect upon the adequacy of the accreditation process. For example, the provision of CIT, in terms of level and content ought to reflect the projected needs of the traineees and the industry rather than just the requirements of the "usual" certification process. Hence it may be advisable for some providers to exercise their option to adapt syllabuses, modules etc. to achieve a more appropriate "match". Qualifications are increasingly taking account of work-based learning. Hence some competences may be achieved through trainees carrying out their normal working activities and if this is judged not to be possible, it may be possible for the competence to be demonstrated and accredited during off the job training.

Accreditation of performance and CIT certification represent the end point of a training process. Many routes to these end points are feasible, each one potentially providing an enrichment of experience, knowledge and skill. It is, however, possible to provide a course for CIT constrained to fulfill the **letter** of the accreditation process in the shortest time and at the cheapest cost. These courses would tend to be industrial content free (to make them of more general applicability) and, therefore, offer a narrow experience of CIT. An experience that "fulfills the requirement for CIT but not the need" commented one MSC Area Office staff member.

The requirements for CIT provision should be identified **before** a certification scheme is matched with them. In practice, this will usually mean that preparations have to be made for several levels of certification to be available. This has a commercial dimension too. How many fees for registration to certificating bodies must be made to provide a range of certification?

Some trainees have an aptitude for work in one application area, (e.g. some may be particularly competent at

wordprocessing), so "advanced" certification in that one area should be feasible. Although care should be taken that this does not compromise the fundamental aim of `developing an IT capability'. Specialization needs to be built upon and complement a broad approach to IT training, not replace it.

If a trainee is a regular user of CIT at the workplace, this ought to be reflected in the level of certification that is obtained. The reference from the placement may be a sufficient recommendation for some new employer, but others (will) require certificates as evidence of proven skill. In these circumstances, a profile of CIT experience and achievement may also prove useful.

Some trainees will join YTS training with considerable experience of "computers" or keyboards, and this information can have major implications for the type of certification scheme to be undertaken. Trainees who demonstrate competence or have evidence of prior acheivement ought to have this competence credited quickly and move on to other CIT skills.

Most industries are currently seeking to define occupational competence, with standards of performance established for the most common occupational tasks, using their everyday (not necessarily CIT related) working skills. The assessment of these skills at the place of work, is intended to be the province of the normal supervisory staff; this, in itself, may revolutionise some supervisor's attitude to training. When establishing an `IT capability' is recognised as a necessary component of occupational competence, then the need for special certification will disappear.

C TECHNICAL AND PRACTICAL CONSIDERATIONS

This section aims to give a more detailed consideration of some of the practical techniques and issues relevant to the provision of CIT training in YTS.

1 Use of CIT at Work

1.1 Types of exposure to CIT at work

The trainee's work placement experience will have major implications for the mode and content of relevant CIT training. It is possible to make a rough classification of the trainee's exposure to computer and information technology under four headings. Each placement and industry would provide a different pattern of experiences.

Regular use of CIT as part of job: these trainees make significant use of computers at work. Their work may not neccessarily consist exclusively of work with computers and it is likely that they will have a variety of other duties that are not related to computers at all.

Infrequent use of CIT as part of job: trainees in this group only make infrequent or minor use of computers as part of their work. These uses will generally consist of data applications, for example indenting for stores. Many industrial placements have computerised ware-houses, where all supplicants for goods have to fill in a request form, or request screen using a computer terminal.

Other industries, such as motor trades, are developing the use of computerised analysers and diagnostic equipment. (One trainee was told by his supervisor that these worked best if "you gave them a good bash on the top") This area will increase in importance and sophistication as the vehicles become more complex.

Trainees see CIT processes being used as part of job: there are many computer applications in the commercial world that trainees observe in action, though they themselves have not the seniority to become directly involved. These would generally be routine supervisory clerical functions such as the production of attendance lists, progress reports, budgets etc. Many of these may be done at the moment using paper, but they are likely to be transferred to some form of computer system as businesses become convinced of the cost benefits.

Other applications of this type might involve the use of equipment that the trainee is not (as yet) qualified to operate (e.g. programmable welding and spraying equipment, some combine harvesters).

Trainees see product of CIT process as part of job: in this group the trainee sees evidence of the use of computers in their industry. This is usually as documentation and forms, which either provide an invoice or a data entry form. For most data entry forms, there are usually instructions to the effect that handwritten information must be legible to the data processing personnel.

Other applications might concern the use of large computers to provide information systems (e.g. PRESTEL, SEAQ) from which decisions, bookings or plans might be made.

Considerations of the exposure to CIT at the placement might indicate that in some placements the CIT training, for trainees where there is extensive and regular use of CIT, may be feasible in a fashion which simply records and credits competence that develops as a consequence of normal work. This is generally regarded as the most efficient way of developing skills of direct industrial significance, given a supportive supervisory framework (10). For trainees at placements of this type only certain topics and skills need be withdrawn for study and practice elsewhere, though it is common for schemes involved with these trainees to provide extensive off job CIT courses. The off-job training being seen as complementing and underpinning their CIT work activities.

Trainees in other placements and industries which presently require little use of computers may need a training provision, remote from the place of work, of the full range of practical experience of computers.

The major distinction between YTS trainees in terms of their CIT experience would appear to be between those making regular or continual use of computers at their placement (and therefore developing practical work-based competence), and those making rare or casual use of computers.

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10 The accepted modes and stages of training for an industrial skill are often given as :

Introducing and covering the necessary theory of the industrial process in a training room.

Practising the skill, to acceptable industrial standard, in a training workshop under direct supervision.

Performing the skill in an industrial context at the place of work, with commercial constraints of time and quality.

The first group will consist mainly of trainees employed in clerical roles across a wide range of industries (although there will be a significant section of trainees who will be based in retail placements). This allows for the provision of off job training, for these trainees, to be concerned with the further development of computer competence in the general clerical (or retail) area.

Casual users, who form the majority of non-clerical trainees, have few opportunities to develop practical competence at their workplace. (Such opportunities as exist, however, ought to be planned and ways sought to profit from such experience). These trainees will be the group mainly catered for by "off job" training courses, usually away from their workplace.

It is likely that one of the main uses of computers for casual users, at the workplace, will be in the performance of tasks that have a clerical or administrative nature (e.g. wordprocessing and data entry). These tasks are likely to be of increasing importance to general workers due to the continuing trend for data entry tasks to be done at "departmental" level, and not by dataprocessing staff.

Other industrial uses of computers based on particular hardware (e.g. microprocessor control etc) are unlikely to be part of off job training for YTS trainees ([11]). This use is more likely to be carried out at the trainee's workplace, if the trainee is expected to operate, or work with, the equipment.

In summary then, trainees CIT experience at the workplace can be seen as involving either continual or casual use.

Continual or regular users: where substantial use of CIT is made at their place of work, and the trainees develop direct practical skill. The percentage of CIT activity that qualifies a trainee as a continual user is a matter for dispute, but this does not invalidate the classification. Their use of computers is not necessarily the only part of their job, they may have a variety of tasks that are not directly computer related at all.

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[11] The argument usually given is that this is for "sound" commercial reasons; the cost of the equipment is generally so high that in order to make its use cost effective it must be in productive use for a high proportion of the time. Any "down time" budgeted for is usually taken for maintenance and repair. It is unlikely that "unproductive" uses, such as training, will be budgeted. There are several counter arguments to this, mainly concerned with the perception of the "unproductive" nature of training.

Casual or occasional users: who use computer applications only rarely, if at all. This use might be involved with some form of periodic report, budget, or target. It may be the use of a stores computer to indent for materials, communicate through an information network, or a more particular trade oriented hardware-based application. In general applications that are ancillary to their main duties.

However, a further distinction should be made about CIT use by continual users, according to the range of their CIT activity. Continual users making use of a single computer application, and those whose job demands use of a variety of applications. Thus our final differentiation is between single application continual users, multiple appliciation continual users and casual users. The CIT provision for each of these groups will now be considered in greater detail.

1.2 Single application continual users

These trainees tend to operate in areas where each individual task is of short duration and their experience is limited to a single application. For example:

Dataprocessing: Trainees may undertake some sort of interrogation of an information system or a database to match particular criteria: checking credit ratings; updating stock control transactions; amending stock control records etc.

Wordprocessing: Other trainees will be in what was the "typing pool" but is now more likely to be a Wordprocessing Local Area Network. These areas traditionally have a high reputation for trainee support from the supervisor. Some of their tasks are not "short duration", as they may involve processing lengthy documents.

Number processing: Some trainees are to be found using "bookkeeping" or accounts type applications, but the most numerous are those involved in retail schemes.

Certain other CIT applications can be included here, probably the most important being electronic tills and laser bar code scanners. The operators perform short duration tasks with them. The equipment usually has a pre-programmed training mode in them, as do many retail computer applications. Some shops have a policy of giving a supervised "till lesson" to operators (even the regularly employed staff) who make more than a small number of mistakes at the till. This generally means that the practical training for these devices is done at the work placement.

Training needs at the workplace: Many office based trainees would learn certain practical skills (keyboarding, changing paper or ribbon in printers, strategies for backups,use of operating systems etc) as a consequence of their daily work.

Many of these trainees have a common clerical or administrative background, irrespective of the industry in which they work.

One of the main features common to workers in these areas are the types of transaction that they perform at the computer or terminal. It is worth looking into the nature of these tasks to get an idea of where the likely problems are and to use them as a pattern for relevant activities for "casual users". These short duration tasks often fall into three phases.

- A "question" phase: where the information to be processed is abstracted form a piece of paper, a telephone call, or talking to a customer (12).

- The "keyboard and VDU" phase: where the essential information from the request must be accurately transcribed via the keyboard into the computer. This process requires analysis and interpretation of the information supplied, and often some form of prioritisation of search criteria.

- "Output" phase: the outcome of this phase is usually some form of "answer"; whether it be an altered database, a printed invoice, a handwritten note or a verbal list of alternatives. This can often lead to new

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12 Here are some examples of "information to be processed" chosen from areas that are likely to be from "human" requests:

"Is there a Cosmic Express holiday in Taramasalata for the third and fourth week in June? How much is it for two adults and a child sharing a room?"

" Have you a comprehensive policy for a blue Granada Ghia 1987 for under £200?"

"This is the list of stock for transfer to Manchester. Print out the docket, check the availability and the stock locations."

In the real world the information is seldom in a form that allows it to be "simply" typed in; putting information into a logical order and some interpretation of intent is often necessary. Sometimes the data is "prepared" by having the information to be processed put into a data collection form.

However user-friendly and artificially intelligent the software, this process is likely to remain. "Natural Language" parsing and query systems will, of course, become universally available eventually. One writer ("Computations from the English") estimates that it will be the turn of the century before the equivalent of a paragraph can be reliably interpreted.

or modified queries if, for example, the search ends in some form of "failure".

The task is seen here to be quite a sophisticated process; involving comprehension, prioritisation of criteria, accurate transcription and formulation of an appropriate response. The use of the computer (keyboarding, use of program commands etc) is a comparatively minor part of the transaction (13).

Training needs away from the workplace: Trainees in placements of this type often have highly developed keyboard and accuracy skills. As one might expect, they may not have been exposed to a breadth of CIT applications but they are capable of "high level" certification in their specialist area. The development of the "breadth" of CIT is one of the possible uses for their off job training.

Part of the off job provision might be geared to the development of more advanced operating skills than they presently require at their work place.

Some "transactions" that form part of their work are transparent to the user (e.g. the communication link to the remote stock control computer and database) until "something goes wrong". One of the features of their "off job" training ought to be concerned with "problem solving".
One essential element of this being "problem classification"

- Do I try to fix it myself? (I know how to change continuous stationery).
- Do I ask somebody else? (The computer tells me that the hard disc is not ready).
- Do I call the boss? (The data from head office is garbled).

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13 In the retail use of computers, some of the details of the process will differ, but the outcome and the dependence on product knowledge and communication will be the same.

Tills and cash drawers that work as peripherals for microcomputers are available and will probably be of increasing significance for small shops and the retail schemes that provide them with trainees. Some large shops use small, hand held, computers for stock recording. These devices are quite sophisticated computers, some even have the capability of acting as terminals for larger computers or information systems such as Telecom Gold.

1.3 Multiple application continual users

These trainees have work which demands the use of many applications, they engage in similar activities to those of the "single application users" but often the output from one of their tasks acts as an "input" or question for the next task (14).

Trainees in this type of placement become very skilled, as might be expected, in a range of applications. This means they ought to have a certification scheme that credits the spread of their skill.

If they need "off job" training, it should focus on the capabilities of CIT systems: the design of information systems and databases would be realistic aims for this group.

Trainees of this type often have a clerical background but, as the systems become available, trainees from other industrial areas will fall into this classification.

Many of the "continual user" trainees will be based at ITec schemes for their training, so they will have the chance to broaden and develop their skills (if necessary). This means that they are exposed to much more CIT training "off job" than non-Itec trainees.

Other trainees of this type are based on LCU clerical schemes with one or two trainees working in the various offices of a large and distributed company. Some of these trainees do not have a separate CIT training provision, but rely totally on the supervisors and co-workers for training in CIT. This has the disadvantage that if the CIT training provision at the work place is not properly planned it may

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14 This is a slightly artificial example of the kind of multiple transaction that may be possible.

We had a phone call from that house in Orchard Road reducing the asking price by £5000 for a quick sale. We are not the sole agent for this property so we must act quickly.

Update and reprint the information sheet for this property with the new price, on the desk top publishing program.

Check the database to see if any of the buyers there might now be interested in this property.

Merge the list of the buyers with the wordprocessing program and send them out with a copy of the new information sheet.

lead to a narrow exposure to a limited range of skills.

Some umbrella schemes that specialise in small business placements have groups of trainees of this type. They often remark that the CIT skill introduced by the trainee has become vital to the company; the company cannot afford to let them leave at the end of their training. This injection of CIT competence into businesses seems to have been a valuable outcome of YTS training.

(One trainee of this type, at present in the second year of YTS training at an Itec, drives a company car and is often made solely responsible for the companies trade exhibitions in Europe.)

Many of these training providers have noted that computer use in small business is not common at present. However, the balance of cost effectiveness for computer use in small business is rapidly changing, so one would expect that trainees from clerical and administrative schemes will increasingly be called upon to use computers at work.

1.4 CIT provision for casual users

The use of computers is rapidly becoming part of almost every commercial activity, and it has often been observed that, in the future, very few occupations will exist that do not have some sort of computer use. Many of these uses will be concerned with particular equipment with some form of built in computer control. (e.g. tractors with microprocessor control systems). The use of these will be peculiar to each industry, and there is a good chance that the users would not recognise that they were, in fact, using computers.

The computers used for Information Technology will, it is predicted (15), have recognizably the same form of keyboard and some form of display for some time yet. In addition, some form of memory and storage device will be required. If this memory is extensive, then some form of file and directory system will be necessary to identify particular data items. These factors ensure that there will be software that performs similar functions to programs today.

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15 Notwithstanding the development of the `mouse' and restricted vocabulary voice systems.

The majority of YTS trainees are probably "casual" or "occasional" users. This is taken to mean that they either do not, at present, use computers at work, or make use of them only rarely. They are likely, however, to observe the use of computers at the workplace and they are likely to participate in processes which have some computer involvement. As such, although of necessity most of this CIT training takes place "off-job", it is still often possible to make links with activities undertaken at their work placement.

A further link is that CIT will most likely form part of their working life if they are required to perform administrative and planning tasks. This would usually mean they would have some form of supervisory responsibility ([16]), where they are expected to organise tasks.

However the requirement for computer competence arises, be it from promotion or from a change in the nature of the work, there will be some common features to the computer activity of occasional users:

- Casual users will not be as efficient as full time operators of computers in carrying out simple operational tasks. They will not use computers often enough to develop fast typing skill or un-thinking proficiency in using programs.

- However slow their keyboarding may be, the data that they process will have to be transcribed as accurately as any other operator. Any non-trivial commercial process depends upon accurate data and communication.

- Casual users will have to follow established office procedures for making backups of data, naming files and directories, and other "data security" activities.

User requirements of computer systems: it is noteworthy that casual users will only be able to make profitable use of computer systems that are competently managed and installed ([17]). They would expect to have systems arranged so that they

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[16] If the trainee will never be in a supervisory capacity, then experience of computers applied to the problems of the workplace could still help to give insight into the way the industry works.

[17] This begs the question of who might be expected to perform this "office system" work. The interface between users and specialists is of particular interest to the Computing lead industry body, who are seeking to make recommendations about competence objectives for both groups.

had very little to do other than the direct processing of their data, text or message.

- This would mean that application programs should load automatically from a batch file, menu or shell, on "booting" the system.

- The programs chosen for their use would be replete with "on screen" guidance and contextual help.

- It would be the responsibility of somebody to allocate them file names, directories and storage space.

1.5 Common basis for CIT applications

Aims for casual users: the overall aim of CIT training ought not to be the development of a high degree of skill rooted in the use of just a few applications packages, but rather to the development of skill and accuracy in the information processing elements common to all computer applications.

Occasional users, by their nature, will be expected to use computers infrequently, they will not be able to remember the minutiae of the way that complex business a packages operate as these details disappear quickly without regular reinforcement. The skills that they develop ought, therefore, to be devised so that they have a reasonable "shelf life". Their use of computers is likely to be an important part of their work and may be crucial to their ability to fulfil the variety of roles that is increasingly necessary for employment. Their transactions with the computer can, therefore, not be expected to be as time efficient as those workers who make continual use. They are likely to be slower at keyboarding and to require more guidance from the program. They will, however, be expected to work to the **same degree of accuracy** as continual users. This requires that their accuracy of working is a major focus of their training in the use of computers. A major outcome of CIT training should be a knowledge of the accuracy attained by the trainee working with computers.

The elements common to the use of computers can be worked out in detail, but it would be sufficient here to list some of the most basic skills. Coverage of the more advanced features of applications programs would still be valid if they provide ways of automating and enhancing the simpler skills.

Aims for continual users: the same general principles mentioned above still apply, although the extent to which breadth and/or depth is sought is relation to particular

applications will depend upon the nature of their CIT experience at work, the type of accreditation sought and the particular wishes of the trainees concerned.

Wordprocessing: applications based on wordprocessing provide a model for transactions with a computer that require the entry of text in a free form. That is, any text or numbers, in a quantity not constrained by a record structure.

This type of transaction models processes concerned with the dissemination of messages (e.g. use of electronic mail, lists, schedules, reports, specifications as well as letters.)

The features common to all applications of wordprocessing software would be :

- Accurate transcription of text.
- Mutability of text: ability to proofread and correct, ability to change text format to meet requirements.
- Storage, printing or dissemination of text.
- The advanced features of wordprocessing programs generally serve to automate these features (e.g. search and replace, moving blocks etc).

Spreadsheets: These programs provide a model for tasks that involve numeric entry. Some spreadsheets (e.g. lotus 123 v2, VP Planner Plus) do have the ability to process labels (i.e. text), but the widest use of these programs is in the area of number processing.

These programs provide a model for data entry in cash books, other ledger programs, cost estimation etc.

The features common to this application would be:

- The accurate transcription of numeric data.
- Using the results of calculation to make decisions (either to detect anomalous entries or to make "management" decisions).
- Decision making on the results of calculations provided in a pictorial form.
- Storage and printing of data in a suggestive form.
- Setting up schema for carrying out a given process of calculations.
- Replication, macros and other advanced features serve to

automate these basic features.

Dataprocessing: This provides an application that is a model for processes that require data to be transacted not in a free format. That is, data is restricted as to width of "field", type of data (text, numbers, date?) and the overall structure of the "record".

Programs of this type have a multiplicity of applications, from stock control, customer accounts to client records.

Common features of these applications would be:

- Accurate entry of text and numbers in the appropriate field and record.

- Searching and sorting of data under criteria: formulating criteria to answer an information requirement.

- Printing reports from the data to provide answers.

Computer aided design: This application has two major branches: those applications concerned mainly with pictorial, diagrammatic images and those concerned with a mixture of text and pictures. They both provide an arena for creative talent (in the same way that free composition on a wordprocessor might) but their commercial application is usually harnessed to some form of defined product. (e.g. the design of the yearly report to shareholders, the floor design of the proposed house extension and garage, the wiring layout for the caravan)

After the primary (paper based) draft design stage has been accomplished, these programs would provide :

- The transcription and amending of the rough design into the computers memory.

- The storage and printing of the design.

The list of skills is more limited than for other applications because the focus of the activity is the "design" area: creating a working realization of some form of model. The detailed technical development will vary from program to program, but it is likely to make use of non-keyboard input devices such as a digitiser pad, mouse or joystick.

1.6 Collection, origination and editing data.

In the examples above the implicit assumption is made that data and text is available in an unambiguous form: that is, no decisions have to be made about the characters to be typed

in to the computer. It is seldom the case, in the real world, that a series of transactions can be carried out unambiguously from data presented.

Leaving aside problems introduced by handwriting and presentation, the data to be processed is often incomplete or garbled in some way and recourse to professional knowledge is often required to abstract the information into a form ready to be entered into the computer ([18]).

This provides the necessity for other, communication related reasoning, and "problem solving" skills to act as an adjunct to the processing skills described above.

These skills might call upon :

- categorization and selection
(" To fit the container for this export order we need cardboard boxes just a bit bigger than the 57/22/33 but smaller than the 57/43/26.")

- questioning and feedback
("Yes that model does have the HP laser engine. Are you just going to use it for DTP or are you going to need CAD? If you need a PDL it will cost more, but for now you might get away with bit graphics and upgrade to postscript later.")

Trainees without these skills make far more calls upon other workers and supervisors, thus increasing the labour cost of the transaction. (Or more properly, reducing the overall productivity of the operation.)

Considerations of this type lead to the use of a computer purely as a device for processing data. The data to be processed is either directly given or the result of a chain of reasoning. The actual keyboarding phase at the computer

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18 You are in the queue for non-account customers at the building supplier. The man in front seems to be taking a long time.
"I'm replacing my drainpipes and guttering. Can I have some new ones?"

The girl at the checkout patiently elucidates the bore, width, length number, material and even the colour. She calls up the items from the stock control system, gives the ident numbers and prices, tells him what extra bolts and fixings he might need.
"Do you think I'll need a ladder?"

is comparatively minor (19), but the computer and the properties of computer system do provide both constraints and a focus for the activity. It would be inappropriate to try to develop skill at processing these type of transactions without involving a computer system as a final stage.

1.7 Operating systems and office practice

This section deals with those skills necessary to the use of computers in an office environment, where they are use primarily as information processing devices. It will not generally be possible for casual users to make profitable use of computers unless the system is configured and installed with their needs in mind.

The assumption that we have made is that the casual users will be primarily responsible for their own keyboarding and interaction with computers. The alternative is to provide a worker who is responsible for all of the computer use, and does the data input for several others. This tends to introduce a time delay in processing, thus increasing the cost of the transaction as well as providing less flexibility and "redundancy" (in the information sense). [For example, you have to give the operator clear, handwritten instructions. It then has to be processed. The dataprocessing staff will usually have a stack of jobs from other workers, which is either LIFO ("last in, first out") or FIFO ("first in, first out") depending on your seniority].

The time taken, and hence the labour cost element, can be determined (20) for various applications and models of skill. Competent casual users are usually cheaper than having a mix of non users and continual users except for some long wordprocessing tasks.

Casual users should not usually be exposed to the bare operating system environment, but on the occasions where they need access to operating systems they should have a working knowledge of some of the rudimentary commands.

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19 The relegation of the computer to a minor role is proper but this is not to say that the computer is dispensable or that the skills developed are not computer related.

By the same token, the description of a blacksmith's work could be reduced to "banging hot metal with a hammer". The **context** of the activity (How hard? When? Where?) is seen to be the most important part and the skill a result of extensive practice.

20 These ideas suggested by an article in BYTE 1983

Backup procedures: Many operating system commands have a potential for having destructive effects on stored data. ((The value of data is the labour cost involved in replacing it. Thus for a small document it would be trivial, for a large database astronomical). Most of these dangers can be obviated or reduced by sensible backup policies. The time and labour costs involved can be seen as a form of "insurance premium".

Formatting: Possibly the most dangerous commands are those to do with formatting discs. These can overwrite the whole contents of a floppy or fixed disc. Some installations remove the format command from their systems, others replace it with a batch routine that causes the computer to display (or try to) the list of files on the disc before asking if it is safe to format. This problem is also present for operations such as backing up working discs, as the new disc will overwrite the old.

Filename policy: Any exercise which results in the creation of a file (this is usually done by the application program itself rather than by a SAVE command) has with it the possibility of overwriting a file of the same name. For this reason there should be a policy for the user to follow about filenames and extensions. The policy ought to provide for consistent and "suggestive" names and extensions; this makes the "weeding" and archiving of files easier to release disc space.

Most of the disc operating commands will ask for confirmation before proceeding, especially if they are doing something potentially dangerous. It should be a feature of training that these messages are pointed out, read and their warnings pondered.

Auto boot and menus: Applications programs for casual users ought to be arranged to auto boot, or load from a menu or shell. One frequent cause of difficulty for users is the need for changing over of discs. (First the system disc to put in the operating system, then the program disc which may, or may not, need to be resident in the drive and finally the data disc which contains the information.) This can sometimes be reduced by using system discs with the programs already installed. This does not, of course, help the unfortunates using a computer with a single drive. Modern business applications progressively assume the existence of two disc drives, if not a fixed (hard) disc for their full use of their features.

Installation: Peripherals must be properly installed. This means that any of the facilities offered by the program are implemented in the way that the software interacts with the printer (e.g. pound signs, line drawing, foreign accents, sideways printing of spreadsheets). It is probably

reasonable to have the user switch between NLQ and draft quality at the printer end, but they should never be presented with the necessity of changing switches inside the printer or searching for information from manuals.

Several other peripherals (optical character readers, plotters, laser printers, modems) will require installation before casual users can use them.

Printer skills: These are usually concerned with routine tasks such as changing continuous stationery, changing from single sheet to continuous, changing print quality, changing paper quality, replacing ribbons and possibly installing new fonts or daisy wheels. Most printers have their own ways of doing these things which means that it would be very hard to give comprehensive skills, rather an exposure to a variety of techniques.

Media skills: This will usually consist of safe handling and storage rules for handling magnetic media. The newer 3" discs are said to require less care, but few of these would survive immersion in a pool of spilled coffee. The physical storage of media is also important, even more so since the Data Protection Act made it a duty on the registered user to keep files holding information about people secure.

Fixed disc systems at first sight seem to require less care. They must not be placed where they are likely to be moved or shaken when they are in operation. It is also the duty of the last user to park them before switching them off. Backup procedures are crucial as is a regular routine for deleting unwanted files.

Computer communications vertical and horizontal: it is thought likely that an important feature of the next generation of computers will be their ability to transfer data from one to the other, even between computers of different types (mainframes, minis and micros). Many micro systems regard other networked computers as an analogue of their fixed disc storage, so it is comparatively easy to share information. Some companies are planning on computers that can be working on several tasks at the same time (eg the user can be wordprocessing a report while the computer is automatically interrogating, by telephone, a remote computer for electronic mail.)

1.8 "Non clerical" industrial applications

Applications in manufacture: These are usually in the province of computer aided manufacture: for example, industrial robots. The training for these is often done "off job" with the aid of computer controlled models. These models simulate the process so closely that software designed to control the model is said to be directly transferrable to the main computer.

Most users of industrial robots have the requirement that all of the employees who work with them are able to diagnose and act upon any fault condition in the production system that occurs. This implies some knowledge of the way that the system is "programmed".

Many industrial robot installations are not part of a network of computers. It is often necessary for data to be transferred manually between parts of the system. Others are part of an integrated network. (e.g. in computer aided electronic manufacture, as the robot installs parts in the boards, the stock is reduced from the stock control computer. The completed sub-unit is automatically credited to stock.)

Monitoring and control: These applications are common in industries such as agriculture, horticulture as well as other uses of large machinery. The computers used monitor some form of environmental condition (temperature of a green house, speed of a tractor, deviation from a linear path) and either take automatic corrective action or ask the operator for a decision.

Most of these applications have a great deal of electronics concerned with them, but it would not be out of the question for YTS trainees to work at a placement where they had to set up the actuators and transponders for the equipment. The programs used for these are usually written in machine code and stored in EPROM. Monitoring of the system is frequently done with oscilloscopes and meters with digital readouts. This makes these applications very different from the Information Technology applications usually found in YTS, and closer in nature to control technology.

2 CIT Off job training

The majority of trainees will have their main experience of the use of computers in off job training. If this training is carefully and professionally done, it can provide a valuable basis for the trainee's use of computers throughout working life. Some of the considerations of the qualities required for this type of provision are discussed here.

2.1 Allocation of physical resources

This will generally be concerned with the provision of a suitable location for the training to occur and provision for the equipment, including making sure it is available for use.

The room for use in CIT training is not very much different to any other type of training room. The major differences are concerned with the provision of power points for the computers. This generally means that the room must have more than the ordinary number of power points. It is possible to make use of extension cables but these are far from satisfactory for long term use. Extension cables can be sources of arcing and "noise", as well as being a hazard if they are not carefully laid out.

Most trainers find that the best arrangement of computers is around the walls of the training room. This provides the safest power cable run as well as the possibility of the trainer seeing what is happening on every screen from the middle of the room.

A training room containing valuable computer equipment presents security problems. It is not usually a sensible solution to dismantle the computer equipment and lock it into a cupboard, so the physical security of the doors and windows of the room is most important.

In an ideal world, it would be possible to organise CIT training where every trainee had a keyboard to use. This is not always possible for some providers and they usually have some stations where trainees are sharing computers. This in itself provides some problems in the management of learning, in particular arranging tasks so that each trainees contribution to a task is separately credited. Some trainers feel that one computer to one point five booked in trainees is a good compromise figure.

It is not generally appreciated that having a mixture of types of computer in a training room often presents difficulties for the trainer. As far as possible, the computers should be a uniform type. Some trainers have to work with sets made up of different computers assembled on an ad hoc basis, which makes any practical, resource based, work very difficult.

2.2 Allocation of other resources

Any complex training course will require preparation and this applies particularly to computer training courses where information is to be processed. This information takes time to collect and to set up. In fact it is reckoned that one hour of course time will require, for the first run through, an hour of preparation time. This is assuming a fully competent trainer. Subsequent courses will require less time because some of the work will have already been done. This labour cost overhead for courses can sometimes be reduced by buying in course material.

A feature of computer training is the necessity for some form of technical back-up for the computer trainer. This support may, in fact, be provided by trainer time especially allocated to this end. Computer systems that are not regularly inspected rapidly become faulty, and it is possible for a whole set of computers to become unusable because it was thought cheaper not to perform preventive maintenance.

2.3 Course scheduling

The way that a CIT course is scheduled can have a profound effect on the success or otherwise of the training. The course should not be so intense as to provide a brief computer interlude with no external re-inforcement, nor should it be so infrequent that time is wasted covering and recovering forgotten ground.

Several styles of scheduling have been used, each with its own particular benefits and drawbacks.

As a block: This can provide an intensive exposure to the use of computers. It is often exhausting for trainees and on some poorly run courses can show a drop out rate of almost 75% over the block (unless the managing agent has strict attendance control). Poorly planned courses in blocks can offer little chance for change of direction or flexibility, and can end up unresponsive to the needs of the trainees.

Well planned courses of this type can provide a concentrated exposure to the practical use of computers and can drive trainees to a high degree of skill in a short time. Courses of this type will have several contingency paths for trainees to follow, to take into account special needs.

This type of course offers little opportunity to set up projects where data is collected at the place of work, unless the CIT tutor has contact with the trainees in other training roles.

Short blocks: these are typically of two or three days duration, they provide roughly enough time to cover one type

of application. The gap between can be used for the collection of data at the workplace and the experience of computers covers a longer calendar time. The trainer has an interval in which to devise tasks of particular relevance to the sum of the trainees.

Some ground is lost between blocks, but this is generally not too significant.

Day release: Here the trainees attend for a whole day for a series of weeks. The CIT training becomes part of the weekly routine and it is generally possible for the trainer to build up a better relationship with the trainees than is usually possible with block training.

The routine nature of the training has drawbacks as well as benefits; the use of computers loses some of its impact and excitement, tasks become left at the end of one week and then forgotten. The CIT trainer, who if fully employed has five parallel groups of trainees, has a much larger problem keeping track of work.

Part of day: The parts of the day are sometimes as short as an hour, sometimes half an hour. The benefit of this style of training is that the experience of computers is drawn out over a much longer time and so the reinforcement of the skills is better. The hazard is that the loss of time involved in gathering the group and dismissing them at the end will erode a large percentage of the working time. (Unless it is argued that trainees invariably arrive for training on time and have everything put away ready for a prompt exit?)

Total Length of course: How many days of CIT training should trainees have? This is a very difficult question. CIT competence is not generally governed by a timed exposure to a computer atmosphere, but is arrived at after a series of graduated practical tasks using the computer. If the CLAIT certificate is taken as a marker, then it would be possible with a well prepared course and a fully competent trainer to get the majority of the trainees to full certification within a period between sixty and ninety hours.

2.4 Dealing with mixtures of trades

Umbrella managing agencies often find themselves trying to provide CIT training for trainees with mixtures of trades and backgrounds. The simple answer to this problem would be to provide only one CIT course that trainees were taken through. The core of the course could not be based around the practical commercial use of computers but in the minutiae of computers themselves. This would have the bonus that it could be used for all of the YTS/CIT courses provided, making a great saving in the preparation time. The argument against

such a general approach is equally simple: it does not work! Our survey showed that many schemes had tried such an approach and had abandoned it in favour of a more thoroughly applications based approach (see report 2 : "survey of current practice in CIT in YTS"). More acceptable (to the trainees) than a standard, inflexible provision are the following:

- Umbrella\ FE solution : One solution to this problem is to ask the provider to arrange courses for specific trades, the trainees can then be sent to in fill.

- Prepare\buy material for each TOC: This is generally the most expensive option. Some schemes compromise and develop material year by year for each TOC.

- Frame the schedule around common features: Probably the best solution to this problem is to devise a course based around the data processing requirements that are common between the mixture of trades.

Take as an example a group consisting of YTS trainees working as dental assistants, veterinary workers, forestry workers and care assistants. What data and CIT requirements might they have in common?

	Dental Care Asst	Veterinary Asst	Forestry Wkr	Asst
Number	2	2	5	3
Diagnosis "Ailment"	Yes	Yes	Yes	Yes
Keeping Records	Yes	Yes	?	Yes
Writing Reports	Yes	Yes	?	Yes
Cost Estimation	Yes	Yes	?	Yes
Design Layout	?	?	Yes	?

It would therefore be possible to provide a fairly uniform course for three out of the four TOC, perhaps the odd group could be joined with another group.

2.5 Dealing with limited numbers of computers

A frequent problem with CIT training is concerned with lack of equipment. It is generally agreed that no "useful" practical computer work is possible with more than two trainees to a keyboard, but frequently schemes have a situation where they have one or two computers to share between the whole group. This scenario might also include situations where non-CIT tutors are trying to introduce the use of computers into their training. Here are some of the learning strategies that have been reported as useful:

Rotate the trainees through computer activity: This model is useful for training situations where the computer is to be used as an aid to learning rather than focussing on the computer itself. The trainees have the free use of the computer as and when it is needed.

- In some workshops, computers are deployed in each of the workshop departments for use as "aids" for each of the practical workshop areas. The computers are set up to provide menus that allow access to simple "realistic" applications that can be used by the trainees as the need occurs as part of their work.

- Other schemes make extensive use of supervised open learning material in a resource library, where each trainee works (usually with a partner) through an open learning course. Many of these have a component that requires computer use. This, as with most open learning resource library techniques, can make great demands on the librarian/trainer polymath.

Rotate the activity through the trainees: This type of training is more usual where the trainees are working co-operatively on an activity that involves computer use at one stage. The trainees are "called" in turn to use the computer.

- Some activities where the group collects or researches information from their normal training which has then to be processed by the computer, usually as a spreadsheet or dataprocessing application. The work is often shared between each member of the group, but sometimes the keyboard operator is nominated as the "recorder" for the day.

- Schemes that have a lot of premium trainees can spend a considerable proportion of their time on projects designed to reinforce literacy and communication skills. As a gentle introduction to computers, they might have non-keyboard but computer related activities available, with simple literacy development applications at which the trainees can take turns. One scheme produce computer related "board games" such as trivia games based on

flowcharts and keyboard layout.

- Many schemes have their computer component arranged as "one to one" lessons with the CIT tutor (who is often, in these cases, the manager). Some trainees prosper very well with this close personal attention and it allows the tutor to have a closer view of each trainee's performance and problems.

2.6 Creation of relevant tasks in CIT training

How is a CIT trainer to develop CIT tasks that are relevant to the needs of the trainee? Some of the issues involved in this fall into the "policy" area as they concern time allocation for trainer preparation. Training in CIT that is industrially relevant takes time to investigate and develop, and also often requires investment in specialised programs (it is rare that standard application programs can be used successfully.) The retail case study in Appendix 3 illustrates some of the problems faced by a managing agent attempting to translate `good ideas' into practice. The specialist CIT training providers mentioned in the other case studies in Appendix 3 spent considerable time and effort developing relevant tasks and programmes for various occupational groups. A couple of examples of scenarios that trainers might develop so as to give CIT activities a suitable industrial context are also given in Appendix 2.

Prioritisation of applications: some of the models for processing data may be more important than others in some trades, so the trainer must be able to make some sort of weighting of them when the course is planned, and be able to rank them in order of importance.

The trainer might reason that number processing and graphical design are more valuable to some branches of manufacturing industry than, for example, the processing of text and other data. This might lead to a course where the primary focus is on the use of spreadsheet programs and CAD.

It might be considered that communication and text processing are more important in some service industries and therefore it might be decided to cover the other application areas in less detail.

Sources of information for trainers: many trainers build up their own collection of information for use as an aid to the development of training resources. Here are some of the sources of information that were quoted most often as being useful.

Trade journals: Specialist trade papers and magazines sometimes have articles that can be used to develop relevant ideas. (e.g. the Building Trades Journal has a regular

computer column). They often have advertisements for the programs that are available for their particular industry. The details of the specification of these programs can be a useful model for suitable activities.

Other trainers: Contact with other trainers is often a very valuable source of ideas for activities that are suitable for trainees. This (and the method below) was used, with great success in the compilation of the Leicester and Northampton work-based project ideas database, hundreds of ideas were selected from, in a wide range of TOC classifications, to compile the PRESTEL database of project ideas. F.E. tutors have developed similar facilities in a number of different fields, with FEU Regional Curriculum Bases being active in trying to promote such developments.

Skilled professionals in industry: It is usually helpful to talk to skilled workers from the industry concerned, they are often more than willing to give you their views on the uses of computers in their industry.

Who pays for the development time?: Trainers who are developing training material are seldom able to supervise other trainees adequately. If the staffing plan makes no provision for release of trainers for this purpose, then the development must take place outside of normal working hours. Some managers argue that it is part of the trainers job to develop the materials that he will use. Many trainers disagree. A proper training development plan is obviously crucial.

Bought in tasks versus home-grown: The preparation time involved with these tasks (setting up databases, documents, spreadsheets) is often a heavy commitment. This can sometimes be ameliorated by the use of commercially provided tasks. These are never as directly appropriate as those devised by the trainee's own CIT trainer but can usually form a working basis ([21]).

Elements of task development: This is intended to be a brief introduction to the development of CIT tasks. In common with all training, there are a few "rules of thumb" that provide guidance for the construction of successful and valid tasks

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[21] FEU produce Beanstore as a retail exercise. The vocational education division of Homerton College (HIVE) provide courses for teachers that feature the production of material in this form. FMS (see appendix 3) have developed databases for horticulture, agricultu.. and catering. Many publishing firms are also developing training resources, often under the heading of "open learning".

for trainees. Here are some of the "principles" that some of the trainers interviewed offer as advice

- Arrange the tasks so that "easy" tasks and skills are mastered before "difficult" ones.

- Have example data created ready for use. This is especially important if the task is concerned with some form of data collection at work.

- Create exercises that develop one skill (or related set of skills) at a time. Have a clear picture of all of the skills to be developed.

- Make the product from one exercise (as far as is possible) a useful part of another exercise (sometimes in a different training area.)

- Make the exercises at the start (of the development of a skill) very simple and only gradually make the exercises in the sequence more difficult.

- Introduce some deliberate ambiguities and difficulties that require professional knowledge to resolve.

- Get some form of "hard copy" for all of the tasks performed, at each relevant stage. Make sure the "hard copy" has the trainee's name on it.

- Make the instructions for the exercise as clear as possible. Make the language simple.

- Insist on fully professional standards of behaviour, particularly in connection with: disc handling, file backups, storage of discs, filing of printout, protection of discs.

- Many trainers recommend that ideas concerned with the practical use of computers be emphasised. (In particular the skills needed to change paper in a printer, recognise the need for letter quality or NLQ output and other similar tasks).

Finally: A very important stage in the development of the task is the review before and after use. The trainer ought to work through every stage of the task before it is used with trainees. If possible, it should be worked through by other trainers and any amendments made. After the task is used, it should be critically reviewed and shortcomings made good,with any particularly valuable points being noted for future reference.

It is the experience of many trainers and teachers that tasks that are the result of hours of labour and which work extremely well with some groups often fail with others. This is an entirely natural outcome of the fact that training groups are composed of sets of individuals, with individual tastes and preferences. It is often neccessary to have a variety of alternative but equally valuable activities available.

2.7 The desirability of industrial context

Most trainers agree that CIT training ought to be within the industrial context of the trainee. This approach does, of course, involve far more preparation of specialised tasks and material and generally more work for the trainer than if a "generalist" approach (applicable to any trainee from any industry) is adopted. The pay-off is that the training in context is often more effective (22). This has been summed up by one consultant as "If the computer training **can** be done in context, it **should** be."

Trainee motivation: This has proved to be a very difficult area for many trainers. They report that they are unable to interest trainees in the use of computers. Other trainers, with just the same type and industry of trainee report no difficulty. This suggests that the problem lies in the learning strategies used.

There seem to be two threads to the problem, both concerned with the trainees conception of his or her role.

- Coming to a training session away from the work place makes the trainee appear "different" to other employees. Their co-workers and often their supervisor, with whose views they may identify, may have expressed the view that they regard "computers" as a waste of their time.

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22 A review of the records of achievement of a series of agricultural and retail trainees over the last three years indicates that groups of agricultural trainees, taught in agricultural context, "covered" tasks in six days that took ten days for groups of retail trainees, not taught in context.

"Covered" in the sense that the tasks were accomplished to a given degree of efficiency, in terms of accuracy and time taken. The trainer and equipment were the same; the difference being that the retail placement agency did not allocate trainer time for resource preparation.

A comparison of school performance (from the trainee's own CVs) indicated that the retail trainees had, on average, better English and Maths CSE/GCE results. (FMS performance records 1984-86.)

Trainees are thus often apprehensive when they arrive for training. In such situations, establishing a closer link to the industrial context may demonstrate the relevance of the CIT activities, not only to the trainees, but possibly through them to others at the workplace as well.

- Some trainees limit their industrial horizons to the nature of the day to day work that they carry out at their present work placement. They may regard any divergence from this (including training) as a waste of their time, and as a result are often unable to answer straightforward questions about the duties and roles of workers in their industry. (e.g. What does a chef du rang do? Who costs and estimates decorating jobs? Does a farmer have to pay craftsman status rates to a pig man employed as a tractor driver)? This poses greater problems, especially as an admission of incompetence in an area important to one's industry can be a cause for insecurity. The trainee may feel it is far better to pretend that the difficulty belongs to someone else. So if the trainer is able to "blur" the distinction between work and training with relevant tasks in a familiar vocabulary, then there may be less chance that the training is dismissed as `irrelevant'.

Value of reasoning in industrial context: Many of the tasks based on the use of a computer have an important element concerned with the use of communication skills and reasoning. This element can only be of full value if the reasoning takes place in the industrial context of the trainee. This means that the task must be expressed in the vocabulary common to that industry (e.g. trainees in horticulture ought to be required to use their industrial knowledge about plants, building trades trainees should be able to distinguish between the different methods of painting)

We can draw an analogy to an area with many correspondences with training, that of expert systems and knowledge engineering; a bare "shell" program is supplied which, in itself, is of no practical use until it has "learned" the concepts, rules and vocabulary appropriate to its area of work. The common vocabulary and concepts reduces the number of rules that are needed to codify expertise. It is also the case that many areas of expertise have concepts and rules held in common, that are nevertheless applied unconcsiously (23). This implies that an "outsider", someone who does not share the context, will find areas of expertise invisible.

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23 Proceedings of Conference on Artificial Intelligence, 1985.

It is not clear that a generalistic, isolated approach to communication and reasoning is transferable later to particular industrial contexts.

Employer credibility: If it is a requirement that trainees compile a portfolio of their print-out from the computer which can later be used to establish their credibility at an interview, it would be far more valuable to have exercises concerned with the application of computers to their industry. Material of this type can often be used to prompt questions that evince the trainee's ability to communicate knowlegeably, even if the trainee is switching to another industry.

Future needs: That the skills developed will have a direct utility for future working is oten expressed, although in reality this is possibly the weakest argument in favour of using an industrial context. It may be that the skills do have to be transferred to another context in order to apply them. Hence it is the development of the `IT capability' which is of most importance, but further training would likely be required to realize that potential. (This is a strength though, not a weakness, as it is impossible to predict the precise skills which will be required in the future). It is, however, common that the training given will enhance the value of the trainee at the current workplace (24).

2.8 Arguments against industrial relevance

The other side of the argument states that the trainee will be better motivated if the examples for processing on the computer are chosen to reflect the trainees interest or hobby. They usually point out that the trainees are unlikely to stay in the same industry and so the industrial relevance would be wasted.

Additionally some activities that purport to be industrially relevant are, in practice, specious. These are generally those which cause the trainee to perform activities that belong to roles that they are unlikely ever to fill. (e.g. "write a program that will simulate graphically the action of a lathe." The trainee will be very unlikely to qualify as a programmer from an engineering apprenticeship, but the ability to use a numerically controlled lathe might be important.)
Some people argue that the most important task is to spark

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24 The trainee may even become the CIT "expert". This has dangers associated with it; even the best trainee cannot hope to pick up the CIT skills necessary to give a balanced assessment of the ways that computers might benefit the placement.

the interest of the trainee in CIT. The would say that if the trainees were allowed to devise their own programming, wordprocessing and database applications based on areas of interest, they are more likely to stick at the job and learn valuable information about computers.

However the context of the material is chosen, tasks that reinforce and develop core skills, as well as tasks that are subject to some form of assessment of performance, require preparation and forethought. This generally precludes "ad hoc" extemporised activities because :

- These tasks generally cannot be monitored easily for accuracy, there is no standard product. It is in principle possible, but in practice unlikely that the trainer will have a chance to monitor in detail the data, programs and text typed into the computer. It is not usually a feature of this type of activity that a "hard copy" can be obtained; considering the possible content, this is probably not a bad thing.

- "Databases" generated in this way are usually poorly organised with regard to fields, data types and indexing. It is unlikely that any useful interrogation of the database might be considered. (A "database" is a collection of information, stored on a computer and designed to facilitate the acquisition of information. A database that stores information that then cannot be retrieved has no value.)

- These tasks are usually limited by the speed of typing. This can mean one page documents, "databases" with less than ten records. There is not usually time to cover the more sophisticated uses of these applications programs.

- There is no way of saying when the task is complete. Tasks that are "open ended" like this are often not under close control, there is no way of judging progress towards some sort of goal.

In practice, it may be necessary to make tactical use of "hobbies" and interest to set off some activity, especially at a time of flagging spirits and energy. (An intensive CIT course can be exhausting for the trainees.) This would mean that a trainer would have a reserve of tasks that could be introduced that reflected lighter, non-work applications of the use of computers. These tasks should still be designed to reinforce the same range of core skills.

Activities like this can be particularly useful with trainees who are poor readers and spellers. The exercise of using a wordprocessor, where you can go back and change your mind and your print out still looks as good as anybody else's, has a

powerful stimulant effect on some trainees. Indeed the success of computer-assisted learning in special needs education has been well-documented.

Overall then, if the industrial context is not to be used, then the reasons for this should be carefully thought out. In addition, particular consideration should be given to the organization and execution of `alternative' activities. To do this well probably requires a greater degree of organization, co-ordination and monitoring: it should not be viewed as an `easy option'.

2.9 Non work implications: impact on society

This is a very wide area for debate. In fact, it is sometimes questioned whether this should be part of a practical CIT course. This issue is often more fully covered in other types of computer `awareness' courses, but it should still be possible to draw attention to wider implications even in a practically-based course.

Very few trainees will be unaffected by computer technology in their lives, as we move closer to a society where an important freedom will be one's ability to gain information.

It should be possible for most trainers to set up exercises that reflect the pervasive nature of computers in our society, and from these exercises stimulate discussions about the issues.

It should also be a duty for CIT trainers to establish for the trainees practical demonstrations of the GIGO principle. Literally translated this means "Garbage in, Garbage out", it implies that computer systems can only process the data with which they are supplied. If human error or transmission error "garbles" the data, the computer has no way of making intelligent decisions about its validity; it cannot reason from the context, from past experience or the "adsurdity" of the information.

Another important issue is concerned with the computerisation of a process for trivial reasons; how can you judge whether the application involves using a computer as a "gimmick" rather than as the result of a carefully reasoned and costed process. It should be possible for trainer and trainees to discus several examples.

3 Trainer support

3.1 Development of Professional Trainer Skills

Many trainers in YTS have no formal qualification as trainers. They are usually fully qualified in the "skill" area they are to teach. The professional skills required to transfer skill to others are aquired in much the same way as any other skill; they are most painlessly learned by trainers who are members of supportive groups and who receive a series of structured experiences of the use of the skills involved.

In the course of the research, we have encountered successful trainers who have developed CIT trainer skill from a wide variety of trades and backgrounds: retail, computer sales, secretarial, motor vehicle training, motorcycle tuning and servicing, programmers, system analysts, teachers and even beekeeping. Many of them commented that it was not often possible for a new trainer to be able to complete an "off job" course in being a trainer before being thrust before a live, sometimes all too alive, group of trainees. It is therefore likely that the neophyte trainer will, to some extent, be "thrown in at the deep end." (Although to some extent the excesses of this almost total lack of provision for the `training of the trainers' have been ameliorated by the development of the Accredited Centre network and the provision of specialist qualifications for vocational trainers).This generally means that new trainers prosper best in an environment where they can obtain support and advice from their more senior colleagues.

Some scheme managers see no relevance for professional trainer skill in training. They see the role of trainer as one that can be aquired by anyone, and inherent in the possession of the craft skill. The fallacy of this view is immediately apparent to an observer of the training arrangements thought satisfactory by these managers: the poor quality of training resulting from poor resources, poor development of trainer communication skills, poor management of learning with, usually, a tendency to cover even the most practical topics by the use of lectures and note taking. This is coupled with a lack of professional respect of the trainers by the manager, lack of professional respect for the trainers by the trainees, and a consequent high turn-over of trainers.

Many schemes take a professional and responsible attitude towards the development of professional skill; many organisations make aquisition or possession of a trainer qualification a condition of employment, others sponsor their trainers through Cert. Ed courses or ITD. They correctly identify the professional skill of their trainers as their most valuable commercial asset. Some organisations have a

policy of offering their staff the chance to gain qualifications in more specialised training areas, such as counselling skills, management skills or dealing with trainees who have learning difficulties or physical handicaps.

These courses can require a high level of commitment from the trainer and manager, as they may require attendance at an Accredited Centre (or college) over an extended period of time.

3.2 Internal support groups

The group meeting together for the trainers course can often develop supportive links, but there is usually no real substitute for support that is based at the trainers place of work. This may just be a matter of enabling an embattled trainer to unburden some of his frustrations over one particular villain (for goodness sake never say "Well, he's all right with me") or it may be a more profound problem rooted in communication problems ("After I've been talking to them for about half an hour they fidget and start throwing paper planes.")

Horizontal support: This kind of support would rely on other trainers for their assistance. Any well run training establishment should have staff that can trust and co-operate with one another to the extent of providing informal support for one another. The success of arrangements of this type will usually depend on the flexibility of timetabling (i.e. will trainers ever be able to get together to talk?). It should be common practice for trainers to sit in, on an informal basis, on each other's training sessions. Although if this is not part of a regular and established policy for everyone then the trainer "picked on" will feel under threat.

Vertical support: This would involve senior staff, possibly the scheme manager and the senior trainers. Senior staff sitting in on training sessions can often be threatening for inexperienced trainers (after all, these are the very people responsible for promotions, evaluations and sackings) so these visits should be on a regular enough basis that they are not uncommon. At the end of each of these visits should be a brief post mortem (with at least two positive comments for each negative observation. It is usually helpful if these comments are documented with brief notes.)

On an interim level, the senior staff should have a regular overview of the training plans of their trainers. Some managers insist on seeing training plans a week in advance, others feel that it is more useful to see the plan after the training session, with follow up comments and analysis.

These considerations apply equally to training provided "in

house" and to training that is contracted out, to another training provider. Professional training providers are generally willing to allow scheme managers to sit in on their training as well as to provide them with copies of their training plan.

Many managers of training providing organisations will say that they have more important things to do than to spend their time making sure that the training for which they are responsible is maintained at a high standard.

3.3 Preparation for training

Training plans: Plans that are suitable for YTS training are not always easy to produce. It is all too easy to produce a plan which presents a series of unconnected training experiences rather than a course with a coherent structure. For a good training plan, each section of the course must have an overall aim, coupled with one or more training objectives.

These must be supported with details of the practical exercises used to develop the behavioural and cognitive skills that make up the objectives. Finally, some form of assessment and record of achievement must be developed to enable progress towards goals and objectives to be monitored.

It is easy to see that this process is complex and will require ongoing assistance from senior staff.

Layout of training room in preparation for practical work: Practical exercises require quite a degree of physical preparation before the group arrive. This usually consists of such tasks as preparing discs, laying out disc libraries and task sheets, and checking equipment for faults. Any items that may be required in the training ought to be checked and made ready in good time, so that the trainer has only to be concerned with the learning process during the session.

3.4 Communication skills

This covers a wide and complex area. All modes of communication used by a trainer ought to transmit information, instruction and data with maximum clarity.

Graphical communication: These will either be complex diagrams prepared before the session starts or simple text and drawings neccessary to illustrate a point during training. In either case they should be clear, free from "clutter" and easily intelligible from the distance that the trainees will view them. Scrutiny of the screen or board from the back of the room is often revealing.

Ration didactic monologue: Many trainers spend too much time

talking at trainees, who are presumed to be sitting quietly at their desks and making notes. Before embarking on one of these monologues, the trainer ought to ask "Is this the best way to make this information/instruction/skill available to the trainee?" In most cases, and for all practical skills, there will be better methods. "Do I have to tell them this? Can I make up an exercise that will allow them to discover this and tell me?"

Some trainees may have a concentration span of much less than twenty minutes and others may have poor English skills and may be quite unable to make any sensible notes.

It can sometimes be quite difficult to develop the skills neccessary to prompt most of the trainees to talk and to contribute their ideas for group discussion.

Use simple language: Make your use of English as simple as possible. Use short sentences and simple words. Very few trainees feel that their intelligence is being insulted by simple language.

Wait until they listen: If you do need to talk to trainees as a group, make sure that you have their attention before you start. This is very important for establishing the trainers role as the leader and instigator of the group's activity.

3.5 Management of learning

This is the trainer's primary job once the training session has started. There are many styles available and most trainers develop their own personal style.

Resource based: This usually means that instructions material and data are provided for trainees in a "cafeteria fashion" for trainees to select activities (with trainer guidance) and to use them to develop skill and knowledge (with close monitoring of "diet" by the trainer) at their own pace.

Effective materials for CIT/YTS are very rare and the labour overhead to produce a bank of one's own materials likely to be prohibitive, so it is likely that a "cut down" version of resourced based learning will be offered; generally with a prescribed series of activities taken at the trainees own pace.

Some activities do not fit in well with this style: for example some group and co-operative projects are difficult. Some trainees respond better to situations where they can work with other trainees and ask them what to do. Others get lost in the unstructured nature of this style. The effective trainer should be able t see, and be ready to help with, any such difficulties.

Tutor based: The major alternative style provides the opposite learning style, the trainees perform prescribed tasks in parallel with each other and with a deadline time limit set by the start of the next task. This does allow for more group discussion and analysis but, if rigidly adopted, tends to prevent many trainees from completing activities for themselves.

Sensitivity to trainee differences: No two trainees are exactly alike in their requirements for training. Some may have some form of learning difficulty, whether it be in reading, concentration, hearing or working as a member of a team. Some of these problems will be obvious, others will require some detection.

Preparation for special needs: Tasks and material ought to be available to provide valuable exercises for trainees who have problems with reading and writing. The trainer ought to be sensitive to special learning difficulties and ready to intervene tactfully.

Preparation for "clever" trainees: Some trainees will require less practice at skills to become competent, this may be because they have prior experience or may be innate aptitude. Trainees of this type should be moved on to tasks which are more challenging. These can often be ordinary tasks that are extended in some way to provide a challenge.

Response to "butterfly" trainees: Some trainees are unwilling to carry out the practice neccessary to become competent (to the satisfaction of the trainer's performance criteria) at tasks. They claim to have "got the idea" and want to go on to other tasks. If the performance of these trainees is closely monitored, it is often found that they are often innaccurate and not up to a commercial standard. If these trainees need this skill to overtake some competence objective, then there is usually no alternative but to persist with practice. Diplomatic trainers may be able to provide equally valuable alternative activities, but should beware of setting precedents.

Trainees who have difficulties working as members of a group: Some trainees are unable to work in an environment where their activity is managed and they are part of a group working towards a common aim. They will tend to disrupt the work of other trainees and attempt to monopolise the attention of the person responsible for their supervision. While some other trainees may effectively `withdraw' from group activities, preferring to work alone. In such circumstances, the group themselves often attempt to re-integrate such individuals. If this fails, trainers should think very carefully about the advantages and the costs of treating these individuals in a `special' way. It may be possible to resolve such problems with individual attention, but it runs the risk of reinforcing such behaviour (especially of the `isolationist'). Many trainers recommend that such problems can be minimised if the trainer provides tasks that are feasible and rewarding. This will occupy the majority of the other trainees, leaving the trainer free to cope with any problems that arise.

Awareness that achievement in CIT can have other beneficial effects: Trainers should be aware of, and if possible build upon, other spin-offs from using CIT, **especially** with `lower ability' trainees. A number of providers with whom we worked in Accredited Centre networks drew attention to the way that achievement in this area could greatly enhance trainees confidence and self-belief. This pattern has also been well-attested in relation to schools (25).

3.6 Accredited Centre Support

Accredited Centres provide models for local (area) provision of staff development and training. They provide training that is "free" to YTS trainers in numerous centres around the country. Accredited Centres that we have visited have been based at Further Education Colleges, Polytechnics, Skill Centres and at private training providers. We have seen a variety of modes of provision of courses.

Accredited Centre as course/event broker: In these cases the Accredited Centre acts as an organiser of courses and arranges for course leaders, accommodation and often equipment to be available for the course. This has the advantage that a wide spread of broadly based CIT expertise and equipment is available. The courses tend to form a recognition "econony" where good practice at a local level can be rewarded by asking the good practitioners to provide

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25 A major national survey in the USA elicited similar findings: "the most frequently reported effect on lower-ability students is improved motivation, self-confidence and self-discipline". [H.J. Becker "Using computers for instruction," Byte, February 1987]

the courses.

Accredited Centre as course/event producer: This is the mode of provision most often used where the Accredited Centre is part of a college or private training company. The courses are organised using the resources, staff and premises of the Accredited Centre. This can lead to problems if the Accredited Centre does not itself employ good practitioners with a broad spread of CIT skills.

Accredited Centre as consultancy broker/provider: In this mode of provision, the Accredited Centre provides a set of consultants (usually from ITec or private training companies) who visit schemes and negotiate CIT provision. They can recommend staff development programme and implement them to suit the needs of the schemes.

This is sometimes associated with the provision of a "walk in" resources centre, where YTS staff can visit and use resources at will.

The consultancy mode is usually considered by users to be the ideal provision but it is not usually cost effective for all services. The rate for courses with less than six delegates present (consultancy rate) is usually uneconomic for most Accredited Centres to provide more than a small proportion of training events in this manner. (One STC said that 33% consultancy to 66% courses, was financially viable, another was constrained by users to organise 75% as consultancy although 66% was the target set for financial viability.)

3.7 Accredited Centre strategies for dissemination

Types of delegate:

- Managers: These are the most important delegates for training, in that they control the resources for other developments. If they are not made aware of policy or good practice, then more specialised courses will not be effective agents of change.

- non CIT trainers: These trainers would be delegates at courses concerned with other skill areas (e.g. professional trainer skills, other skills development). It should be possible to arrange for some of their exposure to training to be through the use of computers. There are CBL packages and authoring systems that may be usefully demonstrated to other skill trainers to (at least) give the idea of using computers currency.

- CIT trainers: Their courses may concentrate on some particular aim (e.g. some form of CIT certification, course about the use of particular applications etc).

- Workplace supervisors: These are very difficult people to get to training events (one STC did, however, have records to show that 85% of the placements had sent delegates to one or more Accredited Centre training course. Another organised courses in the upstairs room of a pub and offered beer and sandwiches as an inducement). These courses are often limited to YTS policy awareness. In the CIT area, the access to some CIT (or IT) competence at the workplace ought to be on the agenda.

Types of event:

- General awareness raising course/events: The majority of Accredited Centre offer events of this type. Some cover two or three days, often with demonstrations and practical use of programs and equipment. These courses are often general with a component on YTS policy.

- Subject focussed training workshops/courses: There are a wide variety of courses of this type, from courses on particular applications to others on general computer use. Courses in the development of CIT based resources are quite rare.

- Working groups: These are usually an effective way of providing a forum for CIT expertise and interest. They usually require a focus for their activity (eg the development of resource base). They may have a relatively short life: fulfilling immediate requirements and then disbanding or breaking into more informal groups. However, to prosper over a longer period they sometimes have some form of monetary reward built in for the participants (e.g. LQI or proposal, choosing the workshop location and course leader in rotation through the members). They are often very useful as a forum for trainers and teachers from a common background (eg CIT tutors from FE).

3.8 Factors affecting the uptake of training

It is sometimes thought that something that has no cost, has no value. Many of the factors that reduce the take up of the free training offered by Accredited Centres seem to be based on "psychological" factors. ("If we've been through the ATO wringer, we must be seen to be competent and not ask for help" commented a cynical PA about some scheme managers attitude).

Self esteem and resistance to competence: Described below are "levels of training" as described in an ICL training film. They describe quite well the development of skill taken as a four phase process, but are not intended as a watertight

taxonomy.

- Unconscious incompetence: The person does not possess neccessary skills and knowledge, is unaware of the need for them and, furthermore, resistant to the idea of developing them.

- Conscious incompetence: The person has been made aware of the gaps in skill and knowledge and is now convinced of the need for development.

- Conscious competence: The person has been through a development process and now has the skills and knowledge but they are applied consciously and slowly. (The illustrative example given by ICL here is of the driver who has just passed the test; every gear change and manouevre requires concentration.)

- Unconscious competence: The person has the skill and knowledge and applies them freely and unthinkingly.

The most important jump is that between levels one and two, and in particular the resistance to change. Admissions of incompetence are very threatening, and often people defend their self-esteem with bluster ("I've been in this business for 25 years. I've forgotten more about being a trainer than you'll ever teach me") or Svejkian[26] sabotage ("Well, we always switch off the file server computer because we don't like the noise the hard disc cooling fan makes")

The state of "unconscious incompetence" is superficially the cheapest. It usually leads to training provision that becomes progressively under-funded. That is money is not spent on change: either on the development of new courses, the purchase of new equipment or the development of staff skill. This occurs because nobody has the knowledge to detect the shortcomings in the training. In the long run, these shortcomings will be apparent in the relative lack of success of the trainees at getting certificates (poorly supported training), in trainee attendance problems (poor supervision), in the proportion of trainees getting full time employment (poor advice from scheme staff, poor allocation and matching to placement), in the turnover of scheme training staff (the lack of staff development and progress), and frequently in the damage done to scheme equipment and premises (poor supervision, trainees poorly motivated). The end result of this process would tend to lead to the scheme losing its approved status.

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26 "The good soldier Svejk" by J. Hasek: For a complementary account that provides a model for users in the grasp of unfriendly systems see "The Trial" by F. Kafka.

Actual costs of attendance:

- Trainer/manager time: Attendance at training events usually takes the delegates away from their work. This remains the case even for training that takes place in their normal working area. This means that their work (perhaps supervising trainees) has to be covered by someone else or it is saved up for their return (filling in assessment forms). Release from tasks ought to be feasible for well planned schemes, although it often carries a labour cost (overtime or pay for stand in).

- Travel costs/location of events: For training events that take place remote from the workplace, the scheme usually has to pay the travel costs of the delegates. Some accredited centres cover a wide geographical area and the distance to be travelled is often given as a reason for non-attendance at training events. Some accredited centres overcome this problem by providing "out stations" where locally based courses can take place.

Benefits of attendance (course outcomes):

- Trainer Certification: This can be a valuable outcome of the training for the trainer and for the scheme. Most certificates require attendance over many weeks, some need weekly attendance over the course of a year, and thus require considerable dedication from the trainer.

- Skills development: This can be related to the development of professional skills (e.g. OHP presentation) or on a detailed technical level (e.g. Introduction to AutoCAD, how to develop work based projects, etc.)

- Development of professional and personal relationships: This frequently takes place during breaks in the training and is an untimetabled element of staff development although it is often of great importance. The relationships might be between the course leader and a delegate or between delegates. This is often quoted as a source of important commercial contacts.

- News and opinions: This again is usually untimetabled and usually results in exchanges of experience about techniques, programs and equipment.

To sum up, attendance of scheme staff at training events has many benefits in terms of professional development. These tend to provide feedback to other scheme staff and tends to raise training quality as an issue for discussion within the scheme.

3.9 Other modes of support for CIT trainers:

ACL support: This group was devised to provide resource, consultancy and staff development support to the workshop schemes participating in the Applying Computer Literacy project. The support was based around two regional co-ordinators who visited the schemes, arranged for visits and acted as disseminators for the material produced by participating schemes. (Some details about the ACL network are to be found in Report 2 "Survey of current practice in CIT in the YTS").

This network could be regarded as operating in the same sort of way as an Accredited Centre working in consultancy mode. Although the task made slightly easier by the common background (computer system and software) of the participating schemes.

The resources developed (dBase 2 databases, Supercalc applications, information packs etc) were freely available to the schemes. One of the valuable outcomes of the process was the communication and reassurance offered to CIT practitioners by the ACL co-ordinators.

User groups: These frequently have no connection with YTS training, and act as a forum for computer users from a wide background. They provide opportunities for technical advice and assistance, but are not generally able to offer help with CIT trainer skills.

Commercial training providers: These providers are able to support the CIT needs of schemes professionally. The drawback is that the training does not usually fall within Accredited Centre category and the full commercial rate for the training would be charged.

Additionally some private training providers,who offer computer training to various levels, have expressed their willingness to provide CIT support for YTS providers. They take the view that they can provide an expert consultancy service to schemes, who are unable to provide such support themselves.

This provision would, again, be at commercial rates. As a rule the commercial rate for training for one adult would be roughly the same cost as a group of YTS trainees. The courses would often focus on the detailed usage of packages rather than their application to a training environment.

ITecs: Many ITecs are providing technical support and training on a commercial basis as a supplement to their funding, as well as providing some enterprising exercises for trainees. They are often CIT providers for other schemes and are able to provide CIT trainer skills as well as competence

in CIT.

ITecs often provide training courses for small businesses in the use of computers so it would seem reasonable that they would be willing to provide CIT training for YTS scheme personnel. This would, presumably, be at commercial rates.

Support for F.E. tutors: Such tutors are probably in the best position for receiving fairly easy access to support, if they are seeking to develop their competence in delivering CIT in YTS. Besides the possibility of attending in-service courses, on a local, regional or national basis, the FEU have played an active role in helping establish CIT in college curricula and to support the use of IT more generally in a range of college activities. As a result, not only are there a wealth of materials, covering curriculum development, staff development and software development, but because of the decentralized nature of FEU project activities there are also centres in most regions with considerable experience in such matters [the special funding available locally under the Educational Support Grant strengthened this decentralizing process.]

Considerable progress has been made over the last three years (since the 1984 survey "I.T. in F.E."), and a number of support groups have sprung up on local, regional and national bases. Various databases and networks (such as ResCue for vocational education and training) have also been established, and there is no reason (except perhaps time to undertake such activities!) for a tutor to feel that he or she is "ploughing a lone furrow".

The ease and extent to which college tutors can engage in `outreach' liaison varies widely between local authorities and colleges. However, where tutors are able to visit trainees workplaces, not only is this an enormous help in setting the context for the off-the-job training, but it often serves to illustrate to the **trainees** that the two spheres are **not** completely separate. As so often `good practice' was only **institutionalized** where it received positive sanction and support from senior management rather than relying on (the often unrewarded) enthusiasm of people on an individual basis.

4 Equipment and programs

Issues concerned with the type of equipment used will be much easier to deal with than previously, with the predominance of so much software and hardware that is taken as "standard". This has benefits as well as hazards.

The main benefits are concerned with the direct applicability of skills from one job and location to another, the hazards are concerned with the retention of "old fashioned" software and hardware because it profits from a "pool" of expertise.

Training that is firmly rooted in the idiosyncratic operating philosophy of a particular application is of questionable value. (This issue is more fully discussed in Part Two of the report).

In practice, the task performed using the computer and software will prove to be more important than the identity of the products used. A "business" computer, with "industry standard" software does not guarantee, of itself, that the training provision will be good and directly relevant to the needs of either the trainee or industry. In a similar way an "educational" computer, with "educational software" will not, of itself, guarantee that "education" will take place.

4.1 Types of computer

Many scheme managers and trainers have strong feelings about which type of computer is the most appropriate for use in training. Arguments are concerned with the perceived transferability and credibility of the skills developed.

One argument favours extending and profiting from the familiarity of computers that are used at school. While the other party argues that the computers used should be credible as serious business computers and the skills developed will have direct industrial relevance.

Proponents of these arguments usually have reinforced their position by buying sets of their favoured computer. As is usual, the answer that best fits a particular environment will have elements from both.

Computers common in education: These would mainly be the Acorn BBC computers: the A, B, B+, Master, Compact and recently Archimedes. (Although RML machines are widely used in a small number of authorities, including Inner London). They all have a wide range of educational and single concept software available. This may be important if there is a special needs thread to the provision of computer literacy, and simple education programs can often be used in a

diagnostic fashion to detect special needs. Application software (wordprocessing, spreadsheet, database) is available, the best examples working from EPROM, as this uses the minimum of RAM and allows larger documents or files. The BBC B with an EPROM board can hold up to 256K of EPROM.

The major disadvantage of these computers is that the disc operating system is non-standard. The names and syntax of the commands does not match with the "standard" operating system. The newer ADFS has many similarities with MSDOS, and in particular a similar tree structure for directories (or catalogues). A system that provides an "icon driven front end" to the operating system is also available. The other major disadvantage to the BBC B computers was the tiny amount of RAM available. This has mainly been corrected in later models.

It is possible to use BBC computers with some degree of MSDOS compatibility with the addition of co-processor boards and software so as to give an emulation of an IBM PC. This is reported to provide 80% compatibility for standard PC software.

Micro computers used in business: These are generally IBM and compatibles. These computers are very common in business, so it may be thought that training on a compatible computer has direct value. In practice, there are many types of compatible computers and users are often unable to recognise the common elements of compatibility.

"Industry standard" computers are weak on educational software. This software is available in a limited way, but as it is usually written in BASIC it is not necessarily directly portable (able to be used directly) between compatible computers. (For example, software written for GWBASIC would not work on an Amstrad 1640 using BASIC2).

These computers are standard business computers, application software that runs on them would be identical to that used in industry. This has benefits but it also provides difficulties; businesses have larger software budgets than training departments, so the software is often expensive. Some solutions to this problem are presented in section (4.3).

4.2 Types of operating system

The operating system used on a computer governs the way that information is stored and retrieved as "files". The operating system provides a set of "commands" that perform various actions on files or groups of files. The operating system environment provides the normal initial "interface" between the user and the computer, before an application

program is established. This "interface" allows the user to perform a variety of significant actions with stored data; in particular it allows for the destruction or deletion of data, the retrieval and reading of data and the renaming of files.

Some computer sites reduce the user's ability to perform these functions by protecting files with passwords, encrypting files or by installing a "front end" environment to interpret and filter the users commands through a series of pictorial or mnemonic menus.

Many operating systems, mainly those on larger mini computers, offer sets of commands that provide some of the features of a "language" in which programs can be written. Some of these languages are optimised to control the operation of programs and files without human intervention, others provide the elements of a database language (with some of the properties of a fourth generation language), some are arranged to operate in "natural" language. It is likely that operating systems for all types of computers will be increasingly designed and chosen with the user and the use in mind.

MSDOS (PCDOS): is the most widely used operating system available. It has most of the facilities required of a small computer operating system. It has limited memory handling (640K) and limited ability to work in a multi-tasking fashion It is, however, unlikely that these will handicap overmuch YTS trainees or trainers. It has sophisticated facilities to route and filter data from one place to another, to create paths through directories, and to set up whole directories as "extra" drives. This is regarded (at present) as the "industry standard" operating system.

The introduction of computers based around more sophisticated microprocessors (such as the 80286, 80386 and 68000) which can cope readily with multi-tasking and can address much more memory will make the introduction of new operating systems neccessary.

MSDOS has been extended to provide support for networking (as MSNET) but some users have commented that MSDOS was not primarily written with networks in mind.

CPM is the old "industry standard" operating system, devised mainly for eight bit computers. Many of the structures of commands were taken over by MSDOS, the major difference being the order of source and destination file name in commands.

The authors of the system showed a liking for funny acronyms (PIP, DDT etc), and sometimes the commands could be a little confusing for beginners.

The lineal descendant, DOS+, is the main alternative to MSDOS, and offers multi-tasking with up to three background tasks being performed contemporaneously with the foreground application.

The major commercial use of CPM+ is in the Amstrad PCW wordprocessing computers, where the system has been enhanced to deal with banks of RAM. This has led to a renaissance of many software titles that had their heyday as "industry standards" in the old eight bit era.

GEM is a program that provides the user with an "icon driven" interface to the MSDOS operating system. Broadly speaking, the operator uses a "mouse"(which houses a rolling ball which drives rotation sensors) to move a pointer on the screen to options which are indicated by graphic pictures or "icons". The user "clicks" a button to indicate which icon has been chosen, and the system performs functions such as loading programs, changing directory, changing the size of the window. A window is a rectangular area of screen which displays the screen output from a particular command or application. It is possible to have more than one application present (but not neccessarily still independently processing, except in GEMK) on the screen in its own window, and to transfer operations between the two.

Not all application programs follow the "WIMP" philosophy, and once loaded they would perform in their normal way. There are, however, many applications available which follow the philosophy through into all of the facets of the program operation. The GEM system is said to be "intuitive" in that it is supposed to be easier for beginners to cope with the operating system if it is toned down in this way. This does not alter the basic fact that having easy access to a complex function does not make using that basic function any easier.

Some operators do not like the WIMP philosophy at all, particularly competent typists who would not derive any particular benefit from it, and they would tend to follow the alternative command structure based on the keyboard.

The **Windows** system, where a window is a rectangular section of the screen, is supposed to provide the same benefits as the GEM environment, but Windows are thought to be more powerful as you can have more than one application active in separate windows on the screen. The window itself is a rectangular area of the screen which can be increased, decreased,or overlaid with another window. Data can easily be transferred from one window to the other.

Window environments are thought to be amongst the more important developments in the new IBM PS/2 and the VAX

series of computers, which, amongst other things aim to provide consistent operating systems and paths for data between all of the micro, mini and mainframe products.

Windows are not as easy to use as the GEM environments. Both of them make heavy demands upon computer memory and processing time. They can be very slow if operated with a clock speed of less than 8 mhz, and they are not particularly advantageous when used from floppy disc.

Unix/Xenix is an operating system designed for use in a multi-tasking, multi-user applications. The Unix operating system consists of a collection of many small programs which carry out one particular job (as compared to MSDOS where the same command might, with suitably changed parameters, perform many functions.) These programs can be threaded together to perform sophisticated functions. Unix is a terse operating system and tends to have unmnemonic commands (e.g. $ ls -al means show all files, including hidden ones, in long format).

In practice, the user will be insulated from the unfriendliness of the operating system by the way that the shell has been configured to provide a menu system for the applications.

It has the advantage of providing an operating system common to many types of computer from mainframe to mini and some micros, and to providing a means of transferring data for applications between them. This can be seen, in a sense, as a mainframe/mini operating system migrating down to the world of microcomputers; as opposed to the operating systems of micros, with their user friendliness and graphics, growing up to the world of mainframes. Graphics displays require much more information to be transmitted by the central intelligence of a mainframe/mini than ascii coded text. It would then be a choice of slower response or fewer terminals.

4.3 Types of program

There are many thousands of commercially available computer programs, all of which have their own way of working. In recent years software engineers have been trying to develop ways in which the command structure of programs can be simplified to provide easy access to the features of the program. It must be emphasised that there is more to the operation of software than just the ease with which complex commands can be selected. It is of no real benefit to have the option selected easily if the operator does not understand how the option functions. Here are some of the styles of program that have been devised:

Light bar/ pull down menus: These programs work by providing menus of options. The menu is activated, by pressing a special key, usually the "/" key, and the option chosen either by typing the initial letter of the command or by moving a "light bar" across the menu, usually by pressing an arrow key, and fixing the desired option by pressing the enter or return key. The light bar highlights each option, and sometimes displays the next menu of options below it. Competent operators of the program can just type in the series of letters representing the initial letters of the commands they want (e.g. /WGDHVCYUQ would change the screen display in VP-Planner).

Pull down menus operate on the same principle, except they are vertical instead of horizontal. The options pull down from the top of the display like window blinds. These are often used in conjunction with a "mouse". The options are again usually selected by highlighting the option by moving the lightbar up and down and fixing the option using the return key.

Many commercially available programs have a command structure similar to this (e.g. Lotus 123, Dbase 3 +, Microsoft Word4) and it seems to be becoming a standard way of operating application software. They have the advantage that operators with poor keyboard skills only need to find the arrow keys and the enter/return key to be able to use these programs (27).

This means that professional software will work with operating systems that "look" the same (28) and have operating philosophies that are similar, so a trainee with a background in one of these will have an idea of the way that others will operate. These programs often have "context sensitive" help screens to provide assistance to the user.

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27 This provides two stategies for the use of the program: one that is keyboard intensive (for users with good keyboard skills) and one that is cursor/pointer intensive (for users who have less well developed keyboard skills or who use the program less often.)

28 Conversely the top three commercial wordprocessing programs (Wordstar, Word and Wordperfect) all have very similar capabilities (e.g. line drawing, thesauri, footnotes etc.) but despite this, these programs still have completely different operating philosophies.

Intuitive/ Icon based command structures: These behave in a similar way to the light-bar menu ones, except that the options are usually represented by small graphical diagrams supposed to represent the chosen option. These diagrams are not always clear and a sheet of paper with a key to them is often required.

The options are chosen by moving a pointer around the screen, often by using a mouse, which takes the operators hands away from the keyboard. For this reason competent typists rarely use the mouse, they tend to use the arrow keys or the initial letter, if those options are available.

Non intuitive command structures: These are usually found in the decendants of the "standard" software devised for 8 bit computers. The archetype of these are the command structures based around Wordstar, and the programs that emulate Wordstar. Here are a selection of Wordstar commands beside equivalent commands from another wordprocessing program of the same vintage.

SScripsit	WStar	Command
@I	^V	Insert
@D	^G	Delete
@B	^K	Block menu
@G	^L	Global replace
@T	^I	Tab

To get around the problems caused by the non-mnemonic nature of the wordstar commands, help menus are available on the screen, and at the highest level of help available occupy roughly half of the text area.

There are many examples of programs which use idiosyncratic command structures, the main reservation about them is that they are not as easy to learn as other, more modern, packages which are designed with the needs of the user more fully in mind. There are, however, many users who had their first exposure to application software of this type and who were trained in its use and who regard its arbitrary command structure as completely natural.

Cheaper versions of standard software: The standard software packages are often very expensive. A development of the last few years is the arrival of software "clones", where the program is identical in most operational respects with the standard program (in some cases offering enhancements) but the cost of the program is much less.

As a reply to this, software companies issue "cut down" versions of their standard packages at reduced prices. It is possible to buy reduced versions of almost all of the more popular items of software, which offer the same command and

operation structure as the full sized program but with fewer facilities.

4.4 Sources of inexpensive resources and programs

General user groups: These are often outlets for public domain software as well as offering members discounts on the prices of some gooeds. Public domain softwares is usually quite cheap, less than £5 per disc and there are a wide range of software titles available, of particular interest are the discs that contain compilations of data bases and spreadsheets to use with standard software. The utilities available are sometimes very good, but the software is "user supported", this generally means that the documentation is awful. If you continue to use software you are supposed to send a monetary contribution to the author.

Training based user groups: These provide support for members who are involved in their group. Some of them provide resources to their members, organise tutorials and staff development events. They usually charge for some of these services, but often once you have joined the facilities are free. Organisations of this type are the National YTS computer user group, National Association of Computer Users in Agricultural Education, and the support network that was set up to assist workshop schemes in the ACL project. The problem with running groups of this type is to keep a balance between the production of resources and the dissemination. As on club secretary said "everybody waits for somebody else to produce the programs". There is a place for an organization that will disseminate computer training resources nationally on a "public domain" basis, perhaps in conjunction with a newsletter.

Magazines: Many useful ideas for training projects are to be found in computer magazines. These generally consist of single concept programs (ie not applications programs) that set up, for example, a database of cocktails and their makings, or a program that generates knitting patterns. The most productive use of listings found in a magazine is to buy the disc or cassette with the program already typed in. These discs cost about £5 which represents a cost less than the labour involved in typing them in. Many magazines have program discs included with them which often contain useful demonstrations of commercial programs.

Books: Many books that deal with particular named application programs provide excellent introductions to the way that the more complicated aspects of these programs work. They can often be used as aids to the development of course material. The major drawback to their use is that they are often too expensive for the trainer to buy privately.

Write your own programs: Probably the most expensive, least satisfactory solution is to write programs yourself. These are only worth considering if you have a limited objective, eg you want to adapt educational software to save results to file, or to provide a way to capture graphic screens to print. People who are capable of writing good, efficient, programs can earn much more money doing just that than they can as a CIT trainer.

APPENDIX 1

Relevant activities for industries with apparently little use for CIT

Some of the industries commonly cited as providing problems for CIT trainers are hairdressing, bricklaying, horticulture, grooms and equitation. A common thread in these trades seems to be that they all require the performance, by trainees, of labour intensive tasks using "manual dexterity" skills in a form that would not easily be replaced by "robots".

Here are some counter arguments as to why CIT still has relevance for such trainees:

1) New technology has implications on social and home life, not just on the performance of tasks at work. It is quite likely that timetables, directory enquiries, "yellow pages", local tourist information, job application forms etc will most cheaply be available from computerised systems. An inability to communicate with these sources would be a serious handicap.(All of these services are available now from the French Teletel system, the local viewdata tourist information stations, and developments of Telecom Gold.)

2) People do not stay in the same job all of their lives, they could move into a trade that required specific skills in CIT that an employer might expect to have been covered in YTS. (A recent Labour Force survey indicated that people change careers on average three times. Not having an `IT capability' may be a handicap to mobility.)

3) People may not stay at a junior level, they may look for some kind of promotion. This usually requires some form of administrative or planning role which could be performed efficiently using a computer system. Even if they do stay at a junior level, their exposure to CIT should have given them some insight into the way that planning and administrative tasks operate (e.g. how their pay deductions are calculated).

Development of CIT in these industries

Many workers in these industries have given comments about the way they see the use of computers developing in their industry. What follows is a summary of these views, which should provide CIT trainers with some ideas or industrially relevant projects that they can use in their training.

Use of CIT in hairdressing.

1) Use as an aid to management of a small business. These are the usual applications of stock control, accounts, and possibly mail shots to regular clients.

A computer based "Client record" system is already an important application in some boutiques, where the "history" of the treatment of the hair is recorded: i.e. things like dye colour, perm etc as well as the characteristics of the hair (dry,porous, fine, thick etc)

Computerising the "Appointments book" is also a feasible application, though many boutique managers doubt the advantage of this over a manual system.

2) Use as an aid to design. This would replace the books and magazines used to suggest new hairstyles for clients. This would not be feasible with current computer systems, but it could (soon?) be possible to merge a "live" video image of the clients face with computer generated images of hairstyles. These could either be standard or styles designed especially for the client.

In terms of design, this would probably not be of great benefit to qualified professionals, who would have the skill to perform this process unaided, but it might be of value for competitions and training apprentices.

Of course, you could make it "coin operated" and use it as an amusement for waiting customers, or even make such a system mobile and use it as the basis of an expensive "home consultancy" service.

(It is important to emphasise that this "design process" is beyond the current capabilities of commercially available hardware and software. It is possible to do a primitive version of this with a video digitised image and some CAD software in a training environment.)

3) As a retail aid. A survey, recently commissioned by the hairdressing industry, indicated that more people bought shampoo from petrol service stations than from hairdressing salons. Many salons are so busy that they are unable to spare the time to market or display products. So, to increase retail revenue of a salon, one might make use of a computer system to advertise products and services; this being most valuable if the system did not require intervention from the staff.

One system, in use now in some salons, requires the operator to measure and classify aspects of the clients hair in conjunction with questions from the computer. The computer then "diagnoses" the hair (from a set of rules incorporated

in the program) and produces a printout that recommends which product the customer should buy to alleviate any condition. It has been observed, by several professional hairdressers, that the diagnosis process could be done "by eye" (and touch) by the hairdresser in much less time, so the value of the system would be based on the perceived authority of the computer as an impartial expert. YTS trainees who had been through successful CIT training, would, of course, regard the output with circumspection.

Use of CIT for grooms and in equitation

1) As an aid to the management of a small business. These would include the normal business applications of stock control, accounting, and wordprocessing.

   Many stables organise a range of riding courses and events so it may be useful for them to be able to produce their own advertising material using a simple "desktop publishing" program. In their customer records they would need to keep records of the progress of their clients through the various tests of riding skill. One manager of a riding school suggested that this might be required for insurance purposes.

2) As an aid to the practical running of a stable. These applications would probably be more appropriate for a stud or brood farm where details of ancestry and medical condition (diet, weight gain or loss, temperature, vet's fees etc) would be kept. There are specialised programs for these applications available but it would be possible to set up one from database software.

   On a different level, it is often difficult to keep track of tack (i.e. items of harness etc) This is often expensive and equipment frequently goes astray in the confusion of taking horses and ponies "eventing". Various schemes have been launched to identify each item with some form of indelible dye or tatoo number so that stolen or mislaid items can be returned to their rightful owner. It would be feasible to set up a database that would provide some form of recording system for these items.

3) As an aid to marketing horses, equipment and services. There seems to be very little information on PRESTEL of interest to managers of stables and other people involved with horses. There may, of course, be information in specialist closed user groups but most information seems to be about horse races. It would seem that viewdata would be quite a good medium for advertisement and contact for a community of interest spread over a large geographical area.

Use of CIT in horticulture

1) As an aid to management. Horticultural firms have to make tenders for landscape gardening contracts, maintain mail-order or retail outlets in a garden centre, depreciate plant (in the sense of tractors and bulldozers) and equipment. All of these can be done on a suitably chosen computer system using fairly standard accounting, spreadsheet, wordprocessing packages.

2) As an aid to the practical running of the business. One of the peculiarities of horticulture is the sheer number of plant and tree varieties that might be present in the list of stock. These are usually identified uniquely by the latin Linnean name (often abbreviated but sometimes in full.) Another is that unsold whips and trees often appreciate in value because they have grown to a larger size. These difficulties can be overcome in the design of a stock control system for horticultural businesses.

   Some garden centres require "information system" programs that will provide clients with plants matched to the criteria that they specify. (colour, time in flower, pH of soil, type of soil, drainage etc). Primitive versions of these are available ("primitive" because they have only two hundred plant species and they do not interface with the stock record to recommend only plants actually in stock.) Expert systems have also been developed which help the process of pest and disease identification.

   Horticulture is one industry where computer control of equipment has made great progress. ie environmental control of a greenhouse, "automatic pilot" for tractors (some businesses have very few workers so they set up a tractor to automatically drive across the plot while the operator sits behind planting.) These systems have to be "programmed" to cope with various eventualities.

3) As an aid to marketing. This would be appropriate for businesses that operated a direct retail or mail order outlet, they would need to advertise their products with posters and displays, produce price labels (perhaps bar codes), in a manner that would constantly be subject to the exigencies of seasonal and unseasonal weather.

Use of CIT in the building industry

1) Use of computers as an aid to management. If we take the model as a small building firm, the usual business applications could be used; such as accounting (a special version to cope with the peculiarities of payment systems in the industry), spreadsheets to deal with quantity estimation, job scheduling software with many applications but, in particular, the hire of extra heavy plant equipment

necessary to complete a particular phase of a job, the scheduling of deliveries of materials so that they neither occupy needed space or stop work due to shortages, deployment of manpower between contracts. There are "critical path" software packages, but the more commonly available scheduling software is (usually) easier to use.

Many costing and estimating tasks may be aided by the development of IKBS or expert systems that are able to induce "rules" from data already stored. (e.g. from the job schedule records of previous jobs; it has taken, on average, 45 mins for three workers to set up a particular item of plant on a prepared site and in good weather. This would then provide an ongoing basis for costing and estimating calculations in the future.)

2) Use of computers as a practical aid. With the exception of computer control and monitoring for heavy plant equipment, the use of lasers and other "hi tech" measuring techniques there are probably few applications of computers that will directly impinge on the working practices of labourers on a building site. (Compared, for example, with the changes in practice and training brought about by new materials: e.g. high alumina cement). At the level of the "gang leader" several uses become apparent. These are mainly local costing and quantity estimation tasks but with an important proviso that the hardware used is portable and robust enough for the rugged conditions of use. If the hardware, for example, was tied into some form of communication system many builders saw possible benefits.

3) Use of computers in very small businesses. The construction industry contains many different trades and crafts and roles for workers. (Some CITB staff confess to confusion by the multiplicity of skills and roles). Many builders work as sole traders and in small partnerships, one of the problems of work of this kind is the time consuming nature of the paperwork involved. One task is the preparation of estimates for work: this is usually based on measurements, quantity estimation etc and often involves looking up the cost of materials in catalogues. If this task were "computerised" the "small" builder might be able to supply an accurate, competitive, estimate within a couple of days rather than weeks. If the builder had a suitably programmed portable computer, he might be able to give an accurate estimate on the spot.

The computer here is used to give access to expertise that is not owned by the employees in the small business.

APPENDIX 2

Development of training resources: possible scenarios for use as training applications

Here are some scenarios that may illustrate how relevant applications can be devised. The whole scenario could be developed as a project for the trainees once they are competent at the usual applications.

Repair
A battered car stands on the forecourt. An insurance report has to be produced quickly. Some insurance companies are becoming concerned about the spiralling cost of car repairs: to be given the work, the garage must be competitive.

After inspection the hand written report lists the damage and the work to be done. The stock control system has to be interrogated about the availability and cost of parts. The part numbers and costs, estimations of labour times and rates are processed through a spreadsheet program. The job planner program schedules the tasks, taking into account the high rate charged for skilled panel beaters and the delivery date of the body panels.

The output from the spreadsheet is merged with the wordprocessed copy of the handwritten report, which is addressed and ready to be posted to the insurance company inspector.

Manufacture
Inside the envelope is a cutting from a trade newspaper and a letter from the boss.

"Chelsea scene :
After the success of "prisoner wear" the fashion buzz for next season is fireman uniforms: Attractive, brightly coloured leggings with tough dark blue jackets. Heavy belts supporting fashion accessories such as chrome plated hatchets..."

"Boss to design department :
We need a costing on pattern for the trousers. We estimate 100 units per week. Do we need more outworkers?
We can probably buy Jackets in from our regular supplier more cheaply, but do the do the range of sizes we need? Send a discreet telex and ask.
Need estimate of costings, working patterns by tomorrow noon."

Both scenarios require significant preparation and research, some of this of course could be done by the trainees. Some of the applications could be used as individual units to develop skills in that particular area. Trainees can be split into small groups to work on activities such as these, this not only promotes a good deal of exercise of communication skills, it puts them under pressure to achieve a goal in limited time.

APPENDIX 3

Three case-studies of delivery of CIT training component of YTS

INTRODUCTION

The two case-studies described below illustrate different approaches to the CIT component of YTS. They operate in particular contexts and face different sets of problems. The first study shows an imaginative approach taken by a specialist computer trainer with a group of hotel and catering trainees, with different placement backgrounds even though they are attached to the same managing agent. The course is highly successful i maintaining trainee interest, and would appear to make a major contribution to the development of their `IT capability'. The only major problem area related to the accreditation process, which was rather lightweight, although presumably they could readily adjust to any new guidance.

In contrast, the second scheme adopted a radically different approach. Their strength were that their trainees all came from a single placement, and this made it much easier to `tailor' applications as appropriate, and that they were undertaking a vocational qualification which required `embedded' IT skills. The biggest problem was that the (non-CIT-specialist) training staff vastly underestimated how difficult it would be to develop effective in-house CIT provision. However, this scheme is of particular interest for the way, given appropriate support, it is possible to translate enthusiasm and ideas into practice. [Remember also before being too critical of the `go-it-alone' decision, that they had already attempted to use three specialist providers!]

The third case-study gives details of a CIT training provider, who has specialized in producing training packages for trainees who have learning difficulties. The packages allow trainees to work through them at different levels, according to their ability. The packages themselves are to be made more widely available in early 1988, and so only a brief commentary is given here.

FIRST HALF OF TEN DAY COMPUTER AWARENESS COURSE (FOR HOTEL AND CATERING TRAINEES):

The first scheme examined is provided by a private training organisation (FMS) based in East Anglia for a local area managing agent with a group of trainees in hotel and catering placements. The trainer for the course works as a computer consultant and is also a qualified teacher. In addition she has had experience of managing residential and catering facilities.

The CIT course reviewed covered the first half of a ten day course. The first (five day) week constitutes an introduction to

the way that computers can be used in the industry. The second half of the course would cover topics such as setting up systems for use. Individual application software is used to develop practical and processing skill necessary for using computers.

By the end of the first week the trainees should be proficient at using operating systems, and entering data and text accurately, handling media, operating printers and to demonstrate a working vocabulary of the names of the parts of the computer system and the simple processes.

DAY 1: Introduction to computer systems

*Trainer comment:
"This section of the course introduces the names of the most common types of computer peripherals, some operating system commands, and some processes. This day provides most of the knowledge base for the week."

This course takes place in the rural setting of a training centre adapted from redundant farm buildings attached to a working farm and stables so the first requirement is for the trainees to be given a brief but firm run-down of the rules and hazards.

*Trainer comment:
"One of the unusual rules is that smoking is not permitted outside the training block. Since many of the trainees are bussed out from urban areas this often forms an amusing start to Day 1."

As a way of introducing trainees to the tutors and to the computers the trainees are first asked to pose for video image of themselves. This picture is then stored for use later in the week for Computer Aided Design and in the desk top publishing component. They are also used as a record of who attended the course and to create personalized badges.

*Trainer comment:
"This provides a useful aide memoire in courses that are arranged as short blocks, perhaps separated by several weeks."

The day starts with a very brief (10-15 min) outline of what the course contains and what Day 1 contains. Each trainee is given a set of worksheets containing details of every program to be used and instructions for using them, a description of every task, and assessment tests to be completed at intervals throughout the course. In addition, each trainee is given a folder containing the disks that are be used for the week. It is stressed that it as important to retain the same set of disks, because the data or text is cumulative, being held over for use in different modules of the course.

The first task of day 1 (45 mins) is concerned with keyboard familiarity. Sitting at a computer that has been powered up and using the keyboard as necessary, answers to such questions as

"What does the shift key do? How is a computer keyboard different from a typewriter keyboard?" are filled in.

Following on from this there are several keyboard tutor programs available, with progress from one to another dependent upon scores achieved. The purpose is not, of course to train the trainees in keyboard skills but simply to make them comfortable and a little faster at moving around the keyboard during the training course and, afterwards in the work place.

*Trainer comment:
"It is important for the flow of the course and the confidence of the trainee,to have the computer switched on, the first disc in the drive ready and the initial programs loaded automatically. Nothing disturbs trainees more than having everybody wait while the trainer tries to fix some hardware glitch, that should have been dealt with before they came in the room."

During the process of this and other, subsequent tasks, scores are recorded by the trainees in their workbooks and by the tutor on a flip chart.

*Trainer comment:
"This activity picks out trainees with prior keyboard experience. Many trainees enjoy competition and respond to a challenge, but you must be sensitive to the trainees who become overawed and fretful of public ridicule. Try to make them compete with their own best performance. It is important that trainees know that their progress is closely monitored."

The second task (45 mins) begins after a 10-15 min discussion session which has usually begun during the coffee break. It aims to draw from the trainees the extent of their previous computer experience, at school, at home, in the work placement. There then follows a "circus" of three activities, so called because there is no particular order or speed at which the tasks must be performed. They are as follows:
"Spell", in which words appear briefly on the screen and must be entered.
"Blank", in which a word missing from a sentence must be typed in
"Quiz", a multiple choice format quiz.

*Trainer comment:
"These tasks are designed to develop the use of letters, shifted letters, delete and enter/return, as well as the idea that using a computer involves responding promptly and accurately to information on the screen. This activity shows up trainees with reading problems."

*Trainer comment:
"In each of these activities, the file of questions relates to catering (for this group) and to the trainees' developing knowledge of computers. The latter task ,"Quiz", remains a background task for the rest of the week to be taken up by any

trainee with time to spare. In practice trainees return to this program repeatedly to improve their scores."

At the end of the morning session the End of Morning quiz is completed, in a fill-in-the-blanks format.

The afternoon session starts with a demonstration of the parts of the computer(15 mins), trainees are shown different types of media, encouraged to discuss their own experience of cassette loading computers, networks at school etc.

The third task of Day 1 (45 mins) is to find the appropriate disc, insert it into the drive, call up the list of programs in the directory, load and run these programs and then write a brief account of the program, as though reviewing it, on a given form.

Among the programs that the trainees can call up are business simulations, text adventures and numerous computer aided learning programs concerned with numeracy and literacy.

Task four (45 mins) Is concerned with the actual running of programs with the trainees given their choice of programs to explore and also offered manuals to consult for further details of programs that interest them. Among the programs available in this session and throughout the course is a flight simulator, a Prestel style Health Data base, trivia quizzes. The Quiz is also still available and the afternoon must end with the completion of the End of Day Quiz and a demonstration (if necessary) to the tutor that each trainee has achieved competence in handling media, consulting directories, loading and running programs.

*Trainer comment:
"We allow no real games to be used in our courses. Some of the educational programs do look like games. The flight simulator program has no serious purpose, but it does come with a thick manual that must be assimilated before any serious flying can be done."

DAY 2: Introduction to wordprocessing

The day starts with a brief (15 min) introduction to WP with a reminder that some files created today will be stored and used later in the course with the desk top publishing task.

Task 1 (90 mins) requires the trainees to start up the WP program and type onto the screen just to see how it looks, then to exit and save their work. The importance of saving the text is heavily emphasised. From there the trainees go on to typing in text presented in the work sheets in handwritten form. This includes recipes, messages and stories. These must then be proofread, checked with the tutor, saved and, where the computer is hooked up to a printer, printed otherwise saved for later printing.

*Trainer comment:
"Our evaluation procedure works mainly from the saved files, the text is marked by a spell checker program."

The second part of the task is to load and edit documents. In practice each of these documents (which concern catering and hotel related topics) exercises a particular wording function or combination of functions. These files can be checked, saved, printed or placed in a print queue so that all printouts have been obtained by lunchtime.

*Trainer comment:
"The mistakes in the first group of documents are always obvious; they usually consist of repeated letters or phrases, missing letters or incorrect letters. Some of the later files are designed to have more subtle grammatical errors."

Task 2 contains a brief outline of Desk Top Publishing and the ways in which it is likely to be used in the Hotel/catering industry. The trainees divide themselves into editorial groups of threes to produce text files on a choice of topics (e.g. a weekly "What's On" hand-out for hotel bed rooms, brochures advertising services and prices, historical/ topical background to their establishment.)

The files must be checked by the tutor, acting as the "publisher" and final arbiter of good taste, in rough draft form, typed in and saved for use on day 5.

*Trainer comment:
"It is important to have tasks that require teamwork and planning. The trainer has to carefully steer the trainees away from over ambitious projects and towards ones that are feasible. It is also a good idea to have a selection of stories prepared for trainees who are unable to write their own."

The last task is designed to provide some relaxation and teach some advanced wordprocessing functions. Trainees are asked to call up a directory of files. load and edit a document from choice of two indicated in their workbooks. These documents (a rather purple love story, and a blood and guts thriller sequence) appear in the wrong chapter order and must be reordered using block commands. Trainees can then use the search and replace functions to personalize their stories by changing the names of the characters.

All printing completed, the end of day quiz and wordprocessing terms quiz are given.

DAY 3: Word processing (Continued) and Files programs

Task 1 (90 mins) begins once any tasks from Day 2 have been completed. Trainees are asked to type in a letter of application for a job, chosen by them, from those advertised in the copies of

HOTEL and CATERER magazines which are made available to them. A sample of the type of letter is given in their workbooks. They must then, again following a pattern, write a profile of themselves. This work is checked in handwritten draft form by the tutor before being typed in. The profile must be formatted so that the text fits around a polaroid photograph taken of them by the tutor, and printed using first draft quality and then if approved in letter (or near letter) quality print.

*Trainer comment:
"Each stage is checked and approved before continuing. The most difficult part of the exercise for the trainer is to make them think of hobbies and interests other than watching television and going to the pub. Almost all of them have some valuable skill or talent to describe but it is so familiar to them that they often do not see its importance."

This task lasts all morning although fast working trainees have extra files available (introducing proof reading symbols), stories or articles to type in for their publicat n or to catch up on a quiz.

The first task in the afternoon (45 mins) concerns using computers to process numerical information. Trainees are require to input petrol consumption data accurately from a log, call up graphs of the information and interpret them to draw conclusions about which vehicle requires servicing.

Trainees are introduced to spreadsheets via the typing in of pre-prepared cash flow data from four hotels. They are required to produce cash flows and decide which hotel manager has been most effective and therefore should be promoted (45 mins).

*Trainer comment:
"The trainee's overall petrol consumption figures and cash flow totals are collected on to a flip chart, this provi es a chance to monitor their own accuracy of working."

The day ends with a CAL program concerned with budgeting on a low income. The program usually provokes heated debate.

DAY 4: Database program, PRESTEL and electronic mail

Day 4 star s with an explanatory talk about data bases (about 15 mins). The first task concerns an imaginary hotel where the trainees are responsible for recording in the database the transfer of daily requirements of food for the kitchen and for receiving delive ies into stock. This means that the trainees carry out one week's worth of transactions (about 50) on a pre-created food and catering supplies data base.

The early transactions are very easy (the information given on the invoice or delivery note is complete and in the same order as the data entry form) but they become more difficult and require more decision making with regard to for example, the location of items according to the stale dates and the categorization of certain food stuffs.

*Trainer comment:
" We invite trainees to comment on the contents and handling of the data according to their experience in their placements. The task involves simple arithematic and verbal reasoning. To make the task realistic we invoice for non existent stock items, ask for more than is held in stock, deliver new items that have to be given a stock code. We have built in to the database a simple method of checking accuracy of working."

The task is complete when a search has been carried out for all out of date stock and a print out obtained of stock needing replacement, a search for all foods of a given category, and stock near to its stale date. If an extension is required to this exercise it can be linked to the next task by requiring trainees to plan menus using up near-to-stale-date foods.

The second task uses menu planning software, the trainees are invited to plan menus appropriate to four banqueting functions described in their workbooks.... a wedding breakfast, a medieval banquet, a St. Patrick's Day Dinner and a Horror Banquet (for light entertainment). Menus are constructed from the choices stored in the program. The menu must then be saved to disk for later use in the CAD portion of the course. The task is completed by the production of a print out of the menu, of a scaled shopping list and of the recipes.

If extension work is needed, the results from this program can be integrated with a spread sheet which provides a costing per setting appropriate to the meal.

The last task of the day is concerned with PRESTEL and electronic mail. A section of PRESTEL (comprising several hundred pages) is available off line to the trainees allowing them to explore the system and to find answers to questions which simulate those that may be asked at a reception desk of a hotel in Scotland. The questions consist of requests for sightseeing, travel and accommodation information. The questions vary in difficulty from easy to very tricky and require some considerable thought and patience.

*Trainer comment:
"Some questions are answered directly from information on an index page, others require information from screens b,c,d of a page at the end of a long chain of choices. We could never afford to give trainees this amount of time to develop search strategies with real live PRESTEL. The hunt for information can become compulsive (with the bus home waiting outside) for the trainees determined to find out the cost and times for the ski lift at Glenshee".

DAY 5: Computer Aided Design

The day begins with a 15 minute introduction to a range of uses of Computer Aided Design in general and of its applications to the hotels and catering industry in general.

The first task of the day uses a program which will print out the menus produced on Day 4 in decorative fonts, appropriate to the particular menu: for example, the horror banquet prints out in Gothic and the Medieval in Old English script.

The printing of these menus takes up considerable time at the computers linked to the graphics printers but there are other design tasks available, such as using a mouse and an art program to design a hotel room layout, or to design a "theme" fabric for a chain of hotels/restaurants.

If the time is available at this point trainees can call up their digitised pictures produced on day one and print them using a ribbon that creates an iron-on transfer for T-shirts that they have been invited to bring along.

*Trainer comment:
"These tasks can take a long time. Getting CAD images printed is very time consuming and some of the design tasks can be very open ended. It is good commercial experience for the trainee to have to schedule work to be completed by a deadline."

The second task fills up most of the afternoon. It consists of groups of trainees using a desk top publishing simulation, graphics programs and wordprocessing software. The teams of three trainees who typed in their editorial copy on day 2 now put together their publication. They have to plan the layout of the page, the size and font of the headlines and the pictures. The selected digitized pictures are "cut" to size and their position on the page decided on. This is where some of the real debates take place as stories and pictures are relegated to the back page. The prepared text printed from the wordprocessing program is formatted into columns to give an idea of the space it takes up before merging it with the page. Making up the page is a taxing and slow process but a considerable achievement.

At the end of Day 5 the week is reviewed, there is a quiz to complete and the trainees are asked to sign and agree a competence document which has the records of their performance and achievement of each task according to the following scheme:

4: able to complete task alone

3: able to complete task with a little help from tutor

2: able to proceed alone from time to time

1: able to proceed only with continual help from tutor

*Trainer comment:
"The second half of the course would be concerned with tasks based on setting up databases, spreadsheets and more complicated documents: e.g. designing forms, mail lists and labels in wordprocessing, designing videotext information systems as well as some more consideration of more sophisticated operating system commands. Realistic but simplified data for these tasks would be supplied and towards the end of the week they would do the preparatory work for a project based on data researched from their workplace. These would mainly be group projects for which they had collected their own data and designed to cover many applications programs: e.g. planning a banquet (including costing, room layout as well as advertisement), working out a tender for a conference weekend, designing a cleaning schedule for their placement kitchen (including layout, checklists and timing). In the second week we would hope to put the trainees through some form of certification. This has still to be chosen by the MA. We are still negotiating the second half of the course with the MA.

One of the problems that we have at the moment is that we are changing computer equipment over from mainly BBC B and some business computers to mainly IBM compatibles and some BBC B. There are educational applications that are not available for IBM compatibles. In the first half of our courses we spend very little time on operating systems commands, almost all of our programs automatically load and most applications have their own commands for loading and saving data. We plan to use icon driven operating systems for both sets of machines in future.

We think it is important to provide a course with a slow, a middle and a fast lane. We are looking out for trainees with literacy and numeracy problems as well as monitoring those who just get bored and careless. We think it is important for trainees to be able to work co-operatively, and even competitively, if they are to be effective and get on in industry."

CASE STUDY TWO:
IN-HOUSE CIT FOR RETAIL TRAINEES IN A DEPARTMENT STORE:

The survey of CIT training carried out locally indicated that most former Mode A schemes were "buying in" their computer training from ITECs, Colleges of Further Education or private providers. However, one MA was providing their computer training in-house and they were visited to find out how this training was progressing. They intended to introduce applications of computers into each session of their off-the-job business course. Trainers had lots of good ideas although they had only implemented a few due to lack of time for development. In the current year trainees are being entered for the first time for the RSA first certificate/diploma in retail distribution. The course guidelines allow for various objectives to be met by using the computer.

Background

The MA has had YTS trainees since January 1985. They were chosen by the area MSC office to work with the ESF YTS/Core Skills project. Originally they were MA for their own trainees plus a number of sponsor placements but they no longer use sponsor placements.

In the past they have tried various means of providing computer training including a college of FE, an ITEC and a private provider.

The course at the College was held in 1985. It was only the second course provided by the college for a YTS scheme. It was delivered in a 5 day block during the summer. Prior to the course there was negotiation on the content between the trainers and the college lecturers. The trainers thought that the lecturers had understood their requirements but in fact the course was not what was expected. "The standard of lecturing was superb for someone doing a degree course". The content was not relevant to their retail trainees. They were shown films on the manufacture of computers and how they work. They did some word processing and played some educational games. The facilities were good; lots of computers; lots of technicians.

Next they tried a private provider, also a 5 day block. Again they spent a lot of time negotiating the content and the course looked good on paper but in fact proved to be unsatisfactory. The tutor could not relate to the trainees and the content was not relevant.

By the following year the ITEC had opened locally and a 2 day course was arranged there. The ITEC was having some difficulty organising its own equipment and no two trainees were using the same computer. The staff did not communicate well with the trainees and the approach was too specialist.

A decision was then made nationally by the company YTS

instructors for each store to have its own computers and provide in-house computer training. This decision was made because outside provision was costing so much and because of the poor quality. BBC computers were chosen because of their widespread use in education. The store took delivery of a BBC computer with Torch second processor. However, only one other store in the region ordered similar equipment, so there was very limited help with the development of CIT activities.

No member of staff has had formal computer training. They do not have enough time to attend courses but the YTS training officer, has been on all the courses provided for the trainees. The personnel officer has a husband who works with computers and she has learned a lot from him. It was the intention to recruit someone part time to develop and supervise the computer training. Finding a suitable person has been difficult. They cannot offer a rate of pay which would attract a person with the range of skills that they require. The combination of skills is probably in short supply i.e. familiarity with BBC, with the software available, awareness of the applications of computers within retail. They have now recruited another person who has an O level in computing, is familiar with the BBC and has some retail experience.

Description of planned CIT Provision
The personnel officer has developed an off-job programme of 20 sessions and it is her intention to include relevant computer activities in each of these. One session is devoted entirely to computers. The programme has not yet been fully implemented, but an outline of this programme is given below.

The trainees form groups of three or four. Each group decides on the type of retail business they want to run Where appropriate the following off-job sessions are related to the type of business they have chosen to run or to their on-job training in the store:

Session 1. Researching the business.
Identifying the type of premises they need. Finding suitable premises by visiting estate agents, examining their catalogues. Finding out rent/rates in various locations e.g. Enterprise Zone, City Centre. Hopes to use computers to compare costs between areas, and to draw plan of ideal premises.

Session 2. Establishing the Business.
Deciding what they are going to sell. Doing market research. Hopes to analyse the results of research on the computer. Doing survey of parking facilities, cost and time. Trainees currently do a comparative shopping project comparing type of shops in different towns which requires them to draw a pie chart Would hope to do this using a computer.

Session 3 Legal requirements.
Forms of business e.g. sole trader/partnership. Would like

trainees to take notes during this session then use word processor to produce handouts.

Session 4 Naming the business.
Deciding on a name and designing the logo. Trainees are using AMX Superart to design their logos.

Session 5. Computers.
Whole session devoted to computers. How they work; where they are used, e.g. travel agents and police; types of computers. Investigating the home computer market by looking at up-to-date magazines and extracting information.

Session 6. Staffing the business.
Designing an advert using the wordprocessor and the logo. Designing an application form using a word processor. Preparing interview notes using a word processor. Storing employee details on a data base.

Session 7. Business capital.
Forecasting how income will be generated. Hopes to use a spreadsheet.

Session 8. Cash Flow.
Taking into account "beginning of season peaks" in demand. Again intention is to use a spreadsheet.

Session 9. Buying.
Comparing manufacturers' price lists. Hopes computers could be used for this. Also would like to get invoices, orders and delivery notes produced by computer.

Session 10 Promoting and marketing the product.
Advertising. Designing advertisement on WP and using logo.

Session 11. Merchandising and displaying stock.
Involves colour co-ordinating displays etc. Would like to derive best-sellers list from info collected by trainees in their own department. Displays arranged according to this list then sales monitored and adjustments made to displays as necessary.

Session 12. Taking stock.
Wants to use computer-based stock control.

Session 13. Consumer legislation.
Trainees take notes during session and produce handouts using WP.

Session 14. Customer service.
General manager needs to log all customer complaints. Would like to analyse these using computer.

Session 15. Credit Arrangements.
Look at interest rates of various companies. Would like to compare using computer. Would like to devise a computer activity

that would help trainees understand compound interest, APR.

Session 16. Deliveries and stores.
Store delivers over a wide area. Would like trainees to analyse deliveries which could perhaps lead to a more efficient system.

Session 17. Security.
Possibly use computer to analyse shoplifting statistics.

Session 18. Holding a Sale.
Perhaps computer could be used to analyse effect on profit margins of mark downs.

Session 19. Planning meetings.
Word processing of agenda and reports.

Session 20. Business Newsletter.
Produce an article for a newspaper promoting their business. Using Pagemaker package.

It should be stressed that the use of computer is not implemented in most sessions because of lack of time for development and previewing software. Also problem of arranging to preview: local supplier does not always have things in stock for them to see. COIC is the only organisation which sends them information on software. Knowing what is available is a problem. They are encouraged by the resources of the Accredited Centre being available for viewing and intends to attend next meeting of support group. There seems to be a lack of material which can be used off the shelf. Would appreciate a help line where they could get advice with technical problems.

Believes computers should be seen as machines that are there for use when required. So far trainees have been taken off shop floor to produce CVs which they are encouraged to send with job applications. They have also designed logos in small groups using AMX art. Next task is to get them using WP to produce business letters. They also use COMPET to analyse which core skills are used in various tasks.

They have the following software: AMX Superart; Pagemaker; Viewsheet; Scribe; Wordwise; Supermarket; Competence Analysis. They are going to buy a spelling checker program in conjunction with WP as some trainees have problems with spelling.

Trainees reaction: they love using the computer, and we have difficulty get them off it.

Development
The above shows that trainers may have interesting ideas for the application of CIT, but that they may still face a number of problems before they are able to implement such ideas. It was therefore agreed that one of the consultants to the Project (Moira Turner), who had also been instrumental in the set-up of a

Support Network based on the local Accredited Centre, should work with the MA upon implementing their ideas for CIT training in YTS.

They had spreadsheet, stock control data base and mailing list software but were not using them with trainees because they did not have enough time to become familiar with them themselves. It had taken almost a year to become conversant with the packages that the trainees were now using: wordprocessing, Superart and graphics. They had ideas about how other packages could be integrated during the 20 session business course and wanted any help that would speed up their familiarisation with these.

It was agreed that support could take the following forms:

- Write clear user notes for the stock control, invoicing and mailing list software programs;

- Set up an example file of employee records on the data base package;

- Design a spreadsheet for calculating the APR on credit cards and for forecasting cash flow.

These tasks were carried out and during a two hour session, the programs and spreadsheets were demonstrated to the training staff. By the end of the session they felt confident to use them with trainees. It is planned that these programs be used as follows:

- **Stock Control**
  Trainees will collect information from their own departments to process during session 12 of the course.
- **Invoicing**
  Trainees will use this to create invoices during session 9 and will superimpose the logo created using superart onto the documents.
- **Mailing list**
  Will be used for mail shots during session 10.
- **Database**
  Will be used to create an employees details file during session 6.
- **Spreadsheets**
  Trainees will investigate credit card terms and compare using APR spreadsheet during session 13.
  Cash flow spreadsheet: the forecasted figures will be entered over the first 7 sessions of the business package to be completed in session 8. Thereafter actual figures will be entered and comparisons will be made with budgeted figures.
  Personnel Officer also felt that this spread sheet would work well with management trainees.

The training staff felt that the help they had received would reduce their development time by months.

A further visit was arranged to find out how implementation was proceeding and to discuss assessment of computer activities as part of the RSA certification in Retail Distribution.

CASE STUDY THREE: `TAILORING' OF CIT TRAINING FOR A WIDE RANGE OF OCCUPATIONAL GROUPS

Computer Training Services (CTS) have been undertaking CIT traianing in YTS since 1983. They have had trainees with widely varying experience and qualifications, both in relation to CIT and education more generally. However, they quickly established a reputation for dealing with trainees, who had difficulties with the standard provision of a number of other providers.

As a result CTS has specialised in producing training packages for trainees who have learning difficulties. This may be due to a physical or mental handicap, literacy/numeracy problems, language difficulties or behavioural problems.

The training therefore has had to be relevant, practical, easy to understand and fun, whilst being flexible and adaptable to all ability levels.

Training Packages have been developed to show, in a realistic manner, the use of Computers in Industry and to relate directly to the young person's Occupational Group. The training is customer-based and additionally develops the trainee's perception of customer/trainee relationships.

A typical scenario for a horticulturist:

The trainee is placed in the Reception Area of a Garden Centre and by extracting information from the customer the trainee can recommend the most appropriate tree, shrub, plant or flower, currently stocked by the Garden Centre. The trainee is given, through a series of `easy to understand' illustrated literature, background information regarding the staff of the Garden Centre and the Manual systems already in existence.

The introduction of a computer is discussed so that the trainee can be aware of all possible problems and also have cognisance of the usual objections to the installation of a computer system. The trainee then works through a number of structured tasks, which become progressively more difficult, in order to develop computer-based techniques. As it is important that the trainee understands that a computer is only a tool to be used as any other tool, other skills are developed such as general strategies for dealing with customers, production of an order, a business letter, using an appointments diary, multiple problem-solving, developing skills to handle customer complaints, etc. The program is self-monitoring to check that the correct information is keyed-in and has in-built consolidation and feedback

facilities.

The original concept has been used to train several thousands of students and is, of course, modified, amended, up-dated and validated constantly. The approach has received particular recommendation from MSC area and regional staff.

CTS has lately been approached by Managing Agents and those providing CIT training to make these packages more widely available and this is planned for early 1988. The aim being to train `the trainers' in the use of the programs, but also and more importantly to stimulate trainers to adapt this concept to their individual student's needs. After all they know their students requirements and problems, better than any off-the-shelf software can possibly hope to address.

The packages are intended to act as a support to computer tutors who have not as yet been able to develop double competence. The training has also proven useful for all Scheme staff to help them in a realistic way understand the relevance of CIT to the trainees.

To maintain quality training, the assessment and accreditation procedures are currently being reviewed. At present it is possible for the trainee to build up a portfolio of their achievements within the CIT area and relate this to the overall external accreditation being sought be a centre. The training package allows the trainees either from the same occupational background or from widening diverse disciplines to work on projects simultaneously.

Areas so far developed include: Horticulture, Retail, Motor Vehicle Repair, Catering, Travel Agency and Carpentry. Under development are Office work, Hairdressing, Bricklaying, Warehouse, Hotel Work, Metalwork and Upholstery.

In summary then, CTS have developed an interesting and innovative approach to the delivery of CIT training in YTS. They are now looking to disseminate their experience and possibly help establish networks to discuss issues relating to CIT training development and delivery. Only a flavour of their approach has been given here, but further details can be obtained directly from:

Jean Yates,
Computer Training Services,
50 Tenby St. North,
Birmingham, B1 3EG
Tel: 021-233-3465

APPENDIX 4

Issues and opinions: collected opinions on Good Practice

These are a selection from the opinions of practitioners and trainees in YTS collected so as to form a simulated debate on the issues concerning "good practice". The majority of the opinions were collected and stimulated by regional working group meetings, others were the results of visits and interviews made as part of the research. The first set of (shorter) quotes relate mainly to trainee attitudes towards CIT and training, whereas the latter set contain more general reflections upon various aspects of a strategy for CIT.

"The games were not relevant to agriculture but they relieved the tedium of the programming."
Agricultural trainee's comments on a CIT course appraisal form.

"Sometimes trainees feel that they already know it all, especially if they have done computer studies at school. They want to leave jobs half finished because they say that they've 'got the idea' and want to do something else. When you check, their work is full of mistakes."
CIT trainer

"Giving out all of the task sheets in one go was a bit of a mistake. They just worked through their breaks and I was left scratching around for tasks by the end of the week."
CIT trainer

"I've learned more about computers here in five days than I learned in two years of computers at school."
Trainee comment. (Expletives deleted)

"I think computers could be used for artificial insemination of cows"
Agricultural Trainee's answer in a questionnaire about uses of computers on the farm.

"This is just like school! I thought when you got a job you wouldn't have to do what people told you!"
Disgruntled trainee

"I think the motivation and interest for CIT comes from school. We often have trainees who say that they don't like computers, and when you ask them why, they say that the computers in their school were only used by the brainy kids, and they weren't allowed to touch them."
Training workshop manager

"We have a lot of trouble motivating our trainees to work on computers, the worst trainees are the construction multiskills trainees, the easiest are the clerical and admin."
Northern workshop manager

"On the contrary, all our trainees are interested and keen on computers. We don't have any trouble interesting our multiskill trainees in using computer applications."
Southern workshop manager

"Our scheme provides engineering placements. Some of our kids are very resistant to having to do, say, electronics if their placement only gets them to do welding."
Scheme manager

"We operate our engineering placements inside our own factory. We move our trainees from section to section, and they see that all of the CGLI700 skill areas are important to the final product. We don't have any trouble with motivation."
Another Scheme manager

"I am only going to work with cats. Why should I have to wordprocess things about the symptoms of dog ailments?"
Veterinary scheme trainee

"I question whether CIT is relevant at all to some trainees. Agriculture, horticulture, building trades. They're never going to use it and they are not interested in doing it. I took on contracts to provide the IT training for groups of these trainees, the aggravation wasn't worth the money!"
Manager CIT training provider

"Current estimates relating to the use of computers both now and in the future would seem to suggest that the input of CIT in two year YTS may not be adequate to meet the long term needs of some trainees, and for others, may be of little real value at all. If, for example, we look at two occupational areas, chosen from opposite ends of the YTS spectrum, Clerical/Admin and Horticulture. Under present guidelines the requirement for CIT is the same for both programmes. One only has to look at the developments currently under way in office environments to realise that the CIT requirement in clerical/admin training falls far short of the true requirement, while conversely, the use of computers in horticulture can hardly be deemed a 'growth area', and is, therefore, less relevant both now and in the future."
ITec Manager

"With building trainees, there's none so thick as can't cope with a database, not if it's introduced in a pleasant way.
Bricklayers might not use computers in their everyday work, but what about when they become self-employed?"
CIT trainer

"I can't get my trainees interested in computers. I turn my back and they run away outside. They won't do what I tell them, they won't listen and they say everything they do is boring.....There just isn't the right kind of software available!"
Harassed trainer

"I've come into training from being a teacher. The kids don't respond very well if you talk to them like they were still kids in school, so you have to find other ways of keeping control. If you don't control what they do, they won't learn anything. You have to have lots of things they can do ready; wordprocessing, questionnaires, quiz programs, fill in the blanks: all made up so they use simple language about computers, their interests or trade. This will keep most of the kids busy while you have a breathing space to deal with the kids with the real problems."
Workshop CIT trainer

"It's a mistake to think of the trainees as not effective people. They are sometimes very skilled at avoiding doing things they don't want to do. I couldn't avoid learning to read and write. I do lots of things I'd rather not do. YTS is probably their last chance."
Workshop manager

"When we did computers at school, we were left on our own, most of the time. The teacher only looked in if we made too much noise."
Trainee

"The kids you have to watch out for aren't always the noisy ones, you can have some, who when they can't do something just sit staring at the wall, sometimes for hours."
CIT trainer

"We often find groups of trainees that want to carry on and work through their lunch and coffee breaks. You have to slow them down, sometimes, or they will be exhausted by the end of the week."
CIT trainer

"I sometimes get a bit bored in some of the training sessions. You show the kids how the task goes, they load the program and they start to work. I go around to see if they need help, but it's obvious that they'd rather I went away and left them to get on with it."
CIT trainer

"The following points do not serve any particular teaching domain and should be viewed against a background of changing subjects for those engaged in education and training. Relevant applications of the technology should be sought at places of work or by consulting professional and trade journals.

Some element of programming should be taught in order to give the student confidence when confronted with something 'invisible' like software. This also enables a student to develop hidden talents in this field and so enter another employment situation to advantage.

Explain the user-electronics-data relationships as simply as possible. For example, in respect of character representation and the binary circuit.

All tuition should remain free from particular systems.

Make sure that the use of the computer system relates to the work-area. Some research will be necessary. Some examples with respect to the arithmetical/logic area are:

Building- number of bricks for a wall
Engineering- cost of a welded joint
Catering - cost of a menu
Motoring - customer's bill for repairs
Pharmaceutical Manufacture - friability estimate

Encourage checking of what appears on the screen, especially when this involves arithmetic.

Produce detailed documentation for each example.

Remember that the use of a computer involves communication in more than one way.

Numerically processed data should read sensibly: e.g. an estimate for a number of bricks presented as 2356.7345 is not acceptable.

Plan for situations in which few systems are available, perhaps just one."
Head of FE department

"Since the introduction of YTS in the early eighties, schemes have been left to 'fend' for themselves when it comes down to organising and arranging training in CIT. This has resulted in wide variations across the schemes, in terms of what they deliver in the CIT core.

If we accept the viewpoint that CIT is 'good' for all YTS trainees, irrespective of the occupational training they are following, which in itself is debateable, then there are good reasons why a national standard of achievement should be considered even at this late stage.

1 Consistency of provision
2 Recognised vocational qualification
3 On-going use of CIT at the workplace
4 The need to recognise a basic right to literacy of a new kind, in a similar way to which the '3Rs' were traditionally considered as the cornerstone of education.

Information Technology skills can be categorised under two main headings:

-Skills required in the workplace
-Skills required to help us function in our everyday lives. (CIT life skills).

IT skills in the workplace are relatively easy to define; wordprocessing, database filing, CAD/CAM, computerised accounting etc. IT skills used in our everyday lives are somewhat less specific, but could include cash dispensers, credit card telephones, etc.

The fundamental question in YTS is should we be attempting training in both aspects of IT or should it be restricted to skills used in the workplace?"
ITec Manager

"BACKGROUND
In any workplace where something is made or built materials have to be bought and worked with to produce the finished job.

During your placement with the jobbing builder you will have been learning practical skills using materials bought by the builder.

Any job that the builder does is paid for by the customer so it is necessary to know what materials have been used and how much they have cost.

While you have been working in your placement you will probably have noticed that when bricks have been delivered some have been broken, or when materials have been left overnight some have been spoiled, by children playing in the sand, for instance. This waste has to be allowed for when working out the total cost for materials.

Most builders work out the material costs on an evening so you will probably never see this work being done but it is nevertheless a very important part of the job.

PURPOSE

This project deals with work connected with what you are doing now but also aims to develop new skills that are important in other jobs as well as life outside work. ...etc"
Introduction to a work based project

"The first thing that must be impressed on trainees is 'good housekeeping'. I personally go into great depths on the very first CL session about the benefits of treating disks in the correct manner i.e. handling of disks, correct storage of disks, areas to avoid e.g. magnetism,drinks etc.

At this point, I also go to great pains to tell them that I personally have backup copies of anything they will come into contact with in the centre in order that they should not be afraid of the machinery or software that they come into contact

with. Even though most trainees have had some, albeit very few, computer studies lessons at school many still have an inherent fear of computers.

I have found over the years that sticking at first to wordprocessing packages helps. This enables trainees to become at ease with the computer and therefore feel more confident. I actually keep a data disk with many small wordprocessing assignments stored thereon in order that I can copy a few assignments onto each teaching disk and give each trainee a sheet with the assignments on it but with manuscript corrections to enable them to become totally competent at editing material.

Bearing in mind the standard of trainees, I feel that we have to keep all CL sessions to a subject to which trainees can relate. I personally keep all monitoring details on database e.g. trainee name, placement, area of the city, YTS group, date last seen. They can therefore see a reason for the database program and can readily accept the need for such."
CIT trainer

"Our information technology and computer awareness module is not taught as a single block of lessons, but interspersed with other subjects of the course.

Because our trainees are taught to type we do not find their prior ability to use a keyboard is any real advantage in computer work. The MSC concept of teaching programming we have not found to work. We do introduce the ideas, but at a very elementary level.

There are two areas of general interest. From rather general enquiry it would seem that the schools Micro Electronics Project has had very little impact at least on the YTS entry we have which is mostly female. Secondly, despite the MSC view it seems to us that in small business the computer has yet to make the impact anticipated and many of our work placements do not use them."
Manager private training provider

"Elements of CIT to be included in YTS:

Computer literacy- hardware, software, common computer terms. Applications of computers: which type of packages are used for which application. Outline of how computers, and their uses, have changed over time.

Programming: elements to include INPUT,PRINT ...

Wordprocessing, database, spreadsheet, (hands on experience of a package, preferably a commercially acceptable one.)

Students should appreciate that databases/spreadsheets form the basic building blocks of more specialised packages eg stock

control, payroll, sales ledger etc and 'hands on' experience of those packages that relate to the trainees employment."
CIT trainer

"Our company does the YTS training for many large retail schemes trainees. Most of the managing agents want us to use CGLI 9441 retail/distribution where there is an option for CIT. None of our places take CIT as an option, and instead we do CGLI726 modules. We do have one large managing agent who does the RSA vocational retail scheme, but they have negotiated the content so that it specifically does not include the CIT competences. They get us to do CGLI726 modules instead. The only problem with the 726 scheme is that it requires our trainers to carry around a large, secure, heavy, metal box with the assessment material in. That is in addition to all the computer equipment."
Manager, private training provider

"We prefer the Pitman courses, they are 100% 'hands on' and ideally suited to short block release courses. They provide a specific qualification to quite a good standard and the trainees regard them as vocationally useful. The theory papers of the 726 scheme are a daunting obstacle for many trainees, while the profile sentence approach of CLAIT has a 'Jack-of-all-trades-master-of-none' touch."
CIT trainer

"We have changed over to the RSA CLAIT scheme because we find it is the ideal approach for our trainees. It is completely practical and almost all of our trainees get at least one application."
CIT Trainer

"How do we measure a good CIT programme?
-Training is work related
-Demonstrates the relevance of computers in and away from work
-Fully integrated 'off-job/on-job' programme
-produces an end product
-allows for initial assessment,ongoing assessment and record of achievement
-should highlight core areas
-should emphasise skill transfer".
Guidance document for CIT from an MSC area office

"The supervisor encourages a low ability trainee and the trainee has made progress. The mother of the trainee was very impressed with what YTS had done for her daughter and, in particular, by the certificate which she had gained for computer literacy. This was the first certificate that the daughter had acquired so the family had it framed."
Computer training consultant

1 J.J. Wellington et al conducted the "Skills for the Future" project which set out to investigate the links between education and employment in the field of information technology. They concluded: "the search for an indication of "skills for the future" is a fruitless and mistaken one. In a period of continuing technological change the emphasis is increasingly likely to be on general abilities rather than specific skills" ["Skills for the Future", University of Sheffield, 1987].

2 Openness should be equated with `open-minded' in that trainees are prepared to make judgements about its use and their role. That is, `automatic hostility' and `unthinking acceptance' are **both** inappropriate responses to the introduction of `new technology'. If the promotion of a critical perspective appears controversial, it should be remembered that uncritical approaches to (or `unthinking acceptance of') `new technology' have been much more costly than have the far fewer but often well-publicized instances of opposition to its introduction. ["The right tune to play in the office", Computing, 21/5/87; R. Pye et al "Profiting from office automation: the way forward", DTI, 1986. See also I. Aleksander "Mind over matter", THES, 3/4/87 and "Beyond Information Technology: the Force of Human Reason" Journal of Information Technology, June 1987.

The case for the development of a critical approach and the need to ensure the overall primacy of purpose is persuasively argued by G. Boomer in "Zen and the art of computing", Adelaide, 1983: "computers, like writing, should not be considered separately from the purposes and values being served ... the least we can do is to make sure that learning with the assistance of computers if carried out by learners who are active, critical and in control".

3 Working alone has for long been an inappropriate paradigm (perhaps conjured up by vision of the lone `programmer' and the profileration of home micros). At all stages work with IT is likely to involve `working as a member of a team' even if on occasion one is physically isolated. [J. Anderson "New Homeworking: a case study of IT as social relations", O.U. (DT200), to be published in 1988].

4 These are precisely the type of objectives which, according to the NEDC report "Competence and Competition" (1984), are promoted in the vocational education and training systems in Germany, the United States and Japan but are often sidelined in this country: "the aims of educational training (ET) in the other countries are explicit. They consciously have such training objectives as team work, flexibility and the desire to learn. In the UK, the tendency is to regard these as `personal qualities' rather than `vocational outcomes'."

PART TWO : POLICY RECOMMENDATIONS

A. POLICY RECOMMENDATIONS FOR THE DEVELOPMENT OF GOOD PRACTICE IN CIT IN YTS

AIMS AND OBJECTIVES OF CIT IN YTS

RECOMMENDATION

"The overall purpose of CIT in YTS should be to develop in each trainee an `IT capability'".

The stress is on a `capability', because a key element is the development of skills, attitudes and behaviours such that the trainees are able to respond to IT-related demands placed upon them in the future.

Overall purpose relates to objective 2 of NTI: equipping trainees with comprehensive vocational preparation. This means that CIT training is relevant for all trainees, because at some stage in their lives (even if not at present) they may need to make use of IT at work. However, change in this area is extremely rapid, and it is hazardous to try and predict what will be the precise skills required in the future (1). What follows from this is that above all CIT in YTS should seek to develop `openness' towards the use of IT (2), ability to work as a member of a team (3), flexibility in response and a willingness to learn/undertake training etc. (4). The development of a general `IT capability' should therefore be seen as a fundamental component of occupational competence (5).

As the emphasis upon the importance of the development of an `IT capability' is critical, then the argument is given at some length in the Appendix.

RECOMMENDATION

"The objectives of CIT in YTS should be as follows:

- to develop an awareness of and familiarity with IT
- give an opportunity to demonstrate possession of more general skills (transferable core skills) in IT-related contexts
- ensure competences in IT developed at work are accredited
- encourage/facilitate progression to `higher level' IT skills

5 This is in line with MSC (PQ branch) attempts to get accepted a broad rather than a narrow definition of occupational competence. To keep the 4 outcomes in mind, rather than just focussing on Outcome 1. Also to some extent it is giving an indication of `trainability' in this area.

- emphasis and encouragement should be given to attainment of vocational qualifications, which incorporate the development of IT skills in context

- ensure the assessment and learning processes are driven by the aims and objectives".

Thus one of the overall aims would be to develop awareness and familiarity with IT. The speed of change, the need for constant updating and the ease with which particular skills can be developed as required would all militate against teaching such skills in the hope that this would increase general `employability'. The only exception to this would be if there was a strong local/regional demand for particular skills. Alongside this awareness function, opportunities should be given to demonstrate more general skills in an IT-related context (e.g. through the use of group project work; many of the authors cited in the Appendix drew attention to the significance of YTS `core skills', although they do not use the term).

A further aim could be to ensure competences in IT developed at work (even if these were often `low-level' IT tasks) were accredited. This would often entail a complementing of on and off-job activities (full integration may not be feasible).

Finally given the continuing shortage of IT skills at `higher levels', encouragement/facilitation of progression should be an aim. Wellington concluded that the overall picture of IT education and training was of "islands of IT education with few bridges between them". Thus attention should be given to the possibility of non-conventional entry into further and higher education, although experience on YTS might have to be complemented with `top-up' modules/conversion courses etc. so as to bring prospective entrants to an appropriate stage of readiness.

DESIGN AND CONTENT

RECOMMENDATION

"confirmation that the design of CIT in YTS should focus upon application/use of I.T."

Likely that entrants will have varying skills, competences and experiences:

- familiarity with hardware/operating procedures
- familiarity with different software packages
- familiarity with I.T., not just computing (including

6 Our work with providers in the accredited centre networks highlighted that a number of providers felt constrained to relate everything back to the trainees industry, even when the link to what the trainee was doing was extremely tenuous and clearly not maintaining their interest. Follow-up from the Area Office survey revealed other providers saw relevance and meaning for the trainee as being the key requirement. A fuller discussion of such issues is given in Part One of this report.

use of teletex, viewdata etc.)
- familiarity with using keyboard
- appreciation of general skills in information-handling etc.

Some will have had considerable exposure to I.T. on a regular basis, others just an appreciation, but for the foreseeable future most pupils are likely to have limited opportunities for much `hands-on' experience (at least in school). [From above, this is not necessarily a `bad thing' if attention is focussed upon more general IT-related skills and computers are used as tools - either to help carry out problem-solving and/or in support of other educational aims. Certainly project work in teams, whereby IT is used, as and when necessary, to support other activities seems an `ideal' way to pursue educational goals and it is also `realistic' given resource constraints].

This means that CIT in YTS should be able to introduce trainees to industrial applications of CIT in terms of context, scale etc. (stock control, WP etc.) and this should provide them with opportunities for `hands-on' experience - so as to be able to practise requisite practical/operating skills, which they may have had limited opportunities to use previously.

That is, following on from previous arguments, there would have been little point in demonstrating/simulating operation of a wages system, stock-control system etc. to pupils while still at school. However, when they start to have sufficient experience of work and work systems, then they do need an understanding of how these systems work: there is a need to understand the context. The applications would of course have to be `tailored' to meet the trainee's particular work placement etc.

The corollary of this is that for some trainees vocational `relevance' may be spurious. If the trainee does not use IT at work, nor is there any immediate possibility of doing so, then other ways may be more effective at capturing and maintaining interest and developing an `IT capability' (6).

RECOMMENDATION

"Vocational relevance can be a powerful motivator and as such should be encouraged. However, it should also be recognised that a vocational link may appear so tenuous and remote that trainees do not see it as relevant: in such cases other means should be sought to develop the trainees `IT capability'".

Preceding arguments emphasised the need for a broad approach to the development of an `IT capability'. The requirement to develop particular IT skills will be dependent upon the

7 Our report "Developments in CIT education and training and their implications for YTS" drew attention to this burgeoning process in relation to CPVE and some BTEC courses in IT and Business IT. If the content grows too vast, then this itself starts to militate against an understanding, based upon reflection and absorption of what has been learned.

The tendency for content to expand to an unwieldy size is, however, a widespread phenomenon. Interestingly the vocational schools (Fachschulen) in Germany attempt to counteract this with the specification of 'points of emphasis' within any specialist subjects undertaken [J. MUNCH "Vocational training in the Federal Republic of Germany", CEDEFOP, 1986].

8 Interestingly the Youth Forum of the European Communities [in "Working Document for the Training Group on New Technologies", Brussels, 1986] argued:

"certain priorities - 'core areas' - need to be identified for inclusion in all education/training programmes e.g. use of data-base, word processing, use of spread sheet etc. There is a need here for action at the [European] Community level, particularly in agreeing priorities and harmonising their provision and assessment". "Training/education programmes should be 'modularized' where possible to ensure continuous and coherent training if young people choose to move from one programme to another. Particularly the new technology 'core' should be applicable to, and transferable within, all programmes".

"Young people should be encouraged to develop a 'portfolio' from their courses; given the potential of the new technologies it should not be unrealistic, for example, to allow every young person to own discs and print-outs recording and describing their achievements. On disc could be stored examples of programmes written, skill levels achieved, a curriculum vitae, etc."

Others can therfore be seen to be grappling with the same sort of issues and coming up with similar ideas. It is also reassuring to see that the type of approach recommended in the Blue Book (and taken further by RSA in the development of CLAIT) does seem a sensible first step. Further, a CLAIT-type approach, while not being ideal, still has considerable relevance not just to YTS, but also as a contribution to the development of IT education and training. [See RSA report "Assessing Computer and IT Core Skills" MSC 1986].

context of the trainees work experience (for example, work on databases, viewdata systems etc.). However, the search for a general or universal `curriculum', based upon particular skills, could be difficult to achieve in any case, even if it were desirable. If the predominant focus is upon content, rather than the overall purpose and outcomes, then there is a tendency for the specification of what is to be included in the content `to grow like Topsy' (7).

RECOMMENDATION

"MSC should resist the temptation to produce a single specification for the content of CIT in YTS. Rather they should emphasise overall purpose and outcomes, and make it clear that these can be realized in a number of different ways. Exemplary material should be produced outlining how this may be done in different contexts".

Our report 4 on `Standards and Accreditation' does contain detailed suggestions about types of activities/applications which could be undertaken at work. From this, and guidance about the NVQ Levels, it is possible to get an indication of the type of skills which could be developed in CIT in YTS. These relate to: data entry, information retrieval, non-text manipulation, para-programming, report production, communications, CAL/CBT and critical analysis. In no way, however, should the above be regarded as a syllabus. Fewer areas may be covered but at greater depth, and practical skills should be covered in context and as appropriate.

RECOMMENDATION

"The precise content (and level) of the CIT component of YTS for a particular trainee should be dependent upon:

- **the interests and prior experience of the trainee**
- **their YTS experience (especially in relation to their use of CIT at the workplace)**
- **the context of their YTS experience (in terms of placement, industry etc. and use of IT; geographical location may also be important)**
- **the type of CIT qualifications being sought".**

The relationship between the above may lead to competing pressures as to the direction and form CIT in YTS should take, perhaps especially in relation to the off-job component.

9 Can retrieve and output specified information:

Knowledge
- know how a database operates
- know how different systems of organizing & indexing information retrieval systems operate

Skills
- find out information
- interpret instructions
- produce/provide information
- decide on category something belongs to

Criteria for Achievement
- specified information is retrieved and output
- accuracy
- time limits
- number of cases

Context
- different types of databases
- equipment/software etc

Personal Effectiveness
- recognise whether information is coherent, consistent
- recognition of faults etc.

10 Able to check and correct numerical information (specification of accuracy, time limits, number of cases);
context: invoice handling; parts ordering
conditions: checking text with screen-based material

CIT and its relationship with the core:

The balance of the `core activities' in the blue book (Core Skills Part 2) should give greater emphasis to the `other activities' to ensure greater breadth (i.e. emphasise IT communications element to a greater extent). However, from the foregoing arguments it is clear the CIT core should seek to do more than just give experience in WP, SS, DBs etc. (8).

RECOMMENDATION

"The existing position of CIT as a component of transferable core skills should be retained. The exact relationship between CIT and the `103' core skills could take one of two forms. Either the core skills could be embedded in tasks, and/or else a portfolio of `best achievements' in the individual transferable core skills in IT contexts could be constructed".

The advantage of aligning CIT with the core skills is that it will draw attention to precisely those components of CIT which we seek to emphasize: the transferable skills.

A number of the transferable core skills have direct relevance to information-processing. If these could be demonstrated in IT contexts, then their possession could be used as an indication of the trainees `IT capability'.

The choice then becomes whether:

i. to `embed' these skills in tasks, the successful completion of which are formally recognised (9) or
ii. to construct a `best achievements' portfolio in relation to the individual transferable core skills with criteria of performance and contexts attached (10).

The advantages of (i) are:
- this is the route taken in vocational qualifications which `embed' CIT
- the format and approach to competence objectives can align and be consistent with the approach taken throughout YTS.

The disadvantages are:
- this approach is designed for cases where the trainees are not using IT skills which are explicitly embedded in other qualifications (where then does the achieved competence go on the certificate: if not in Part 1, does it appear in Part 3 (2)?)
- it could be argued that the whole thrust of the approach should be to extract and emphasise those transferable skills which would enable a trainee to demonstrate an `IT capability.'

11 Although the examples given on TFS96 would need to be reworked so as to emphasise more substantial achievement.

Advantages of (ii) are:
- it is a much simpler approach
- it is consistent with existing guidance (on TFS96) (11)
- managing agents and trainees could be supplied with particular examples, so they would have a clear idea of how to search and what to emphasise

The disadvantages are;
- it does not `fit' so well with other developments on standards and accreditation
- dangers of disaggregation due to focus upon particular skills.

RECOMMENDATION

"As the overall aim is the development of an `IT capability', a variety of approaches to the transferable core skills could be allowed, provided they resulted in a clear demonstration of that capability".

DEVELOPMENT AND DISSEMINATION

RECOMMENDATION

"Schemes should be encouraged to develop an overall approach to CIT: that is, they may wish to structure and develop on-job or off-job training or even work activities themselves in order to deliver IT-related competences."

While not advocating a wholesale restructuring of work activities, it is often possible through minor adjustments to ensure that the trainees get `more' from their training. Co-ordination of their activities in different components being especially important. In this respect, it is important to allocate time (of both trainer and trainee) not only for the attainment and demonstration of competences, but also for the planning process as to how this could be achieved.

RECOMMENDATION

"It should be emphasised that the recommendations contained in this report are based on existing `good practice'".

The recommendations should act as a `spur' to recalcitrant schemes: they cannot be dismissed as `impracticable'/`unworkable'/`not feasible'.

12 Part One of this report discusses these issues in greater detail. The project team was involved in the set-up of a number of support networks based upon accredited centres. It should be remembered that support networks do not have to be formal and/or long-standing. After a few initial meetings, a large group may fragment into smaller groups, working in similar contexts and/or within similar constraints. Periodic meetings of larger groupings can, however, serve to give providers more of an overall picture of what is happening. Such meetings may also be useful as a means of exchanging information about other forms of support.

Inter-agency links could focus upon attempts to improve the standard and quality of trainer training: local quality initiatives could sometimes play a role here.

13 It should be remembered that the last upsurge of interest coincided with the issue of the `blue book' ("Core Skills in YTS Part 2: CIT") in 1985. It is therefore vital that the interest generated by the new guidance is translated into **action** by mobilizing support at all levels for the new strategy. It is also important to `enable' accredited centre and MSC staffs to promote the new strategy.

RECOMMENDATION

"Schemes should be encouraged to institutionalize `good practice' in their CIT activities: in particular, CIT should not be hived off as a specialist activity, which does not concern other staff".

Besides all the recurrent disadvantages accruing from a lack of liaison and integration of CIT activities with other activities, such a `separatist' approach also leaves schemes vulnerable if the specialist leaves or there is a change of provider. A number of schemes found they had to `start all over again' in such circumstances. At the very least there needs to be the development of an `IT capability' among non-specialist staff who are associated with the provision of CIT in YTS in some way. `Shadowing' of specialist staff may prove useful in this respect.

RECOMMENDATION

"Encouragement should be given to the development of support networks between providers: these networks could be on a geographical or industrial basis or according to the type of provider".

Support networks can provide a valuable function in offering providers encouragement, an opportunity to share problems and solutions and a focus for CIT development activity. Those involved in the networks would decide what were the most pressing issues for themselves, but the following could be among those discussed: resource allocations, software, staff development, balance between on and off-job activities, collaboration, flexibility of programme design in relation to trainees prior and current CIT experience, use of portfolios, competence-based assessment, monitoring and evaluation (12).

RECOMMENDATION

"CIT good practice should be given a high profile. This should involve both a wider and a more active approach to dissemination than previously. Sufficient copies of guidance and support material should be issued so as to reach both CIT `specialists' and managing agents. Dissemination should involve not only regional promotions, but also more local events".

Managing agents, providers, trainers and MSC staff were virtually unanimous in agreeing that CIT training needed a `boost' if it was to make an effective contribution to YTS (13).

14 The spin-offs for the trainees could also be considerable. Not only would these type of activities lend themselves to group project work, but it would also help to set technical activities in a social context. For example, establishment and maintenance of networks do not solely, or perhaps even primarily, depend on technical issues!

RECOMMENDATION

"A development strategy should `enable' both accredited centre and MSC staffs: that is, give them sufficient information and support such that they can actively promote the new strategy".

RECOMMENDATION

"It should be emphasised that the trainees themselves can be a valuable resource in the spread of `good practice'".

For example, trainees could be involved in an active search for possible IT applications at work, where there are comparatively few instances. Alternatively, they can be used to construct an inventory of applications in placements, where IT applications abound. These type of activities could then contribute to a placement database, which would make co-ordination and liaison easier in subsequent years. Similarly, trainees could be used to investigate the feasibility of support networks, looking in particular at how IT itself could be used to facilitate such contact (14).

STANDARDS, ACCREDITATION AND PROGRESSION

Please note that the recommendations on standards, accreditation and progression are presented here only for completeness. Report 4 deals with these issues in great detail.

RECOMMENDATION

"Most favoured approach to accreditation is through the use of vocational qualifications with embedded IT skills".

RECOMMENDATION

"Other options for accreditation are through the use of specialist IT qualifications or the development of a profile of IT-related competence objectives".

RECOMMENDATION

"Assessment of achievement in CIT should usually be competence-based. Where accreditation of IT-related achievement is not already incorporated in either vocational or specialist qualifications, then providers should be given clear guidance as to how to assess and accredit competence in this area".

It is important that competence objectives are:

- broad
- have separate criteria of success
- recognise the need for a knowledge component.

An alternative, although more likely a complementary, approach could involve the use of a portfolio of achievement in this area. This would allow:

- accreditation of other activities/achievement
- appropriate demonstration of `IT capability'
- greater involvement of workplace supervisors
- future users flexibility in how they use recorded information.

RECOMMENDATION

"MSC should actively seek to promote the incorporation of `IT capability' as a fundamental component of occupational competence for all trainees. It should work with lead industry bodies and NCVQ to try to ensure that this is recognised in all industrial sectors".

RECOMMENDATION

"The devising of an instrument to assess and accredit prior learning experience in I.T. should be a high priority".

APPENDIX

Support for the adoption of a `broad view' to I.T. training: the development of an `IT capability'.

There has been a good deal of interest throughout Europe in information technology education and training and its relationship to employment. Three recent UK studies are worthy of mention in this respect: each sampling employers in order to ascertain their views about the skills required among IT users as well as specialist companies. All three samples were relatively small, but their findings are consistent. A European work programme on IT and vocational training also reaches similar conclusions. The research carried out in West Germany is of most interest, however, because not only have they compiled more detailed information but also because they have undertaken a far more comprehensive survey (involving over 3000 companies) of companies about their future IT skill requirements.

Without exception, all argue that a broad view should be taken of IT training. The findings of each of these groups will be considered in turn.

U.K. Findings:
H CONNOR and R PEARSON highlight that "among service users [of IT] increased attention on the end-user and more emphasis on IT applications have meant an increasing requirement for good interpersonal skills among IT staff" ["I.T. Manpower into the 1990s", IMS, 1986].

The work of A. FITZGERALD "New Technology and Mathematics in Employment", Birmingham, 1985, in a study commissioned by the DES, drew attention to how specific IT-related skills could be acquired fairly readily by employees in a context (at work) which had meaning for them. He specifically argued against premature `vocational' specialization: "is it possible that use of computers in schools in a variety of subjects where they have an immediate and exciting application might be a better preparation for meeting them in employment than endeavouring to prepare pupils for their use in employment specifically". These themes (ease with which employees can be trained in particular IT skills, especially if they already have a positive outlook on the use of computers), which were endorsed by Connor and Pearson, were taken up still more vigorously by the "Skills for the Future" team.

J.J. WELLINGTON et al "Skills for the Future", Sheffield, 1987: their survey of IT users revealed that they considered they required:

- an awareness of IT (it was felt detail about particular skills DB, WP etc. could be given)
- keyboard familiarity (although recognition that this may be

of less significance in future)
- ability to work in a team, relate to other people and communicate etc.

Thus general skills were seen as more important than particular skills - indeed employers were virtually unanimous in not wanting a narrow skills-based approach, which sought to develop specific I.T. skills. However, awareness and familiarity with IT was a valuable attribute for entrants into employment, with IT users, to have.

`Lower level' IT work (WP, SS, DB etc.) skills were often seen as transferable between operating systems, software etc. Employer preference was for evidence of general academic achievement. Wellington et al argued that the idea that undertaking "computer literacy courses in school makes pupils more employable" may be a mistaken view. The above could then be seen as relating to those who were not (yet) using IT at work. Wellington et al argued that even at lower levels, employees effectiveness was enhanced by background knowledge. Our own observations and discussions with CIT tutors would support this - some trainees had been performing tasks at work without any understanding of the context e.g. what is a DB, how it works etc.

The argument is then that detailed work with databases, spreadsheets etc. should only be undertaken when the context at work makes it appropriate to do so.

European findings:
The European Commission has set in train a major Work Programme on new IT and vocational training which looks at the impact of new technology on employment and qualifications. Some interim results were published by Euro Technet in "Summaries of concerted Research Reports", EEC, 1986.

The projects cover a number of topics and we should draw to the attention of those interested in particular areas that there are projects in the following fields:

- Numerical Control and Computerized Numerical Control
- Industrial Robot Technology
- Flexible Manufacturing Systems
- CAD/CAM systems
- Office and Data Processing
- Communications Technology

Recommendations from the major research programmes (pilot projects) emphasise the need for multi-skilling and skill transfer; that directly applicable knowledge and skills will be insufficient, and that more general attributes will also be required ("e.g. ability to recognise interrelations").

One of the U.K. Projects ("The impact of new technology on skills in manufacturing and services", MSC, 1985) drew attention to the

need for diagnostic skills and the likelihood of skill deficits at technician level.

This need for a broad approach to I.T. skills was also one of the themes of the EEC/MSC conference on "People and Technology" (1986): for example M. TISSIER argued "a more generic approach to training means more emphasis on the general competences needed for working life-negotiation skills, the ability to work in a variety of settings - alone, with others, in large groups, in small teams .....[shift] towards a broader understanding of education for competence and personal understanding". H. SCHMIDT reinforced this view: "the answer is improved general education and broadly based vocational training in which new technology is part of the general culture of work". J. SMITH (Ed) "People and Technology" volume 1, Eurotechnet, 1987.

German findings:
K.J. UTHMANN "The dual system of vocational training in Germany and its contribution to solving the problem of youth unemployment" in Educational and Vocational Guidance Bulletin, IAEVG, 1986: speaking of new technologies, especially communication and information technologies, Uthmann makes the point "one of the most important problems is the question of qualifying the personnel. To impart knowledge is not as important as the ability of making knowledge available. The knowledge of details is not needed, but the knowledge of systems, the capacity to work in a team, of acting in solidarity [are]" (emphasis added).

H.R. LAURIEN "School and vocation - new developments in the working world as a challenge to the educational system" in the same bulletin, reinforces the point, and interestingly while speaking of Berlin reaches a remarkably similar conclusion to the "Skills for the future" team in the U.K. Laurien argues: "modern businesses require readiness constantly to relearn, to be prepared to adapt and to be capable of adapting" (emphais added) and "new information and communications technologies are part of the requirements of the working world of the future" but, as with Wellington, the proposed requirement is less about the introduction (in schools) of specific subject information and more about "providing a general education". Hence introductions to computing (30 lessons) are "not intended to train programmers but to provide familarity with the instrument, its use, what it can and cannot do".

H WILHEMI and R KOCH "Vocational Education and the New Information Technologies" Federal Institute for Vocational Education and Training, Bonn and Berlin, 1986, argue that while "NIT-related knowledge relevant to applications in the occupation" are important, also "the ability to think in abstract terms, ability to think systematically, ability to relate work

activity to an overall plan of action, communication skills and ability to learn are gaining in importance".

The authors also draw attention to what the consid' IT-related education in schools should seek to achieve (they see most states in Germany moving towards this, although implementation is at different stages). They consider:

"The most important knowledge-related teaching objectives in this context are:

- introduction to patterns of thinking and methods conducive to the solution of problems with computers

- impartin; of ski s that will enable the use of the compute as a tool for tasks involving the acquisition and processing of information

- provision of insights into the use of computers in public administration, in industry and in private life, their significance and effects, particularly as regards competitiveness in industry, changes in the job market, changes in the nature of jobs themselves, data protection and protection of the right of the individual to privacy.

On the other hand, the outstanding attitude-related teaching objectives in this context are:

- development of a rational and critical attitude towards the information technologies and their applications;

- development of perceptiveness and an ability to make critical judgements in a society influenced by the new media and information technologies"

To return to a vocational training context, Wilhelmi and Koch emphasise the inter-relationship between the development of general abilities and active learning:

"General qualifications such as the ability to think in abstract terms, problem-solving ability, independence and ability to co-operate can only be imparted in the vocational training context by combining tradit onal and new subject matter. This, in turn, requires active-learning methods of teaching such as the project method, individual-speed programmed learning by computer, simulations, practice companies or practice offices".

FEDERAL INSTITUTE FOR VOCATIONAL TRAINING

"Research Results from the Federal Institute for Vocational Training", Berlin, November 1985 looked at future training requirements in relation to qualification structures and the acquisition and use of occupational qualification. The German findings, based on a survey of 3000 companies plus in-depth work with personnel and training staff, were strikingly similar to

those of Wellington in the U.K. For example:

"the majority of the companies hold the view on the basis of experience so far that all the staff need broad qualifications in the use of the information technologies needed in the company's work ..... an ability to communicate and co-operate with others remains a major requirement".

GLOSSARY OF ABBREVIATIONS USED

ACL	Applying Computer Literacy (project)
CAD	Computer Assisted Design
CIT	Computer and Information Technology
CLAIT	Computer Literacy and Information Technology (RSA)
DTP	Desktop Publishing
EPROM	Erasable Programmable Read Only Memory
FE	Further Education
FESC	Further Education Staff College
FEU	Further Education Unit
IT	Information Technology
ITEC	Information Technology Centre
LANAC	Leicester and Northants Accredited Centre
MSC	Manpower Services Commission
NCC	National Computing Centre
NCVQ	National Countil for Vocational Qualifications
NLQ	Near Letter Quality
RAM	Random Access Memory
SEAQ	Computerized on line airline seat reservation system
TOC	Training and Occupations Classification
VDU	Visual Display Unit
YCB	YTS Certification Board
YTS	Youth Training Scheme

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Criteria for Good Practice in Computer and Information Technology in the Youth Training Scheme is in two parts. The first contains a discussion of good practice. The second part contains policy recommendations about how we believe CIT in YTS should develop. This report is the third in a series of reports published as outcomes of a project exploring issues of good practice, accreditation and progression in CIT for 13 - 19 year olds in general and for the Youth Training Scheme in particular.

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The research was commissioned and funded by the Manpower Services Commission.

The Centre for Research in Youth and Further Education is a joint venture of the Department of Educational Studies at the University of Surrey and the School of Education at Roehampton Institute of Higher Education.

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