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ABSTRACT

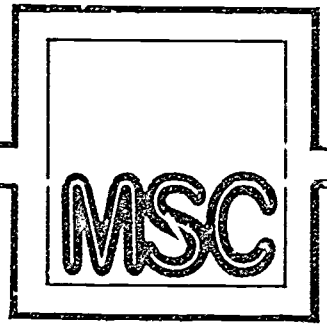
A study examined the role of computer and information technology (CIT) instruction in the Youth Training Scheme (YTS). A number of successful local YTS training schemes and initiatives were identified and analyzed. One phase of this analysis focused on standards, accreditation, and progression in the CIT component of the YTS. Special attention was paid to the following components: progression into YTS, computer awareness, general certificates of secondary education, the Technical and Vocational Education Initiative, certificates of prevocational education, achievements in CIT at school, and methods of taking account of prior learning. It was concluded that, besides being technically sound, good assessment must also be practicable, comprehensive, dynamic, and unobtrusive. Because assessment is not an exact science, assessment processes need to be judged against how they are intended to be used rather than against absolute criteria. This is especially true in YTS programs, where primary importance is given to CIT's role as an enabling technology and where transferability of training and context-dependent analysis are emphasized. (Appendixes include discussions of accreditation of prior learning experience in information technology, a case study of a typical computer studies scheme, reviews of a typical awareness certificate, standards for grades, certificates of prevocational education, vocational qualifications with an embedded CIT component in the clerical and retail fields, learning outcomes and assessment for scheme modules, and two assessment schemes.) (MN)

U IVERSITY OF SURREY & ROEHAMPTON INSTITUTE
CENTRE FOR

RESEARCH IN YOUTH AND FURTHER EDUCATION

STANDARDS, ACCREDITATION AND PROGRESSION IN COMPUTER AND INFORMATION TECHNOLOGY EDUCATION AND TRAINING AND THEIR IMPLICATIONS FOR THE YOUTH TRAINING SCHEME

Alan Brown and Julian Mills



PUBLICATION NO. 4

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C O N T E N T S

R E A D E R S G U I D E

This report focuses upon a range of issues concerning standards, accreditation and progression in CIT education and training, mainly for 14-19 year olds outside a conventional HE/advanced FE route. As such, the report encompasses the education and training of young people, who are likely to be **users** of IT, rather than specialists in computing and information technology. The debate ranges quite widely within those parameters, but the central theme is the implications of these developments for the CIT component in the Youth Training Scheme.

The report seeks to fulfil three functions.

i. to act as a source of reference for both those directly involved in CIT education and training and those for whom this comprises only a small part of their total activities. The intention is to give an overview of recent developments in an area, where there has been substantial change over the last two or three years. The overview can be gleaned from just reading the text, with the commentary and the appendices giving an indication of the processes underlying recent developments and further detail respectively.

ii. to be used as decision-support in relation to pragmatic issues concerning the local delivery of CIT in YTS. Thus tutors, trainers or scheme providers may wish to `dip into' the report, if they are faced with particular choices about accreditation processes in CIT in YTS. The report can be helpful as a source of ideas about a range of possible assessment issues: whether in terms of types of qualifications, approaches to producing competence objectives for CIT activities or accrediting work-based learning. Those requiring assistance in making such choices can go straight to the relevant section. While this report should help providers clarify what type of accreditation they should seek, there is not sufficient space to go into the detail of all the relevant qualifications. One or two **exemplars** of each type are chosen. Further details are of course obtainable from the examining and validating bodies themselves, but there is one recent development of possible interest to those providers contemplating using external accreditation for the first time. This is the setting up in 1987 of a Further Education Curriculum Information System (FCIS) Database. This database provides a summary of the qualifications awarded by the major FE examining and validating bodies. It details awards and the main `units' of subject content. The usefulness of the database comes from drawing together detailed up-to-date information, on a fairly comprehensive basis, in a **single** place: as such, it makes an ideal starting point for a provider seeking to `match' their circumstances and requirements with the most appropriate qualification. (The database was developed

initially for FEU, but if other organizations want access, they should contact Guildford Educational Services 164 High Street, Guildford, Surrey, GU1 3HW).

iii. to contribute to the debate about policy: in particular, the direction CIT in YTS should take. It was integral to the design of the project, that it should make a significant contribution to the development of a revised strategy for CIT in YTS. The full recommendations of the Project are presented in Report 3, but delineation of the first seven (of 20) recommendations here should be sufficient to give an indication both of our argument about the general orientation for CIT in YTS, and the approach to be adopted on the issue of accreditation. As will be seen from the recommendations about accreditation, these allow for different options, and a debate about the relative usefulness of these different approaches is part of the substance of this report.

The relevant recommendations are as follows:

RECOMMENDATION 1:
The overall purpose of CIT in YTS should be to develop in each trainee an `IT capability'.

RECOMMENDATION 2:
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
- 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.

RECOMMENDATION 3:
Most favoured approach to accreditation is through the use of vocational qualifications with embedded IT skills.

RECOMMENDATION 4:
Other options for accreditation are through the use of specialist IT qualifications or the development of a profile

of IT-related competence objectives.

RECOMMENDATION 5:
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 6:
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 7:
The devising of an instrument to assess and accredit prior learning experience in I.T. should be a high priority.

[1] Briefly the aim of the research is to explore the issues surrounding the development of good practice, standards and progression in the CIT Core Skills. To do this, developments in YTS need to be put in the context of related developments in CIT. For a fuller description see original background paper (project proposal). Among the outcomes of the Project have been the publication of a series of reports. This is the fourth in the series, other reports are:

- "Developments in CIT Education and Training and their implications for YTS"
- "Survey of current practice in CIT in YTS"
- "Criteria for good practice in CIT in YTS"

[2] A glossary of abbreviations used are given in Appendix 10.

[3] We would like to thank the many teachers, researchers and advisory staff with whom we made contact for their time and co-operation. We are also grateful to the staff of examining and validating bodies who took the time to explain the philosophy and overall direction of policies as well as supplying details of how particular schemes operated. Also contacts made at exhibitions and conferences attest to the interest and enthusiasm of many of those involved in this field. The constructive comments of both our Support Group and Steering Committee are readily acknowledged, as is the contribution made by the Project consultants: Chris Barber and Moira Turner. There is a transparent link with the work previously carried out at Surrey (see "Developing work-based learning", Evans, Brown and Oates, MSC, 1987) and of the Core Skills Project team more generally (now being carried on as part of the Work-based learning project at FESC). Acknowledgement should also be given to the work of independent training consultant Bob Mansfield of Barbara Shelborn Associates: a number of ideas put forward in this paper crystallised after our discussions.

[4] See Report 1: "Developments in CIT Education and Training and their implications for YTS". This focused upon recent curriculum developments in CIT, particularly in relation to the processes, outcomes, problems and successes of the development process.

[5] There is an implicit tension between attempts to promote a more practical approach and resource constraints (especially in schools) where a more knowledge-based approach while not necessarily desirable may be realistic given problems of giving large numbers of youngsters significant `hands-on' experience. It is noticeable that examining bodies whose primary target is perceived to be those at school adopt a more conservative approach than those aiming primarily at youngsters in further education and training.

[6] Encouragement to develop competence-based training plans was given from the outset of two-year YTS ("Guide to content and quality on YTS", MSC, February 1986). The RVQ report (MSC/DES 1986) and the establishment of the NCVQ gave further boosts in this direction: with the intention that vocational qualifications would be built around statements of competence. While MSC collaborate closely with NCVQ (for example, through their joint Technical Advisory Group), MSC retain responsibility for work on standards-setting within YTS, with the YTS Certification Board overseeing such developments.

1. INTRODUCTION

This report is the fourth in a series of information papers produced as an outcome of a research project looking at computer and information technology (CIT) training in the Youth Training Scheme (YTS) [1,2]. Information for this report was collected during an extensive programme of visits and interviews in the period April 1986 to September 1987 [3]. As with all the information series papers, this report aims to contribute to the debate about CIT education and training, and the authors would welcome any comment on issues raised in this report.

In the last few years there has been a plethora of new initiatives in CIT education and training for 14-19 year olds. The scope and design of a number of these developments and how they related to YTS were discussed in a previous report [4]. There was a degree of commonality in that most of them put great emphasis on practical application rather than relying solely on knowledge-based learning. As a result assessment procedures were seeking to reflect competence, and at least trying to move towards criterion-based assessment [5]. Such developments also align with the direction YTS has been taking in relation to standards, competence and recognised qualifications [6].

Reflection upon other developments in CIT therefore has considerable significance about the direction CIT in YTS should take. Firstly, in relation to progression: progression routes into and out of YTS are essential if trainees are to build upon their experience rather than duplicate it or receive no recognition for what they have achieved [7]. Additionally, issues surrounding standards, competence and accreditation of achievement are technically difficult [8], and it should be possible to learn from the efforts of others [9]. Issues of progression assume even greater significance given the continuing acute shortage of skilled personnel in computing and IT related areas [10]. Experience and accreditation of achievement in CIT in YTS may facilitate transfer of those trainees looking for opportunities in this area [11].

Additionally, recent debates about the possibility of a national training strategy for IT [12] make it important that developments in CIT in YTS take cognisance of the possibilities of continuing education and training in this field [13].

It was intended that this project should facilitate the contemporaneous development of a strategy for CIT training in YTS. To this end, this report is organized on a text and commentary basis, whereby major findings, recommendations and alternative proposals are presented in the text, while further detail is given in the commentary. For similar

[7] This applies equally to progression into and out of YTS.

[8] For example, doubts have been expressed about the feasibility of GCSE being able to deliver meaningful grade-related criteria on the scale originally intended.This will be discussed further later in the report.

[9] One outcome of this Project has been a set of recommendations to MSC relating to issues of standards and progression in CIT in YTS, including outlining alternative proposals about how to treat standards in this area. Following on from these, MSC intend to issue new guidance to the field (probably around April 1988).

[10] Again this issue is more fully debated in a previous report (report 3): "Criteria for Good Practice in CIT in YTS" Reference there is made to the findings of:

- H. Connor and R. Pearson "I.T. Manpower into the 1990's", IMS, 1986
- A. Fitzgerald "New Technology & Mathematics in Employment", Birmingham, 1985
- J.J. Wellington et al "Skills for the future", Sheffield, 1987
- IT Skills Shortages Committee [The `Butcher' Committee] reports, DTI, 1985
- P. Virgo "The IT Skills Crisis - A Prescription for Action", NCC, 1987

A consistent theme of the above reports has been to draw attention to the importance for users of IT, not just specialists, to have requisite skills, knowledge and experience.

[11] some colleges, for example Skelmersdale, have initiated a policy whereby all students and trainees, even those on 10 day courses, are made aware of opportunities for further education and training in this area.

[12] Scotland have already produced their own national plans:
"Microcomputers in Scottish Schools - A National Plan" SCET, 1985 and "Microelectronics and Information Technology in Further Education - a Plan for Scotland" SCET, 1986.

[13] The argument that too little happens in CIT in YTS to worry about such matters can be discounted for two reasons. Firstly, our second report `A Survey of current practice in CIT in YTS' drew attention to examples where the CIT component is already highly significant.
Secondly, it should be clear that CIT will have increasing significance in the future. For example, the questioning of the relevance of CIT for trainees in motor vehicle repair workshops sits uneasily with developments such as Ford`s Service Bay Diagnostic System, "which Ford say could revolutionise vehicle servicing" (Computing: March 1987).
Similarly the AA are installing mobile data terminals in their breakdown vans as a final stage of computerising breakdown and recovery services (Computing: October 1987).
Our report 3 ("Criteria for good practice in CIT in YTS") outlines relevant activities for industries with apparently little use for CIT.

reasons, an overview of related developments is given in the text, while detail of how these operate are given in the appendices. By this means, we hope this report will fulfil two functions:

i. to give a brief overview of related developments in CIT for those interested in policy and/or the aims and objectives and design and evaluation of CIT education and training.

ii. to act as a source of reference for those concerned with the implementation of such training as to the various possibilities open to them in relation to assessment and accreditation.

One final comment should be made about the choice of developments reviewed in this report. They have been chosen as illustrating trends in this field. The report is not intended to be a comprehensive coverage of developments in CIT education and training for 14-19s [14].

The developments considered will therefore reflect upon the treatment of standards and progression under 4 broad categories: developments prior to, during and post YTS [15], coupled with a general commentary upon how these fit with the new national framework for vocational qualifications.

[14] The most obvious limitation being the exclusion of traditional routes into higher education: neither A levels nor `mainstream' H.E. developments in CIT are considered. That is not to say that ex-YTS trainees may not transfer at some stage in their careers into H.E. or advanced F.E., but rather that the focus of this study is to look at more pressing issues of standards and progression; those of more immediate relevance to existing YTS populations.

[15] This classification is approximate, since a number of developments specifically try to cross such boundaries.

[16] examinable courses:
explicit/implicit tension between these and use of IT across curriculum: `computer studies' courses often restrict access of other students, may lead to early (and inappropriate) gender stereotyping.

use of IT across curriculum:
use of CAL is sometimes restricted by excessive use of networking [see Wellington op cit; our Report 1 cont asts approaches in Scotland and England in this respect]. In any case, use of CAL often predominates in science and maths rather than genuinely going across curriculum [compare Stage 3 aim of MEP, which regarded this as critical]. Also note `disappointing' impact of computers in secondary schools according to a recent DES survey reported in Education Theme of Micro User: "Country Cousins get the micros", Micro User, May 1987.

limited resources:
even without `networking' ill-effects, ratios of pupils: computer even in `keen' schools typically between 20 and 70 : 1
insufficient staff development: our report 1 and Wellington both argue that more generally there has been over-concentration on getting in hardware and software, with a consequent neglect of "human factors".

relationship between education and employment:
the "Skills for the Future" project of Wellington et al, funded by MSC's TVEI unit, sought to investigate the links between education and employment in the field of I.T. In particular, it offers a critique of the "relevance" and vocational significance of I.T. education of any kind. The ideas expressed offer considerable support for views of A. Fitzerald in "New Technology and Mathematics in Employment", Birmingham, 1985 about the ease with which most I.T. users at work are able to learn/acquire the necessary skills and knowledge.

Further corroboration comes from "Youth labour markets in the 1980s" K Roberts et al, Careers Bulletin, Autumn 1986: this summarized the findings of Youth Labour Markets Research Project for Department of Employment. These indicated that:
"firms were anxious to train bright young people who were not set in traditional ways, and who had already become acquainted with keyboards and electronic information processing at home and school". Once again, a desire for young people with `general IT capability' is coupled with an assertion that companies can then train as required:
"firms felt capable of providing training in vocationally specific skills, and believed that technical qualfications would be within reach of any really bright young people who were willing to learn".

The whole thrust of work in this area highlights that there does need to be links between school and post-school in the field of I.T. However, it also strongly supports our contention that the link should be based on a broad notion of `IT capability'.

2. ISSUES IN STANDARDS AND PROGRESSION IN DEVELOPMENTS PRIOR TO YTS

2.1 Progression into YTS

Experience of CIT at school is increasing in importance. While for many pupils only a broad introduction is given, coupled with limited hands-on experience, an increasing minority now spend a significant amount of their time undertaking work in this area. The commentary outlines some recent trends (16), but this issue is covered in greater detail in our previous reports. The reasons why it is important to facilitate progression into CIT in YTS are both general and particular. General reasons include avoiding unnecessary duplication (sometimes even of entire courses), improving efficiency of training and facilitating further development of skills and abilities for individuals. In particular, approaches based on competences and/or portfolios could easily accommodate prior experience by setting contexts in which achievements could be demonstrated and/or built upon. Politically also, it would be difficult to argue for removal of barriers to progression from YTS, if little was being done to facilitate progression into YTS.

Trainees entering YTS [17] may have little or no experience of CIT, but where they have this experience could be one of three types [18]. They may have a formal qualification, which either partially or wholly relates to CIT. The second category relates to experience of using CIT at school and/or home but without endorsement of formal qualifications (for example, they may have used databases, word processors or graphics facilities). The third area relates to experience in vocational applications (that is, they may have used CIT either at work or while on work experience [19] where again achievement has not been formally recognised).

The second two categories raise special problems about recognition of prior learning. This issue including the feasibility of designing an instrument for use upon initial entry into YTS such that account can be taken of prior CIT experience is discussed in section 2.7 and appendix 1. For the moment we will concern ourselves mainly with formal qualifications.

These qualifications could relate to `computer awareness' (AEB, Cambridge etc.), computer studies or IT as subjects in their own right (GCSE) or to a complete curriculum with a substantial CIT component (CPVE, TVEI). In the last case, the approach may result in qualifications of the other types and/or a profile of achievement [20].

[17] This will in the vast majority of cases be from school, but there is also the possibility of transfer into the second year of YTS. Perhaps, for example, after a year at college doing CPVE.

[18] The categories are not mutually exclusive.

[19] Work could of course include part-time work. Work experience could be part of a specific course or programme (CPVE, TVEI etc.) or relate to broader initiatives encouraging school-industry links (for example, SCIP, UBI).

[20] Indeed cognisance needs to be taken of the increasing use of profiles and records of achievement. However, their relevance to a compilation of CIT experience and achievement will depend upon both their form and content; that is, if the profile is expressed in terms of competences then it may be possible to use it. However, if it is primarily knowledge-based then a `testing' of the application of that knowledge in particular contexts could be required before it could be translated into statement of competence. A record/profile may also be at too general a level of behaviour to be applicable for this purpose. (That is, not necessarily a judgment upon the records/profiles themselves as they may have been designed for other puposes).

[21] Again for further detail, see J.J. Wellington et al "Skills for the future", Sheffield, 1987.

[22] These type of problems are not of course unique to this country. In America, "awareness" courses consisting of copying diagrams (from books or blackboards) of flowcharts and architecture, of role playing games (where students adopt the roles of various parts of a microprocessor) have proved to be remarkably (or perhaps unremarkably) unpopular.
Indeed a recent national survey in USA revealed that "most schools can provide a substantial computer experience to some students only by limiting the number of students who have access to computers" (H.J. Becker "Using Computers for Instruction" in Byte, February 1987).

[23] For example, the Associated Examining Board's `Basic Text in Computer Awareness' gave the following guidance: "by means of practical work students should be able to demonstrate their ability to use a computer", "although practical work is not formally tested it is seen as an essential part of a course in computer awareness"; "The Board takes the fact that an entry is made as confirmation that the candidate has had the practical experience which will be needed to tackle the test"; "Although there will be no formal test of practical skill, centres may find it helpful to study the following guide to the type of practical work that the Board considers complementary to its Basic Test in Computer Awareness:

a) Identify the main elements of a typical educational or training micro-computer system. Connect these components together, switch on and check they are ready for use.
b) Run a package in an educational or training context
c) Process text using a word processor
d) Interrogate a database
e) Retrieve information from a viewdata system".

A recent addition to this field has come from CGLI in conjunction with the CBI. They are certificating "Basic Competencies in I.T.". The course is intended to give pupils experience in using WP, DB, and SS

2.2 `Computer awareness'

CIT awareness courses are increasingly popular (especially for lower secondary school), but limited in terms of time, hands-on experience etc. They are most effective, if used as a pre-requisite to later use of IT across the curriculum. Typically they could involve CAD, WP, computer as a learning aid, models, electronic music and DBs [21].

Computer awareness in secondary schools is often hampered by a lack of available equipment. Even with an estimated one computer to thirty students in secondary schools, opportunities for practical work are limited. Roughly two thirds of the computers in secondary schools are located in computer department rooms (often in networks).

This reduces the scope for the ad hoc use of computers that might occur as a natural consequence of an investigation or a project. (This is to be contrasted with primary schools: if they have more than one computer, each one is sited in a different room).

Thus not only is the practical use of computers in "computer awareness" often limited by logistical problems, but there are major constraints upon the `natural' use of IT as an analytical tool in other settings [22].

An introductory course in the lower school is sometimes followed by a certificated `computer awareness' course in later years. Because of the previously mentioned constraints, examining bodies have an ambivalent attitude towards hands-on experience. They recognise that a high practical content is desirable, but they also acknowledge that if formal rules were given this might debar many prospective candidates, who have only limited access. A compromise is achieved through exhortation to give practical experience wherever possible (23). Similarly, assessment often requires the ability to recall knowledge rather than being a demonstration of practical competence. Further detail of assessment processes of one popular awareness course (which can be taken as part of the Cambridge Information Technology certificate) is given in Appendix 2.

Overall then, upon entry to YTS it would be helpful for the tutor to know that a trainee has had some familarity with terminology and operation of computers, and awareness certificates would seem a guarantee of that. The extent of the practical orientation of the course would be a question of fact, which it would not be possible to gauge from the possession of a certificate. However, if the course did have a strong practical orientation, then it would probably be inappropriate to undertake further introductory courses (e.g. RSA CLAIT: the basic SCOTVEC computer awareness module etc. It should be remembered, of course, that these

packages. The course can take as little as 20 hours, and assessment involves a multiple choice paper and a practical assignment. So perhaps this is an indication of an increasing practical orientation (or it may be that as the target audience are "primarily sixth formers", it is felt that it is more realistic to expect that they will have the access required to undertake a course with such a clear applications-based aproach).

[24] This should be easy to achieve if a scheme is being used which has clear progression routes. For example, Cambridge, CGLI and SCOTVEC all operate modular schemes and RSA has a stage II IT qualification for those who complete stage I CLAIT. Deciding upon equivalence of qualifications, where the transition from school also involves a switch of schemes may be a little more problematic. However, a body of case-law will presumably quickly build up, and a practical `test' could reveal the extent of practical competence.

[25] D L Nuttall "The Current Assessment Scene" in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC, 1987.
The national criteria, especially in relation to the widely publicized "Standards for GCSE grades A, C and F" reproduced in Appendix 4, may also start to have an educative effect as to how people conceptualize standards. This will be a long term process however, and many people will presumably continue to operate with much vaguer notions about standards.

Another commentator, M.J. Cresswell "Describing examination performance: grade criteria in public examinations", Educational Studies Volume 13, 1987, gives a comprehensive discussion of the difficulties involved in trying to formulate unambiguous grade criteria.

[26] However, the DES is also quick to point to comparisons with previous applications: "Grade A to C [of the GCSE] will have standards at least as high as O-level grades A to C and CSE grade 1. Grades D to G will have standards at least as high as CSE grades 2 to 5". ["GCSE- the new exam system at 16-plus", DES, 1985].
The answer to the apparent riddle of how can a set of standards, being calculated in a completely new way, be equated with the old standards hinges on the use of the term "standards". Technically there can be no equivalence between the standards, but `standards' can be, and often are, used in an almost mythical way to reassure people about the overall quality of some part of the education system and its outputs. It is in this latter sense, that there is felt to be a relationship between the two systems. It is an understandable attempt to bring about change, while also emphasising a continuity with what went before.

themselves may have been taken by some pupils at school). In such cases the response of the tutor should be dependent upon the type of CIT qualifications to be given in YTS. If vocational qualifications with an embedded CIT content are to be undertaken, then problems of progression should be largely resolved. The vocational application would still be relevant, and it should be hoped that prior experience should facilitate the application of CIT skills in the new context. However, care should be taken in those cases where a specialist CIT qualification is usually undertaken, that there is scope for those who have already achieved it or its equivalent to make further progress [24]. Issues surrounding practice in YTS will be more fully discussed in Section 3.

2.3 General Certificate of Secondary Education (GCSE)

GCSE is a major curricular innovation. It is leading to a thorough overhaul of school assessment processes, including much greater emphasis upon the demonstration of practical competence. GCSE lays down detailed specificiation of aims, objectives, content and assessment methods of courses. There is an insistence upon some form of assessment of course-work. One innovation is the introduction of grade criteria and Nuttall summarises their importance as follows: "what is important is that grade criteria make clear to students for the first time exactly what is expected of them, how they might improve their performance and where they should concentrate their work if they want to improve their grade" [25]. The grade criteria are intended to outline the specific standards expected for each grade [26].

However, GCSE grade-related criteria specifically attempt to **decontextualize** achievements. If they were to be contextualized, they would be of much more limited practical use. It is intended that they should be used predictively and as such this implies a clear model of transferability.

Behaviour in relation to specific tasks, questions both in coursework & exams. (1) >inference> some general statement of competence (2) >inference>

Behaviour in relation to other tasks (in YTS these are likely to be in relation to work or training activities) (3)

Clearly the GCSE criteria are intended to relate to what the young people showed they **can do** (in mainly school settings) and what they **should be able to do** (in subsequent settings).

[27] That is, the inferences may be valid, but the criteria are not used for other reasons. Those making the decisions may be unaware of or choose (for whatever reason) not to use the criteria. Alternatively, the inferences may not be valid, but may still be used because they are a means of allocation. For example, time and again, it has been shown that performance in arithmetic as measured by tests is not a reliable predictor of performance in tasks/roles at work requiring a high arithmetic or mathematical content (see for example, "The relevance of school learning experience to performance in industry" D Mathews, EITB, 1977 and "New Technology and Mathematics in Employment" A Fitzgerald, University of Birmingham, 1985) but nevertheless such tests continue to be used because they are one simple means of reducing the number of applicants. The lack of validity of the tests is simply not perceived as a problem.

[28] Indeed the whole development and promotion of work-based learning hinged upon its ability to reach those who rejected or were rejected by formal learning in educational institutions. ["Developing work-based learning" K Evans, A Brown & T Oates, MSC , 1987 traces the development of work-based learning through schemes such as Tradec and UVP which were specifically targetted at `traditional non-participants in further education.']

[29] By summer of 1987, one examining group had initially rejected proposals for a GCSE in IT on the grounds of overlap with Computer Studies. The examining body felt wider consideration should be given to the balance and demarcation lines between these two subjects. Other examining groups have, however, pushed ahead with GCSEs in I.T. For example, the Southern Examining Group is running a modular course in I.T. in conjunction with RSA. In addition, this examining group, this time in conjunction with Digital Equipment Corporation (DEC), is working on the introduction of IT modules into all GCSE subjects, not just the sciences.

[30] Most markedly in relation to degree of emphasis upon programming and computer systems. Although as argued in Appendix 4 this distinction is less apparent than previously.

Now it is likely that in YTS (or elsewhere for that matter) that assessors will require evidence that trainees can perform required behaviours in the changed context, before they in turn will accredit what the trainee **can do**. This means that GCSE grade-related criteria should only be used in the selection of tasks/activities, at an appropriate level of difficulty, which enable a trainee to demonstrate his or her competence. Now whether the criteria will be used in this way will depend upon a number of factors. One of these will be whether the criteria are **useful** in assigning appropriate tasks/activities: do they help the trainer, tutor or supervisor? This is a pragmatic test, and separate from considerations of the validity of the inferences [27].

A further consideration is that at the moment there are wide disparities between performance at school and performance on YTS, not least because of the **motivation** of the young people [28]. Now whether predictors of behaviours in the transition from school to YTS (or work, more generally) improve will depend not only upon the success of the technical specification of grade-related criteria, but also upon the success or otherwise of GCSE and developments such as TVEI in transforming the school environment and young peoples perceptions of themselves and that environment. Details of the assessment processes for one scheme's GCSE in Computer Studies [29] are given in Appendix 3, while Appendix 4 outlines the general standards for GCSE grades A, C and F.

Although the content of computer studies courses are markedly different from those designated computer awareness [30], from the perspective of a YTS CIT tutor the issues faced in relation to progression are remarkably similar, particularly as to how to gauge how much practical experience trainees have had and where they should be `fitted in' in schemes which take much more of an applications-based approach.

2.4 Technical and Vocational Education Initiative (TVEI)

Standards and certification in TVEI follow no universal pattern. TVEI offers a philosophy and a framework, within which IT can figure in one of two guises:

a. specific courses within TVEI framework:
GCSE, CGLI, RSA, BTEC, etc. - some of these may focus upon I.T., but in any case the new courses are emphasising ability to communicate, problem-solving etc.

b. as a `core' component: the core is intended to promote initiative, motivation, enterprise and to develop IT-

[31] The move towards records of achievement is two-fold. On the one hand, there are general records of achievement which seek to document personal qualities, interests and achievements. It is government policy that by 1990 all school-leavers should have a record of achievement, and large areas of the country are already piloting such systems. In addition, other records or profiles seek to document competences in particular areas, including I.T. There may be particular cases where the information is in such a form that they can help in making decisions about what might be appropriate activities (including `level') a trainee should undertake. Although often it will not be the specific information conveyed which is of signficance, but rather that the trainee is used to assessing and/or commenting upon their performance which can be picked up within CIT in YTS: not just in relation to initial allocation, but also in trying to `match' on and off-job activities and in trying to develop a profile of achievements in CIT in YTS. This line of argument is taken up by D. Nuttall in relation to the need for colleges and examining and validating bodies to respond to student's changing perceptions about the role of assessment: see "The Current Assessment Scene" in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC, 1987.

[32] For example, the criteria of performance for profile statements of RSA CLAIT do not appear on the certificate. They are of course readily available from RSA, but the general problem remains, especially given the plethora of IT certificates and profiles: where a **particular** tutor has not the criteria readily to hand, what credence should be given to the statement that the trainee is already "able to interrogate a database"? The above should not be taken as a plea for the inclusion of performance criteria on the certificate. There are cogent arguments against such a proposal (especially a desire not to `clutter' certificates unnecessarily), and such a specialized use may be relatively rare, but it does illustrate that decisions about progression may not always be straight forward, even when the information is presented in a `friendly' form.

related and general problem-solving skills. For further comment upon this, see our report 4 and "Progression into Engineering", Surrey, 1987. However, the key point here is that trainees may have already completed a number of specialist IT modules even before they enter YTS.

Thus achievement within TVEI may include virtually any of the other qualifications mentioned in this report. Hence from the perspective of formal qualifications, it is not necessary to delve further into TVEI. However, TVEI is of interest for two reasons: one particular (it seeks to promote profiling and the development of records of achievement) and one general (its underlying philosophy and emphasis) and these both have profound implications for progression issues.

An early attempt at Information Technology skill profiling in a TVEI scheme produced the following:

"Can organise and summarise a variety of information. Has used the following equipment:- Word processor etc.

Shows a high degree of confidence when using IT equipment, and can apply IT skills to a variety of situations. Can produce information in textual form, pictorial form and in diagramatic form".

Before being too critical of such attempts, it should be remembered that IT is of course only one of a large number of areas being profiled, and there is the rub. The profile is too general to be of much use for **particular** purposes. Certainly for a CIT tutor looking for evidence of previous achievement, then the statements appear to be unfocused on any particular development of skill, and reflect no prescribed level or quantification of competence. It should be re-emphasised that this was an early attempt at profiling, but it does foreshadow the direction in which much assessment is moving. There are problems about the balance between the general and the particular, and about how to express competence, but records of achievement are increasingly being used [31]. So there is a possibility that such records may be directly relevant to decisions about progression, especially if they are expressed in terms of competences. However, a further problem for tutors could arise even where performance is described in terms of competence. This could simply relate to whether the criteria of performance are attached [32].

TVEI is, however, also of significance to our debate for broader reasons. The philosophy and emphasis of TVEI is highly congruent with arguments advanced throughout our series of reports. In particular, it is interesting the way some TVEI schemes which initially interpreted the

[33] The post-14 curriculum as represented by TVEI therefore shows a clear continuity with post-16 developments brought in as part of the "new FE" over the last 15 years. The antecedents of such approaches are documented in "Developing work-based learning" Evans, Brown and Oates, MSC, 1987. The advent of the GCSE and of the `new' vocational qualifications should also act to smooth transitions between school and work-related non-advanced further education. There is a danger, however, attendant upon such a continuity, and that is that it will serve to emphasize the discontinuity between such routes and the traditional academic routes (based on A levels and higher education). Innovative and imaginative approaches may therefore to some extent `fail', not because of their merit or otherwise, but rather because they are primarily associated with vocational education and training, which is seen as inferior to an academic education. Such an analysis arguing for a more comprehensive reform of all education may seem to be beyond the scope of this report but it should serve to illustrate the way in which developments (or more precisely the lack of development) outside the ambit of vocational education and training nevertheless have repercussions within it. Besides the general slight of an inferior status, the existence of a separate tradition for academic studies can increase the barriers to progression between FE and HE. Further, the obsession with content within the academic route can result in students not having the time to experiment with other ideas or approaches.

Some encouragement should perhaps be taken from the fact that TVEI is making some impact on A level curricula : for example, in the agreement between Cambridgeshire TVEI and the University of Cambridge Examination Syndicate to develop a modular programme of A and AS levels. Also attempts by TVEI to promote a more co-ordinated, and practical, approach to technology is being complemented by a number of other initiatives, including British School of Technology (BST) and the Science and Technology Regional Organization (SATRO) network.

[34] Quotation is from "The CPVE Framework and Criteria for Approval of Schemes". While CPVE may become increasingly available part-time within YTS, the dominant mode has been full-time at school or college, usually immediately after the completion of compulsory secondary education (post-16). This means that transition into YTS, where it occurs, will be in to the second year of YTS. This makes it especially important to `match' what has been achieved on CPVE with suitable activities to be undertaken in the second year of YTS.

FEU have consistently argued that progression would be the key to success to CPVE. They have highlighted the importance of establishing LEA-wide criteria for progression into FE courses (this line has been pursued through a number of FEU projects and its staff development programme supporting CPVE. Further details can be obtained from FEU, who have produced a large number of pamphlets, reports and statements concerning this issue).

`vocational' emphasis rather narrowly have subsequently broadened their approach. The intention of TVEI was always to develop transferable skills and to put a premium on initiative, motivation and problem-solving skills. The technical and vocational emphasis was to be firmly based upon experiential learning, and it was hoped that this would improve pupil motivation. New forms of school assessment were one element of ambitious plans for curriculum development - another key feature was that individual local authorities and schools would themselves be in control of the curriculum development process. All this is praiseworthy, and its significance lies not just in whether there is an overlap in content, but more that youngsters moving from TVEI to YTS should be used to working in a more practical way and adopting a problem-solving approach to learning [33]. Whether with the expansion of TVEI, and its transition from a pilot programme to a `mainstream' one, the `new' curriculum is able to retain its vigour and reshape existing curricula remains an open question.

2.5 Certificate of Pre-Vocational Education (CPVE)

One of the key elements of CPVE was that it was seen as a basis of future choice, whereby "students completing the CPVE will be looking for progression into employment, or into continuing forms of further education" [34]. However, it also aims to be a general pre-vocational introduction. For both these reasons, an assessment system was required which gave fairly full information, which would allow subsequent "gatekeepers" to make decisions about entry, credit exemption and progression. The CPVE itself is awarded for completion of an approved CPVE programme, but this is coupled with a summative profile and a summary of experience. IT is one of the CPVE's core areas, and as such is an element of the summative profile, with the precise statements being chosen from a bank of summative core competence statements published by the Joint Board for Pre-Vocational Education. The core competences for IT are given in Appendix 5. Some of the core competences in other areas (most notably communication and problem-solving) have general implications for CIT, but some of the optional vocational modules also relate specifically to IT. Again these are discussed more fully in Appendix 5.

CPVE thus seeks to build up a strong core of general skills and knowledge. While this can serve a useful pre-vocational function, doubts have been expressed about how this could link with subsequent vocational education and training. For example, the Director (Accreditation) of NCVQ: saw CPVE's "overall profile recording achievements based on a much looser definition than NCVQ's standards require" hence he could not see any prospect of progression in that it could make "little by way of a direct contribution to an NVQ", with "assessment not being based on clear performance

[35] M Ridley making the keynote address at a conference on "Progression into Engineering - building bridges between education, training and employment" at University of Surrey, July 1987. Proceedings will be published in due course.
It should be remembered, however, that the criticisms referred to the CPVE profile itself. As part of CPVE, a youngster may undertake vocational studies which result in other full or partial qualifications which do relate to the NCVQ framework. See Appendix 5 for more detail on this.

[36] For example, work with databases in a school setting may have been geared to understanding the principles of operation (how fields and records are designed; setting up a small database etc.) rather than working with a large database: inputting and/or retrieving information over an extended period of time.

Indeed in some respects children may have experience of systems which are not yet in widespread use, but can be expected to become increasingly important. For example, in the use of `logic programming': R. Ennals and J. Briggs in "Fifth generation computing : introducing micro-Prolog into the classroom" Journal Educational Computing Research, 1985 describe their use of logic programming in schools since 1980. Besides having a number of wide-ranging applications, such an approach is noteworthy because emphasis is placed on the clear description and explanation of knowledge areas rather than on behaviour of the computer. Clearly it would be desirable to build upon such experience and interests, and one possibility would be to look for applications involving `expert systems', which might otherwise be regarded as too `specialist'.

[37] "Progression into Engineering", University of Surrey, 1987, emphasised the importance of recognition of prior experience. The Project examined the possibility of constructing bridges between education, training and employment, in relation to the gap between skills and knowledge acquired within pre-vocational education and foundation training and those required for progression to higher levels of occupational training and vocational qualification in engineering.

criteria" being a particular weakness [35]. The picture with regard to the CPVE profile is remarkably similar to that for TVEI, or school profiles more generally. Although they mention I.T., vagueness and a lack of specificity makes any attempted assessment of what trainees can do in IT quite difficult.

2.6 Summary

Achievements in CIT at school (or more generally prior to YTS) are:

i. unlikely to be expressed with sufficient precision so as to enable automatic exemption from any proposed activities in CIT in YTS (although qualifications obtained which are themselves often available post 16 are obvious exceptions: e.g. those of RSA, CGLI and SCOTVEC), but what they could be used for is to select appropriate tasks, in certain circumstances, which if achieved, could be used not only to recognise that competence but also to give that exemption.

ii. the contents and the educational purposes may be sufficiently different, that a demonstration of competence in the changed context or for a different purpose would still be desirable [36].

iii. However, developments in this field are moving with such speed that it would seem desirable to have a system which could allow for automatic credit exemption.

2.7 Taking account of prior learning

The devising of an instrument to assess and accredit prior learning experience in I.T. should be a high priority. The need for entry into and out of YTS should seek to accommodate different `credits'. However, before either `credits' or `modules' can be devised, previous relevant experience needs to be established [37]. The devising of an instrument to assess and accredit prior learning experience in I.T. is an important task. As it is seen as a vital component of a CIT strategy, arguments about it are set out at greater length in Appendix 1.

[38] It should be re-emphasised that there is no particular significance in the exemplars chosen. A whole range of other qualifications (of both types) could be used to deliver the CIT component of YTS. (Indeed our report 2 "A survey of current practice in CIT in YTS" showed a wide range of qualifications were being used). The precise qualifications chosen could be dependent upon the context of particular schemes. Besides the offerings of RSA, CGLI and SCOTVEC mentioned in this section, BTEC, LCCI, Pitmans and Cambridge Local Syndicate are among those offering specialist CIT qualifications.

[39] SCOTVEC, BTEC and CGLI are among those moving in this direction in some vocational areas. Unfortunately, there is no policy about the inclusion of some CIT in all basic vocational qualifications. [The need for such a policy is argued strongly in Section 5]. In the absence of such a policy, it is difficult for CIT tutors (or others) to get an overall picture of what CIT trainees are undertaking in their vocational qualifications. The degree of emphasis given to CIT varies not only between vocational areas (although it is of course to be expected that it should figure much more prominently in some areas rather than others), but also according to the policy of different examining and validating bodies. Given the plethora of possible levels of involvement in CIT in vocational qualifications, it is perhaps unsurprising that a number of tutors and managing agents baulk at attempting to co-ordinate their CIT provision. As so often, Scotland is at least a partial exception to the above commentary. The inclusion of CIT as a core area within the SCOTVEC 16+ modular system, and the progressive nature of the system based as it is on prerequisites, means that it is much easier to ascertain starting levels of trainees in relation to their CIT competence. Elsewhere in the UK, however, often the only clear guide will be the possession or otherwise of specialist CIT qualifications. It is extremely difficult to make judgments about `levels' of competence in CIT in relation to the different systems of vocational qualifications. As a result, even at relatively `high' levels, an assumption is often made that there has been little or no prior exposure to CIT. Such a system allows an enormous amount of duplication - it is in urgent need of organization and overhaul, whereby achievement in CIT can be progressively achieved and accredited.

3. ISSUES IN STANDARDS AND PROGRESSION IN DEVELOPMENTS IN CIT DIRECTLY RELATED TO YTS

This section seeks to outline the options available for accreditation, in the form of nationally recognised qualifications, of the CIT component of YTS. The choice is essentially between specialist CIT qualifications and vocational qualifications with an embedded CIT component. Examples of the two types will be given, together with an account of a system which contains elements of both [38]. Additionally, there are discussions about how the type of CIT activities undertaken at the workplace could relate to the approach taken to CIT in YTS. The final sub-section pulls all these strands together and makes recommendations about the accreditation of CIT in YTS, together with a commentary as to how CIT competences could be developed.

3.1 Vocational qualifications with an embedded CIT component

Increasingly recent vocational qualifications have begun to include an embedded CIT component. The new RSA certificates in the clerical and retail distribution fields will be taken as exemplifying this process, which is now being taken by a number of examining and validating bodies [39]. Occupational competence can be developed at a number of levels, resulting in memoranda, certificates or diplomas as appropriate. The system being flexible enough to accommodate entry and exit at a number of points, and for training programmes to be built on a combination of occupational competences and specialist single subject qualifications if required. The extent and nature of the embedded CIT component in RSA vocational qualifications in clerical and retail areas is more fully discussed in Appendix 6.

The diplomas/certificates in office procedures and retail distribution being especially clear in specifying the nature and content of the embedded CIT component. Occupational tasks are analysed into skills and knowledge, but these should not be discretely tested. Rather the application of skills must be demonstrated through the performance of tasks to the prescribed criteria for achievement. In addition, the work placement is seen as a key learning context and the criteria for achievement invariably draw attention to the need for the task to be demonstrated over time and in a variety of circumstances. As noted above, this is more fully described in Appendix 6, but what is of significance and should be re-emphasised here are the opportunities this gives for trainees to overtake competences (i.e. in these qualifications to be accredited with achievement of `tasks') based to a large extent upon what they have been doing at the workplace. This may involve some structuring of the range and content of the workplace activities undertaken by particular trainees. This should not involve any major

[40] The link between work-based learning and assessment is discussed further in Sections 3.5 and 5. For a fuller account of the issues involved in the design, delivery and accreditation of work-based learning, see the outcomes of the FESC Work-Based Learning Project. Publications are r adily available; including, for example, "Work-based learning in Vocational Education and Training", T. Oates, FESC, 1987.

[41] A fuller account of the work undertaken and its context is given in Appendix 2 of Report 3, where this example is used as a case-study for the delivery of CIT in YTS. The development of the ideas outlined in both reports were largely attributable to the work of one of our consultants: Moira Turner.

[42] For example, the MA concerned intended to revise and update the list as more CIT activities are incorporated both in work activities and off-job.

restructuring however, because training (either on-job or off-job) can complement the work activities. The off-the-job training may also have to compensate where such experience/training opportunities are lacking at the workplace [40].

The way in which CIT activities can then come to be treated as a `natural' part of a large number of occupational activities rather than as a separate component can be illustrated by the following example [41].

A Managing Agent obtained agreement with MSC and RSA to integrate their differing methods of recording achievement. Certain elements of the occupational tasks (competence objectives) then realized a number of opportunities for delivering CIT **in context.** For example:

Task	Making a sale
Element	Demonstrate understanding of internal and external credit facilities.
CIT activity	Intend trainees use spreadsheet to compare credit terms.
Task	Deal with customer complaints
Module	Reply to letters of complaint (simulation)
CIT activity	On word processor.
Task	Issue appropriate sales documents
Element	Prepare and issue invoice
CIT activity	Using invoicing program.
Task	Store and retrieve information
CIT activity	Set up data base Enter and edit data Obtain a print out of stock holding.
Task	Order merchandise
Element	Research suppliers
CIT activity	Trainees will set up data base of suppliers and extract information. Write letter of enquiry (using word processor).
Task	Estimate stock requirements
Element	Estimate stock order levels
CIT activity	Use of supermarket simulation program.
Task	Draw up duty rota
Element	Determine peak daily customer flow
CIT activity	Results to be presented using a histogram drawing program.

It should be noted that the above are only **some** examples of such contextual CIT activity [42]. The embedding of CIT

[43] In such cases, it may be useful if a trainee keeps a portfolio of their CIT achievement.

[44] Quote is from "Microlectronics and Information Technology in Further Education: A Plan for Scotland" SCET, 1986. The above report gives the following example: "thus at present we may require that students experience computer-based accounting systems. In time no other option may realistically exist".

[45] Note RSA have adopted a similar approach (see 3.1 above). The embedding of CIT skills in their vocational context and the specification of outcomes in relation to tasks should reduce the risk that undue attention is given to narrow machine or software specific skills, which are liable to rapid change. Attention is focussed on the wood not the trees! Other commentators, including Mansfield and Wellington (see following sections), have argued strongly for the need to steer clear of the temptation to link outcomes and competences to the means of achieving them.

[46] One commentator sees this as mirroring "the traditional and generally creative tension between the national and local in Scottish education": D. Raffe "The extendable ladder : Scotland's 16+ Action Plan", Youth and Policy, 1985.

activities does mean that some CIT activities may not fall within the scope of the vocational qualification. For example, the trainees in the above mentioned scheme also used route scheduling programs and graphics packages [43].

3.2 SCOTVEC 16+ modular system

This is a Scottish system of certification based on a collection of modules covering a wide range of vocational areas, and a range of professional standards. In one sense, SCOTVEC modules could be considered as a case for inclusion in Section 3.1. Indeed they pioneered the use of vocational qualifications with an embedded CIT component as a matter of policy. The justification for the separate section, however, comes in that the SCOTVEC modular system also contains specialist CIT modules. Indeed IT is defined as one of the core areas. It thus also links with subsequent sections.

Each module covers a notional forty hours and is criterion referenced to (usually) five "learning outcomes". Performance against these outcomes is continually assessed by the tutor. The assessment is either by observation of practical performance of a task or by special tasks made up by the tutor (and accepted by SCOTVEC).

Many learning outcomes for the introductory modules are based on knowledge rather than practical competence. The specific "applications" modules are usually more practically oriented. At the moment statements of competence in CIT can come through the learning outcomes of either specialist CIT modules or vocational ones. For vocational modules it is expected that use of computers will initially be explicitly mentioned, but "as their use in the corresponding vocational field becomes almost automatic, so syllabuses will assume their educational use" [44]. This is of course the advantage of specifying the outcomes separately from the conditions [45]. The Scottish system also manages to combine an overall coherence and sense of direction with flexibility in delivery and ease of updating. The learning objectives and performance criteria were produced by the SED, and remain under central control through SCOTVEC. They are prescribed, and guidelines are given on the following processes, but the detail of content, teaching, learning and assessment processes remain under local control [46]. More details of the learning outcomes and assessment procedures for SCOTVEC modules are given in Appendix 7.

3.3 RSA CLAIT (Computer literacy and Information Technology)

Certification is based on the ability to perform practical tasks. The certificate is awarded if candidates qualify for the requisite profile sentences from at least three of six application areas which are assessed by assignment.

[47] The development of CLAIT preceded those of the clerical and retail qualifications by 12 months. This is significant for two reasons:

i) lessons learned from CLAIT led to the incorporation of `computer literacy' skills, which were covered by the same general entreaties as other components: "knowledge and skills must **not** be seen as separate elements requiring discrete assessment or coverage. The application of skills must be **demonstrated** through **performance** of the task to the prescribed criteria for achievement" [taken from the introduction to `Diploma/certificates in Office Procedures and Retail Distribution: 1986 onwards']

ii) we should all take heart from the enormous strides made in that time: not only was there much `talk' about competence and new types of standards, but also real progress was being made `on the ground'. Understanding and application can be seen to be starting to percolate throughout the vocational education and training system.

[48] Although trainees or students wanting a broad introduction to all 3 areas can take an Introductory Certificate in Information Technology. This offers a choice of modules from all 3 fields.

The assignments are all practical exercises performed under supervision of the assessor (with later moderation). Assignments are either set by the RSA or are devised locally. The general core of "computer operation" competences are included implicitly in the "applications" specific assignments.

The competences must be done to a level of skill that satisfies the assessor. (Data entry or text entry tasks allow up to three errors).

Completion of one or more competence objectives qualifies a candidate for "profile certification". Achievement of all unstarred competences in three appliciations qualify a candidate for certification at Pass stage 1. All competences in three assignments qualifies for a distinction.

The IT Stage 2 scheme acts as a more advanced level of certification.

Unlike RSA's qualifications in clerical and retail which separate competence objectives (simply called `tasks') from criteria for achievement, within CLAIT such criteria are embedded in the assignments which constitute the assessment process [47]. The view has been expressed by a number of providers that all trainees, if they have not already done so, should undertake a broad initial qualificiation such as CLAIT and then subsequently (but still within YTS) go on to undertake single subject options. More details about RSA CLAIT are given in Appendix 8.

3.4 CGLI Information Technology (726 Series)

The City and Guilds 726 system is a collection of modules that certificate "Information Technology". `Modules' are available at four levels (introductory, elementary, intermediate and advanced) and cover three major areas (Electronics, Programming and Computer Applications) [48].

Each module contains a list of "objectives" which are tested after they have been logged or covered. Some objectives are tested by practical tests, while others are tested by short multiple choice (or short answer) tests which must be completed without error [up to 4 tries are allowed, with a five week gap between attempts at practical tests].

The modules might have (typically) three written and five practical tests as well as some tutor assessed areas. The tests are taken over a notional 45 minutes.

[49] This argument is partly framed by a debate about the possibility of CIT competence objectives being set for clerical placements. To this end, extracts from paper by Bob Mansfield "The Development of Competence Objectives for Computer Applications in Office and Administrative Occupations" - December 1986 are of significance. The following are some of the issues raised:

- debate about usefulness of training based on BBC etc:
  use of machines, operating systems and software that are not used at all in commercial environments and are less demanding in skill terms leads to questions of confidence, based on the issue of `what will transfer'. Mansfield argues that "if it can be demonstrated that the level of complexity, type and design of hardware, software and operating systems is **not** significant in terms of skill transfer (or that learning methods designed to promote transfer can overcome any problems of retraining) then we can live with the situation where operators are being certificated on educational machines for `users' whose needs and systems are quite different". Both Wellington and Fitzgerald report that employers see training for such operators as **not** problematic (see report 3). They would presumably argue that using non-commercial equipment can still develop the requisite IT capability (and that attempts to train prematurely to highly specific ends may themselves be misplaced).

  Also some of these concerns may be by-passed by the `incorporationist' philosophy of recent BTEC and RSA qualifications in this area, whereby computer applications and competences are `embedded' in broader occupational tasks. This reduces the need to set separate CIT competence objectives.

- Mansfield proposed that competence objectives should be grouped into modules. The outlines of the proposed modules were as follows:
  : prepare a micro to run an application
  : operate a spreadsheet to produce automated calculations
  : operate a text processor to produce printed documents
  : operate a database to store and retrieve data and information
  : carry out system management functions within the operating system

- Mansfield draws attention to the increasing convergence of computer applications in clerical areas. For example:
  applications: WP, DB, SS are now in broadly the same form on all micros (as are `integrated packages')
  operating systems: DOS or CP/M, with some use of WIMPs
  price: reductions in hardware and software prices have resulted in increasing availability to a large number of small businesses

- future:
  Mansfield considered these changes "will create a need for trained operators in office systems .....", and that "computer operative skills are on the brink of changing from desirable skills to meet the anticipated needs of the future to essential skills urgently needed in the present" Note, however, this is a sharply different view to that of Wellington, who thought that it is not easy to predict exactly what will be `the skills of the future', that there is no evidence of shortages at these lower levels and in any case it is easy to train for these skills when they are required. Perhaps the two views can be reconciled in that more employees will be involved in such developments, but that prior training should be broadly conceived: developing an `IT capability', which could be used as a base for any more specific training.

If not all of the tests in a particular module are passed, the objectives that are passed are credited.

When modules are accredited, these can be built up to achieve certification in I.T. at a number of levels. This flexibility will be increased from March 1988, when all CGLI certificates will be available on the basis of credit accumulation: records of achievement will detail credits achieved, and these can be assembled over time to lead to a certificate. Besides the implications for progression both pre- and post-YTS, it also helps to take the pressure off during YTS to try and get everybody through to a full certificate in a single attempt.

Competence objectives are tested by short written tests for knowledge and concepts, assignments for practical competence and occasionally some competences are assessed by a method devised by the tutor.

Fuller details of the assessment scheme are given in Appendix 9.

Other recent changes have also been made to increase flexibility. The introduction of `open assessment' means that trainees can take assessments as and when **they** want, according to their own rate of progress. (A further development, which is itself a practical example of an application of CIT, is that the assessment can be delivered and marked `down the line' by computer. Then there is even the possibility that the certificate itself can be produced almost immediately using local desk-top publishing facilities, if they are available).

As a result of these changes the CGLI 726 series, qualifications in which were initially perhaps realistically attainable only by those undertaking substantial CIT training (e.g. at an ITeC), now warrants wider consideration. This is particularly so now CGLI have a range of qualifications in IT at different levels.

3.5 Relationship between CIT activities undertaken at the workplace and approach taken to CIT in YTS:

Clearly the amount and type of CIT activities undertaken by trainees at their workplaces will be influential in other decisions about their CIT component in YTS. The following examples relate to varying types of CIT experience which may be encountered in clerical placements [49].

i. where trainees undertake substantial CIT activities at the workplace: if the trainee is taking BTEC or RSA vocational qualifications (or if they were undertaking computer applications competence modules), then off-job could compensate for any `gaps' in coverage of

[50] See our report 2 and J.J.Wellington et al "Skills for the future", Sheffield,1987.

objectives at work (e.g. if trainee was undertaking a fairly narrow range of tasks etc.).

Overall then, it may be possible to demonstrate a general `IT capability' coupled with achievement in specific skills (e.g. WP). However, note it would mainly be (prior achievement and) work experience that would lead to development of a `worthwhile' speed. One should question the value of taking someone through, for example, a WP module off-the-job without other opportunities to develop speed and experience; little `employability' (or other) value in text processing using `hunt and peck' techniques!

Alternatively there may be cases where work experience affords other opportunities for a substantial CIT component (e.g. going beyond simple data preparation and entry). Then achievement and demonstrated competence through complementary off-job training if necessary, may lead into opportunities at 18+ for computer operator posts (note the area office survey highlighted one or two examples where this type of progression was encouraged).

ii. where trainees perform a very limited range of CIT tasks at work: these may include data preparation, data entry or response to routine enquiries with stock control systems, mailing databases, invoice production, credit control, pay/tax systems etc. The trainees may spend considerable time doing above or similar tasks, but the tasks are highly routine and people are easily trained to perform them. In such cases, evidence both from our own area office survey and Wellington suggests that employers are looking for **flexibility** from staff in being able to transfer to other sets of similar tasks [50]. An example from a scheme, visited as a result of the area office survey, can be used to illustrate this point.

Checking credit-ratings is becoming automatic (performed in store) and this obviates the need to telephone central offices, where VDU users deliver a reply, typically within 7 seconds! The personnel in head office would then transfer to other low level IT-based tasks. The organization has a large systems division, one of whose primary tasks is to ensure that the tasks required are `user-friendly' and that staff can be trained quickly to perform them. There is, therefore, a very clear (and wide) divide between those performing `high level' and `low level' IT tasks. The only department with IT opportunities for youngsters in-between was in finance. There team-work on financial modelling meant there were were opportunities for development of IT skills and experience. However,

anyone moving into such an area would be expected to undertake related professional training in accountancy. So once again movement into areas requiring high-level IT skills (use of information and control systems, modelling etc.) is dependent upon more general development (whether in personnel, finance, accounting etc.) rather than possession of particular IT skills. The ideal being where the two sets of competences cannot be separated or are at least developed in tandem. Failing that, it is clear that the preference is for the development for functional/specialist competences and then training in use of requisite IT competences as necessary.

What does appear unrealistic is to develop detailed IT-competences first with a view to gaining employment in areas where these are used (that is, it is difficult to conceive of situations where detailed understanding of how to use, for example, databases, spreadsheets or information systems is going to help employment prospects without a strong general background and/or more particular specialized knowledge, skills and experience). That is, not to argue that such competences should not be developed, but rather that they should be developed in the service of other education and training goals. So once again, the argument is for development of an `IT capability' and attention to broader education and training goals, rather than exclusive concern to development of particular IT skills.

iii. where trainees have little or no opportunity to use CIT at work: the preferred solution in this case is much more straight-forward. The goal should be the development of an IT capability and this has to be carried out almost exclusively off-the-job. As in (ii) above, there would be little value in seeking to concentrate on the development of specific skills. Being able to `operate a database to store and retrieve data and information' on its own without any commercial experience is likely to be of limited value to the trainee (if achievement of this competence has taken a considerable `slice' of their off-job time for CIT. It may just be worthwhile if it is consolidating and accrediting prior achievement). The trainees would, in most cases, be better off with a broader approach (including use of databases etc.) coupled perhaps with material for a portfolio, which showed how they used IT and at the same time demonstrated more general skills (in relation to communication, problem-solving etc.).

The issue of the general approach which should be taken to CIT in YTS is more fully discussed in Report 3, but the above shows that the type of CIT activities undertaken by

[51] The approach adopted by RSA was documented in Section 3.1. The BTEC First Certificates and diplomas have included among their core skills "using IT". Thus trainees following these courses (the first three are for clerical, retail and hotel and catering trainees) will cover IT applications as an integral part of their vocational qualifications.

[52] Even if it could be shown that the IT content of a particular vocational qualification with an embedded CIT component was `narrow' and that the training, on and off-job, and experience at work all focused upon a particular area (for example, use of a viewdata system), what are implications of this? If our overall aim was defined in terms of content coverage, then we might ask that other work in CIT should be undertaken (for example, use of spreadsheets). But this is not the overall purpose - that goal is defined as the development of an `IT capability' and the promotion of an `open' attitude to IT. Substantial achievement in one area (depth rather than breadth) besides being a necessary component of occupational competence, also can be seen to meet our wider concerns. Would mastery in this area mean that the individual has an `open' attitude towards the use of IT? Would they be confident about undertaking further training in IT? The answer to such questions is likely to be yes - hence we can be reasonably confident that they would be able to develop particular IT skills (again, like use of spreadsheets) as and when required: particularly given the evidence from Fitzgerald that training in such skills is seldom problematic, provided there is a willingness to learn. [A.Fitzgerald "New Technology and Mathematics in Employment, University of Birmingham, 1985].

Also, it can be argued that an apparently narrow area, if covered in depth, can deliver a large number of IT related transferable core skills.

In short then, apparent narrowness if coupled with depth of experience can deliver our goal because it is learning in context. Narrowness without the context and lacking depth of experience (that is, without time spent at the workplace dealing with queries etc.) would be far more problematic. We have argued time and again that premature specialization and development of narrow IT skills in the belief that this ensures `vocational relevance' and `increases employability' is unsound and misguided. It should be emphasised that no criticism is implied of ITeCs, New Technology Workshops and similar developments because they are of course delivering depth of experience. By the same token, they do not focus narrowly or exclusively on one area.

trainees at work should be an important variable in deciding upon particular approaches both to learning and assessment of CIT in YTS. This leads on to a consideration of different types of accreditation which may be appropriate for the CIT component in YTS.

3.6 Accreditation of CIT in YTS

Given the foregoing arguments about the inappropriateness of premature IT specialization for `vocational' purposes (that is, development of particular IT skills out of context), then emphasis and encouragement should be given to the attainment of qualifications, which incorporate the development of IT skills in context (e.g. both RSA and BTEC qualifications are starting to do this) [51].

The most favoured approach to accreditation should be through the use of vocational qualifications with embedded IT skills.

That is, the `vocational' element comes from the occupational area: clerical, retail, brewery, travel agent etc., rather than attempting to `separate out' the CIT component. This is a matter of emphasis, however, and in some circumstances (trainee not committed to that industry; lack of suitable qualifications with an IT component etc.) a separate qualification (e.g. RSA CLAIT) can be used as an indicator of trainee's IT capability. Finally, if neither of the above avenues is taken, some other means should be utilized to demonstrate the trainees have attained an awareness and familiarity of IT (CIT offers potential as one medium for actually demonstrating such competence: the construction of a profile, record of achievement, project work etc. can itself be computer-generated).

What of possible criticism that this approach with its emphasis on what happens at the workplace is too "narrow". This is a plausible theoretical criticism, but the evidence from our survey was that in practice high `IT users' make more not less use of further education, which can act to broaden `awareness'. Imaginative off-job training can act to situate what trainees are doing at work in a wider context. Many IT users recognise the importance of trainees having a wider understanding of CIT, so as to give a cognitive base to their activities at work [52].

Other options for accreditation of CIT in YTS could involve specialist CIT qualifications or the development of a profile of IT-related competence objectives. For example, RSA CLAIT or similar specialist qualifications are not ideal as they are `separatist' but they can be seen as encouraging a readiness to use IT. Hence they can meet general goal of developing an IT capability, particularly if assignments are used imaginatively.

[53] Our earlier report "A survey of current practice in CIT in YTS" established the validity of this premise.

[54] The `pull' from assessment may distort what you are trying to achieve in two ways. Firstly, there may be a concentration upon that which is to be assessed. For example, existing specialist CIT qualifications do not exactly `match' with aims and objectives advocated in this report (they place too much emphasis upon the particular elements). The second distortion is closely related to the first: definitions of occupational competence have traditionally been too narrow (more detailed arguments about this are given in our Report 3). How to assess occupational competence, when it is more broadly defined, gets right to the heart of current concerns about new vocational qualifications.

[55] Fairbrother outlines the dilemma as follows:
"one of these conflicts concerns the need to get students to solve real, live problems, and at the same time acquire an armoury of skills which can be brought to bear on the solution of these problems. Which comes first, attempting to solve the problem, which requires a synthesis of skills, or analysing the problem into the separate skills so that they can be taught?" [R. Fairbrother "Selecting, designing and evaluating assessment instruments" in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC, 1987.]

[56] Although not for all purposes - if an ex-trainee wanted to undertake further study in IT rather than in the clerical or retail vocational areas, then he/she may have to `unpick' their IT competences in order to gain entry and/or credit exemption for such a course.

[57] Much of the evidence, cited in previous sections, re-iterated how entrants into employment, further education or training may find it helpful to have corroborative evidence to show they have an awareness and familiarity with I.T.

An alternative could be the use of YTS certification procedures to build up a profile of IT-related competence objectives, drawing upon transferable core skills performed in IT contexts.

How this is done is critical, because almost by definition, those using external qualifications are serious in their intent towards CIT [53]. Great attention should therefore be given to the approach to the accreditation of CIT activities where external qualifications are not used. While the overall aims and objectives should drive both the assessment and learning processes, there is also interaction between the latter two processes. This means that the approach taken to competence objectives is vital both to what is learned and what is accredited.

Thus learning and assessment requirements may start pulling in opposite directions [54]. This is particularly the case when it is a general (problem-solving) approach which you are trying to develop, for this also requires an understanding of particular strategies and techniques which may prove useful [55].

The idea that individual skills have little value except when they are used for a purpose is a potent argument, especially if learning and assesssment can both take place in holistic contexts (e.g. achievement of tasks in RSA qualifications in clerical and retail areas). In such cases the `embedded' nature of CIT skills makes their separate identification redundant for many purposes [56].

Although in other cases (either where the attachment to a particular occupation is not particularly strong and/or where CIT skills do not feature prominently in the relevant vocational qualifications) there can still be considerable merit in the separate identification and accreditation of an `IT capability' [ ].

Generally issues of standards and accreditation are of critical importance, in relation to the deliberations of YCB, NCVQ and through them various industry bodies as well as examaining and validating bodies. If trainees are attempting recognised vocational qualifications, with an embedded IT content, or specialist IT qualifications (such as RSA's CLAIT) then the issue of standards is dealt with by the appropriate examining or validating body. However, some trainees may not be going down either of the above routes, while others may want recognition of IT achievements over and above those recognised in a formal qualification. In both these cases, guidance upon the specification of standards in relation to IT achievements is still required. Obviously general guidance about standards-setting and competence objectives will be relevant, but some discussion of these general requirements in the context of the

[58] This means that the final recording process need not be too demanding, and that the overtaking of interim competences can to a large extent be under the control of the trainee, with guidance from tutor or trainer as appropriate.

[59] This analysis is consistent with the arguments put forward by Bob Mansfield in "Competence Objectives in Office and Business Occupations" (report to MSC), December 1986. Mansfield argues that any attempt to design competence objectives must come to terms with problems of the appropriate level of aggregation (skill, task element or task). Some other elements of Mansfield's work are perhaps noteworthy here:

- MSC have adopted a model whereby the "objective is stated in non-specific form, and which allows success criteria to be added, so clearing the way for the establishment of standards which have a number of functions and uses".

- it is important that competence objectives are grouped into assessable modules.

- as with other commentators cited in Report 3, Mansfield draws attention to significance of `core skills' (problem-solving, communications etc.). He argues for a `key word' approach to the specification of the competence objectives.

- importance of context and conditions:
  as the framework of competence objectives will not **prescribe** machines/software etc., it is important that details of context and conditions are documented

- in subsequent and as yet unpublished work, Mansfield has given the following as exemplifying an appropriate level of aggregation:

  "edit existing text in a text processor";

  "extract and replace referenced materials in an established filing system."

[60] Mansfield, op cit, argues that performance criteria should have the following features. They should be:

- precise and unambiguous
- observable
- describe essential aspects
- avoid procedures/methods
- describe aspects of work organization and overall work role as well as `product'.

[61] That is, where trainees have worked in an area before, it should be clear exactly what they have achieved. This will reduce `straight' duplication, but will mean they may wish/be required to work in the same area, but to more stringent criteria or in different contexts. It should also facilitate transfer of skills from working with, for example, small databases on a BBC-B to working with much larger commercial systems.

development of `IT capability' may still be useful. Certainly such considerations will be important for trainers and trainees interested in developing portfolios of trainee achievement in this area.

The following comments upon competence objectives should then be borne in mind:

- level of aggregation:
  `smaller' learning or enabling objectives can be subsumed in a full competence objective [58]. A competence objective should be `broad in concept', that is, operate at a level above specific tasks or individual skills [59].

- separation of competence objective from criteria of success [60]:
  this allows standards to be progressively changed/improved as required. In particular, this could get over some apparent problems of `duplication'; help with progression; deal with issues relating to, for example, different scale and complexity of some `dummy' databases and commercial ones [61].

  The separation of criteria of success is clearly vital in an area where conditions and contexts change so quickly, because the emphasis is more on what the trainee can do. If the two were mixed, there is a danger the skills will be automatically regarded as obsolete simply because the context has changed.

- possibility of accreditation of other activities (e.g. production of menu cards using design packages etc.):
  trainees need to have freedom to add to own profiles/portfolios any examples of substantial CIT achievements.

- within the competence objectives, there is a need to have sections relating to knowledge:
  for example, in order to be competent at information retrieval, not only are certain skills required (both general and specific) but the trainee needs to have an underlying cognitive framework of how such systems operate and what are appropriate search strategies and techniques. Without this broader understanding, a trainee may be able to follow procedures successfully for a time, but may come unstuck if unaware of, for example, if, when and how the system is updated. Similarly a knowledge of information sources and when it is and is not appropriate to use computers would also be important.

  A section on required knowledge, however, should not be unnecessarily extensive (for example, in the above case

[62] Clearly using the RVQ report (MSC/DES 1986) definition of a vocational qualification: "a vocational qualification is a statement of competence clearly relevant to work and intended to facilitate entry into, or progression in, employment, further education and training, issued by a recognised body to an individual", then whether the statement of occupational competence facilitates progression can be considered at one level to be a question of **fact** (in terms of acceptance of those possessing it for progression in employment, further education and training). However, at another level it is also a matter of **judgement.** That is, if the statement of occupational competence neglects certain areas and sets of skills and these subsequently become increasingly important, then those ommissions may mean that the statement does **not** facilitate progression, in the sense that nothing they have previously done helps them with what they will now be faced with in employment, education or training. This is not, of course, a plea for the lead industry body, the NCVQ or anyone else to "second guess the future". What we are seeking to do is draw attention to the need to build in an `openness' towards the use of IT as a vocational outcome not an `extra' [our report 3 highlighted the criticisms from NEDC outlined in "Competence and Competition" about the dangers of too narrow a definition of occupational competence].

[63] While NCVQ is understandably preoccupied at present with specification and implementation of standards of occupational competence, design and implementation of NVQ framework etc., it should be remembered that one of the nine specific tasks given to NCVQ when it was set up was "to promote the interests of vocational education and training and, in particular, of vocational qualifications and **to disseminate good practice**" (our emphasis). Hence one possible future strategy may be to work with one or two industry bodies upon how they treat CIT and then use NCVQ and/or YCB as a means of drawing that approach to the attention of others.

[64] Quote is from J. Wellington et al "Skills for the Future", University of Sheffield, 1987.

[65] The advocates of the YTS core skills argued that this was one of their key functions. There were criticisms of its complexity and that the 103 core skills contained a mixture of skills, some over-lapping, some very difficult to assess and accredit etc. However, a sub-set of those skills could be used both as a common language and as a means of accrediting achievement in IT-related contexts. [K. Evans, A.Brown, T.Oates "Developing Work-based learning: An Evaluative Review of the YTS Core Skills Project", MSC, 1987 outlines these arguments in greater detail].

[66] As argued in previous reports it also has the considerable advantage of making trainee achievement in CIT a matter of public record.

[67] A quick scan may be sufficient for an employer who is interested only whether a job applicant has a general `IT awareness'. Closer scrutiny would be appropriate if the post required particular kinds of IT experience or if the user was an FE course tutor considering an application to a course or for unit exemption. The portfolio could also help to structure discussions about previous experience in an interview.

it would **not** be necessary for the trainee to have detailed knowledge about how to set up a database). If knowledge is essential to competence, then it should appear in the criteria of performance (essential knowledge should include procedures for dealing with rare, but highly significant, events like breakdowns etc.). Possession or use of knowledge should usually manifest itself in the outcome, although occasionally it may require special or separate testing.

- the future:
lead industry bodies will be charged with the responsibility for specifying standards. However, they are likely to be preoccupied with what they see as more pressing concerns, in relation to specifying occupational competence, to spend much time reflecting upon how CIT `fits in' if it does not already `loom large' in occupational activities. Even where CIT is mentioned, this may be very vague ("competent in computer applications appropriate to the industry"). The NCVQ is interested in seeing whether proposed modules, prospective qualifications etc. meet their general criteria, they do not intend to `interfere' with the content as such: that is to be the province of those directly involved with that industry [62], [63]. This means that different approaches could be taken by the industry bodies in relation to the treatment of CIT including how they treat standards. This means that the comment about "islands of IT education with few bridges between" [64] could soon also be applied to IT training. Approaches will, therefore, have to be made to lead industry bodies on an individual basis. However, if goals of flexibility and transferability are to have meaning, then it would be helpful if achievements were expressed in a common language [65].

- keeping options open:
One of the elements reiterated during this series of reports has been the speed of change in I.T. and problems associated with trying to `read the future' as to what skills will be required sometime hence. This should perhaps make us cautious about `bundling up' trainee achievements in this area in a particular way. Either as an insurance or as an alternative trainees could perhaps be encouraged to keep a portfolio of their experience and achievement in IT. One attraction of this is that the completion of such a portfolio can itself be used as a demonstration of familiarity with IT [66]. A further attraction is that it can be used in different ways depending upon the purposes of the person looking at the portfolio [67]. Finally, it may be that supervisors at the workplace as well as tutors could be involved in the corroboration

D. Mathews draws attention to some of the difficulties associated with generalizations either in profiles or in graded assessment, if based as they are on particular performances or specific contexts. He goes on to argue

"the solution may be to recognise that one aspect of the accreditation process is interpretation by the information user. It may be better, through portfolios, to offer some of the measured performances and to resist inappropriate generalizations" [D. Mathews "Assessment in the workplace -news from a faraway land of which we know little" in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC, 1987].

[68] Mathews, op cit, notes: "supervisors who are otherwise perfectly willing to assign responsible work to trainees/students suddenly become inhibited in accrediting achievement".

[69] This relates to the framework for a description of occupational competence offered by B. Mansfield and D. Mathews in "Job competence- a description for use in education and training", FESC, 1985. They outlined 3 classes of skills. Those concerned with tasks, task management and role/job environment.

[70] Not least in the assumption that the person assessed would be able to repeat the performance; our report 4 dealt with some of the inferences associated with different types of assessment. It also goes into a much fuller discussion about standards.

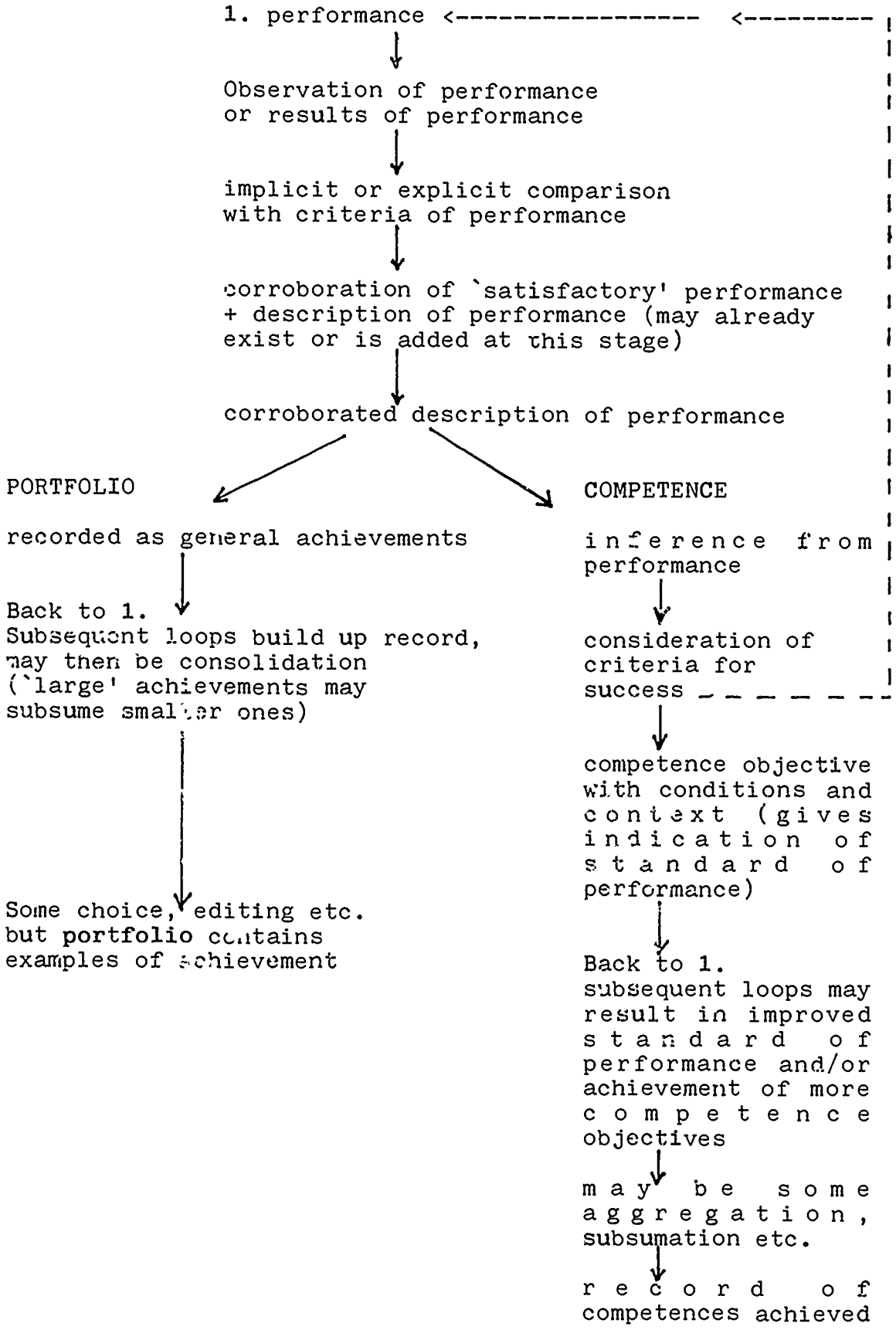
[71] The term `rationale' is used rather than reliability and/or validity because the extent of these should at least theoretically be capable of empirical investigation. If the rationale is made explicit, then it is easier to examine, challenge and perhaps change.

process and they may feel easier reporting performance rather than trying to make generalized assessments of competence [68]. Also focus upon performance may highlight instances of role/job environment skills which it is otherwise easy to overlook when focusing mainly upon competence in tasks [69].

- inference:
inference is either explicitly or implicitly built in to every assessment process [70] we should not shy away from it - the key is to refer back to aims and objectives and ask whether this is the type of inference required (in this particular case, does it tell us something about the trainees `IT capability') and whether we agree with its rationale [71].

- use of a portfolio:
from the above it is clear that not only are there a number of inter-related processes of accreditation, but also there may be a number of different purposes as well. Further given the degree of uncertainty caused by the rapidity of change and the need to encourage progression and up-dating of IT-related skills, then there may be merit in allowing a degree of freedom in recording achievement in this area. This would enable the user (whether employer, trainer or FE `gatekeeper') to interpret it as appropriate. A portfolio may then be used: it is likely to be used alongside rather than instead of a competence-based approach. Figure 1 shows a possible relationship between the two strands.

Figure 1.



May wish to promote or combine both strands.

Summary:

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.

As previously argued, it is important to promote an `IT capability' as a fundamental component of occupational competence for all trainees. The demonstration of such an `IT capability' should be accredited, and it will be necessary for all relevant parties (MSC, NCVQ, lead industry bodies etc.) to work together to try and achieve this across all industrial sectors.

[72] For particular individuals progression may involve taking qualifications which others have taken during YTS (see previous section), but in such cases there should be few barriers to such progression.

[73] The range of courses and training schemes in CIT at this level is itself burgeoning, and is beyond the scope of this report. However, opportunities abound for individuals wishing to seek further education and training in this field. There is specialist CIT provision in BTEC programmes at both national and higher national levels. At national level, students cover topics such as structured programming, computer systems, organizational studies and communication skills. At higher national level, three related strands have emerged: computer studies; IT and business IT. Besides such specialist provision, as with other vocational education and training programmes, embedded CIT components are becoming increasingly familiar.

[74] For an expansion of this argument, see "Selecting, Designing and Evaluating Assessment Instruments" by R Fairbrother in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC 1987.

[75] This model pervades higher education, A levels and was of course the basis for GCE O levels. It is typically used in defining access to HE, AFE or in some cases employment: A level, BTEC National; graduate level entry etc. The point here is not to criticize the model as such, but simply to draw attention to the differences between input and outcomes models. The pressure is perhaps greater on BTEC, than for example universities, because it is closer to the interface between the two systems. One reason NCVQ was of course set up was to reconcile the two systems into a single unified whole. BTEC itself recognises the disjunction between the two models. M. McAllister, Chairman of BTEC's Assessment Working Party, makes it clear that "BTEC is committed to looking at ways it can move towards criterion referencing". The spirit is willing, although McAllister also highlights "the practicalities of moving in that direction are many and complex", not least in relation to the resource and staff implications of such assessment processes. ["Current developments in BTEC Assessment Policy" by M. McAllister in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC 1987].

4. Issues in standards and progression in developments in CIT post-YTS

How can experience in CIT in YTS, together with any other relevant CIT experience, be used as a platform to further experience in this area in future education, employment or training.

The issue of progression post-YTS can perhaps best be dealt with by looking at a single case, as illustrative of the issues surrounding possible progression into higher levels of FE or HE [72]. Progression into BTEC national or higher national programmes is the chosen exemplar of this process [73]. BTEC is a validating body rather than an examining body. This explains to a large extent its historic concern with the inputs rather than the outputs of the education process [74]. BTEC seeks to lay down guidelines over aims and objectives, course content, length of time teaching it, appropriate student activities and assessment strategies. Colleges control the examination process. The role of moderators is then crucial in maintaining standards between colleges, and to a certain extent across subjects. What is then effectively being standardized are the inputs into the process and the outcomes in terms of examination and to some extent coursework performance.

This is clearly fundamentally different in philosophy to an outcome-model, where the major concern is with performance not with aspects of the teaching/learning process. Ideologically then in some respects BTEC sits much closer to traditional HE than to the "new FE". The inferred link here is not with statements of competence, but from the level of qualification [75].

Behaviour in relation to specific tasks, in continuing & summative assessment (coursework and exams) ——defines——→ level of qualification ----inference---->

People with that qualification will be able to perform certain other tasks

BTEC does, however, have some more direct links with task-related performance in that a BTEC qualification may be taken as the off-job component of some form of vocational training. Alternatively the guidelines may specify a period of work experience. A third link could come in that a technical or professional qualification could specify the necessity of having obtained a BTEC qualification at a particular level and having had a certain minimum number of years experience at/in a particular occupational level/area.

However, for youngsters leaving YTS progression into further education may be one of their options. As such BTEC programmes, either full-time or part-time, may be one of

[76] Not least because accreditation of achievement of youngsters on YTS in the past has been `patchy'. These problems do not of course apply where the youngster previously followed a BTEC course during YTS. This is increasingly possible given BTECS's response to RVQ proposals that YTS trainees should be able to progress towards qualifications outside the programme by acquisition of credits during YTS. This has resulted in the development of unit-based qualifications.

[77] One way of trying to ensure that all entrants are starting from approximately the same point has been to run preparatory courses for those without formal qualifications in particular areas. (Although interestingly such courses have also been used by those whose skills in practice needed `honing', when their formal qualifications may have led you to believe that they would already possess such skills). Certainly the value of such `conversion' or `familiarization' courses especially in areas such as I.T. has been proved in a number of colleges. Such familiarization courses have been run in conjunction with BTEC and other programmes, either immediately prior to, or as part of the induction for, the course. Not only can they help to improve students confidence, but they can also act to ease pressure on tutors. The CGLI "Basic competence in IT" could also be used in this way.

[78] at least for mature entrants (over 19s).

[79] The use of records of achievement, portfolios of work etc. will presumably make such decisions easier in the future. Such entry may then cease to be regarded as exceptional in both senses of the word.

[80] However, it has been argued that in such cases it is possible that profiles of skills, competence and knowledge coupled with evidence in the form of a portfolio may be sufficient (see, for example, R. Gorringe "Prior learning Assessment and BTEC Programmes" in Coombe Lodge Report 19 "Action on Assessment in BTEC", FESC, 1987). Gorringe goes on to advocate the value of prior learning assessment programmes for students either before, or simultaneous with, their certificated course. One of the reasons why it is important to open up progression routes into BTEC national, is that this is itself often used as a progression route into H.E. For example, careers advisers destination surveys have shown that between a third and a half of national diploma students go on to H.E. from some courses, including those in the CIT area ("An alternative route to H.E.", T. Marshall, Newscheck, July 1987). This opening up of progression into BTEC national is already underway in relation to its `own' prerequisites: thus either CPVE or BTEC First certificates/diplomas may be used as entry qualifications to the national scheme as well as the GCSE route.

[81] Thus an ex-trainee may have undertaken some BTEC units, even if they did not complete a full diploma or certificate. For example, some BTEC units can be taken as part of CPVE, which itself may have been taken prior to or during YTS.

[82] See report on "Criteria for good practice in CIT in YTS" for a commentary upon employers views about the type of achievements they would like to see prospective employees having. Contrary to `perceived wisdom' these do not relate to narrowly defined skills. The findings from a number of large surveys. both within the U.K. and across Europe, are remarkably similar in this respect.

their chosen routes. Whether they are deemed suitable for study at that level will be fairly easy if they possess certain academic qualifications. The position is less clear in relation to achievement in YTS [76]. Presumably until a sufficient body of case-law is built up, the entry "gatekeepers" may as an interim measure want evidence of achievement which they see as corresponding to the `level' of the course [77]. While entry without the requisite academic qualifications has always been a possibility [78], based upon some recognition of prior learning and experience [79], and may increasingly become a reality, the granting of advanced standing or exemptions from elements of the course are likely to remain problematic [80]. However, with the growth of unit-based routes to BTEC qualifications and the trialling of portfolios as a means of demonstrating prior achievement with a view to unit exemption, it is clear that attempts are being made to reconcile the different starting-points of input and outcome models [81]. Such developments are consistent with the recommendations made in the RVQ, and the purposes and aims of the NCVQ in designing and implementing a new national framework for vocational qualifications.

What becomes clear from the perspective of progression from YTS is that even if that progression is into further education, then what would be of most use to the young people will be clear statements of their competences achieved, coupled if possible with some portfolio of their work. The "pull" from further education as to how they would like to see achievement recorded upon leaving YTS is therefore strikingly similar to views expressed by employers [82].

In the particular area of CIT, BTEC offers courses in IT and Business IT, as well as IT itself being a component of a large number of other courses. This diversity once again supports the case for CIT in YTS being used primarily to develop general information-handling skills (an "IT capability"): focus upon "narrow" IT techniques being likely to close down future opportunities rather than opening them up [83].

Progression, however, could also occur within the company. Indeed an EITB report on higher-level skill shortages in IT (published mid 1987) specifically argued that companies should seek to train and retrain existing staff, including those with lower level computing competences [84].

The new Open College should perhaps also be mentioned in relation to progression. The courses, which include some in CIT areas, typically involve around thirty hours of study. Whenever possible, they will lead on a modular basis, to a qualification from a national body, such as BTEC, RSA, CGLI or SCOTVEC. There are also links between OC and NCVQ in seeking to develop industry-wide competence-based standards. So, once again, it is clear that progression routes are being opened up and that there are opportunities to build

[83] Course tutors have no reservations about whether it will be possible to teach prospective students about how to use particular programs (e g. spreadsheets) - what they are concerned with is whether the students will be able to use the **information** generated to good effect. The skills required relate to the organization and analysis of information, not its **mechanical** production, even if the means are electronic.

[84] A couple of companies, followed up as a result of our area office survey, already did this: preferring to recruit at 16 and encourage further education and training so as to fill posts through internal promotion, rather than recruiting at or near graduate level.

[85] i. "IT Manpower into the 1990s" H. Connor and R. Pearson, IMS, 1986: involved an analysis of changing pattern of supply and demand for IT skills. They considered:

"in-company training and development will continue to be employers prime means of generating new IT skills at technician level"

"an important and expanding source of supply of basic IT skills from FE is via BTEC courses"

"shortages of experienced staff are likely to remain over the period to 1990, IT graduates could also be in short supply ... [but] technician shortages are likely to be less of a problem".

Note IT technicians are defined as working in support of IT professional staff.

Once again, there is a message about dangers of over-specialization. IT courses in HE "should avoid over-specialization to ensure flexibility in relation to changing labour market opportunities".

ii. [The `Butcher' Committee] IT Skills Shortages Committee

a. "Changing Technology-Changing Skills" DTI, 1985.
Conclusion: "it is clear that there is a need for greater numbers of technicians to have particular IT skills and **for a higher level of general IT skills in the technician workforce**" (emphasis added).

b. "Signposts for the future" DTI, 1985. A key element is that "those examining, accrediting and validating will need to recognise that much learning and skill development happens away from formal arrangements. Only if this happens will industry and commerce in the UK be able to exploit IT to the full". Hence a clear delineation of achievements in CIT in YTS, especially if in form of a profile, offers possibility of updating and presentation if ex-trainee is seeking further education and training and/or recognition of competences developed.

iii. It is important to acknowledge however that well-documented skill shortages in IT related almost exclusively to **higher levels:** there are no perceived shortages at lower levels.

For example, Wellington in "Skills for the Future" identifies typical levels of recruitment:

upon achievement in CIT prior to and during YTS (whether this is through specialist qualifications or vocational qualifications with an embedded CIT component). The expansion of opportunities, coupled with possibilities for credits and exemptions, does make the provision of informed counselling and advice essential: young people will need support in choosing routes appropriate for them, rather than following a particular track because that was their starting point.

In addition to the `usual' arguments about the importance of progression, progression in the area of CIT takes on an added significance for two reasons. One is the speed of change, whereby IT becomes increasingly important at work. In such cases, a record of `IT capability and experience' could provide a useful starting point for any continuing education and training (allowing such training to build upon existing strengths, compensate for any weaknesses or omissions; deciding whether any `bridging' support would be appropriate etc.). The second reason is the continuing acute and well-attested shortage of highly skilled personnel in CIT and related areas [85]. Progression routes should seek to facilitate the transfer of ex-trainees looking for opportunities in this field. Such opportunities could be realized either through continuing education and training with existing employer or else a spell of further and higher education followed by re-entry into the labour market at a `higher level'.

- systems analysts, programmers now almost exclusively Higher Diploma/Certificates or above
- computer operator recruitment typically 18+
- 16+ entry related to fairly low level, easily trained tasks; WP, stock control, clerical and office VDU users, data preparation and entry. Most uses involved low-level data retrieval function. Certainly there was little room `at bottom end' for work in electronics or programming.

iv. "Computers in science-based industry" J.Douek, FEU, 1986. This considered "the fundamental and urgent need identified by the survey was for science technicians to have the competence to use computing/micro-electronic equipment and to acquire a sound understanding of its capabilities. Computer appreciation and skills, including keyboard skills, and familiarisation with the basic peripherals and data processing software were clearly identified as the core of this necessary competence".

v. "The IT Skills Crisis - A Prescription for Action" P. Virgo, NCC, 1987. The NCC study which involved consultations with over 400 firms, considered that the lack of skilled people had become the biggest obstacle to the use of IT. It argued for better information on the quality and relevance of courses and qualifications. Thus encouragement and facilitation of progression could be important, especially "as the bulk of the skills in short supply can be acquired from scratch in under 18 months".

[86] NCVQ have themselves produced plenty of literature outlining their role and the framework for the new national vocational qualifications. See, for example: "The NVQ framework", "The NCVQ: its purposes and aims"; "The accumulation of credits towards a NVQ"; all published by NCVQ in 1987.

[87] "Developing work-based learning", K. Evans, A. Brown, T. Oates, MSC, 1987 documents this process and provides an evaluative review of one of the major advocates of work-based learning: the YTS Core Skills Project. The Project defined work-based learning as: "linking learning to the work role and having three inter-related components, each of which provides an essential contribution to that learning process. These three components are: structuring learning in the workplace, providing appropriate on-job training/learning opportunities and identifying and providing relevant off-job learning opportunities" (M. Levy "The Core Skills Project and Work-based learning", MSC 1987). The definition could perhaps have made explicit reference to the value of work activities to the learning process and how learning opportunities at the workplace could be utilized without necessarily any formal structuring, but it does serve to highlight the potential of work-based learning to act as an integrating force in vocational education and training. As previously noted, this work has been continued by the Work Based Learning Project at FESC. Of particular interest is the forthcoming article by D. Mathews "Accreditation of work-based learning - a new approach for education, training and employment". In this, Mathews highlights how the accreditation of work-based learning "and its interpretation depends on anticipating transfer rather than making broad generalizations about ability".

5. CIT in YTS and the new national framework for vocational qualifications

Already in this report, attention has been given to the detail of changes in some vocational qualifications. However, what is also required is to situate all the developments previously mentioned in the context of the major overhaul of vocational qualifications currently underway. The intention of this section then is to provide a brief overview of the place of accreditation processes in CIT in YTS in the context of current major changes. Consideration will be given to the movement towards work-based learning and assessment and how these relate to the levels in the national vocational qualifications.

The impetus towards work-based learning and asessment given by YCB and NCVQ will be discussed briefly (the response of the examining and validating bodies has already been detailed in previous sections). However, here is not the place for a detailed examination of NCVQ policy [86] rather we felt it may be helpful to give **our** interpretation of how the NVQ levels could be matched against possible CIT applications in YTS, together with illustrations of the differential use of CIT competences. It should be stressed this is intended to be a source of ideas: it carries no **official** status, but we hope both practitioners and policy-makers may find the ideas helpful.

Recent years have seen an upsurge in interest in work-based learning and assessment [87]. While the value and importance of work-based learning has been readily acknowledged, people are sometimes uneasy about the value of work-based assessment. One essential element of the accreditation process is the degree of recognition conferred upon the qualification by subsequent users. In this respect, there may be a tendency to think that assessment in the workplace is of less value than that which occurs in more traditional (mainly educational) settings. This may be partly because, even where workplace assessment is thorough and systematic, the results are intended for local (organization-specific) consumption.

Within YTS, there is currently a project specifically concerned with the technical evaluation and development of work-based assessment. The project offered the following advice at the outset of the project [88]:

"Some elements of good practice as far as assessment is concerned are:

- never making judgements about competence on the basis of one assessment; multiple observations, whether with different people or the same person on more than one occasion, are essential

- never relying on a single method of assessment; there are methods of assessment other than the supervisor's rating, such as self-assessment and peer assessment,

[88] As quoted in Youth Training News, February 1987.For further details, contact: Robert Wood, Project Manager, Technical Evaluation and Development of Work-Based Assessment, PRD Limited, 36-38 London Road, St Albans, Herts A21 1NG. Further work on work-based assessment which may be of wider interest concerns that carried out by YHAFHE. YHAFHE have produced regional schemes for work-based assessment and accreditation in a number of occupational areas, including clerical and agriculture/horticulture. The schemes are modular and have at their heart a set of Learning and Assessment Models relating to occupational functions. The Models specify levels of competence and criteria for success which relate not only to occupational skills but also to related knowledge, task management skills and the ability to transfer. Further details of this innovative approach are available from : YHAFHE, Bowling Green Terrace, Leeds, Ls11 9SX.

[89] These are: agriculture, electrical contracting, travel agents, hotel and catering, engineering craft, printing, construction craft and road transport. These areas cover about 25% of YTS trainees.

[90] "Summary of vocational qualifications in YTS," Janice McFall, Youth Training News, July 1987.

[91] That is not to say however, that some examining and validating bodies do not try to `pour CIT education and training into existing moulds of how courses, qualifications etc. operate' so as to acheive consistency across subject areas. This may lead to obsessive concern about the duration of courses (specification of a minimum number of hours) and extremely detailed consideration of the content in terms of what students must **know**, without thought that the `old model' was predicated upon the assumption that there was a more or less finite body of knowledge and possession of this would last the recipient most,if not all, of their working lifetime. To change the metaphor, it was almost as if the education component of such qualifications was seen as an `inoculation': it may be unpleasant but it was good for you, a good `dose' post-adolescence could mean that you did not have to take any more for the rest of your life. The rapidity of change in most occupational areas undermines this argument, but to apply it to an area such as CIT is nonsensical. Surely above all else, what initial qualifications have to do is to leave learners if not necessarily with a `love of learning', at least with a positive experience of education and training such that they are eager to return to update their skills, knowledge and experience throughout their lifetime! A switch to a concern for competence and outcomes would lessen the temptation to try and overload youngsters with a counter-productive, and ultimately self-defeating, concern for the maximum amount of input.

which deserve consideration

- establishing that what is to be assessed follows directly from an analysis of the job; if the job involves, for instance, getting on with other people then that attribute must be assessed as a legitimate element of competence and not referred to, apologetically, as a `soft' skill

- checking that assessors understand why they are doing what they are doing

- being able to communicate recorded achievements unambiguously to people both inside and outside the scheme

- ascertaining that, once attributed, competence is maintained".

The examining and validating bodies are also playing their part in raising the profile (and credibility) of work-based assessment. Thus the new BTEC First certificates and diplomas both require one work-based unit out of totals of 5 and 8 units respectively. The commitment to work-based assessment by the RSA is even more emphatic, with work-related tasks (including those actually performed at the workplace) being used as major evidence for achievement. Similarly CGLI development work on skills tests has made increasing use of work-based assessment techniques. These developments can be seen as an attempt to align with the requirements of the new framework for national vocational qualifications.

YTS Certification Board (YCB) was set up in April 1986 and they have approved systems or frameworks within which competences can be achieved as the basis for acceptable qualifications. By July 1987 qualifications had been approved in eight occupational areas [89], with an intention to develop standards and qualifications in most other occupational areas by March 1988 [90].

Overall then, even before the advent of NCVQ, it is clear that the education system in general was at least moving in the direction of criterion-referenced, competence-based assessment and away from knowledge-based, norm-referenced assessment. Vocational education and training, in particular, appears to have been making efforts in this direction. Two-year YTS is, of course, itself committed to the development of competence-based standards, with an emphasis on outcomes rather than inputs to learning and training.

Interestingly CIT is at the forefront of some of these developments, not least because there is no long-established tradition of conducting education and training in this area in a particular way [91].

[92] "The National Vocational Qualification Framework", NCVQ, 1987.

[93] It may be that these requirements may result in a rather narrow definition of occupational competence, and in particular a focus upon tasks (or work-related activities) which neglects some important elements of occupational performance.

[94] M Ridley: Director (Accreditation) of NCVQ speaking at a conference on "Progression into engineering - building bridges between education, training and employment" at University of Surrey, July 1987. Proceedings will be published in due course.

[95] Ridley, op cit, explicitly acknowledged that it is possible that a trainee "with the right opportunity might well go beyond a level 1 (NCVQ) qualification." Remember also that it is possible for a trainee to go part way to a qualification within YTS and complete it subsequently.

The NCVQ has been set up to achieve a coherent national framework for vocational qualifications. Vocational qualifications are expected to be modified and up-dated so as to meet national standards of occupational competence, which will relate to a simple structure of levels. A vocational qualification is defined as "as a statement of competence (skills, knowledge, understanding and ability in application) needed to facilitate entry into or progression in employment and/or further education and training, which incorporates assessment to specified standards of:

- skills
- relevant knowledge and understanding
- the ability to use skills and apply knowledge and understanding to the performance of relevant work related activities" [92].

Some key features of the new framework are that:

- the levels are based on degrees of competence

- importance of specified standards: comprising clearly delineated standards of performance

- qualifications should be employment led: set by relevant industrial or commercial sector (under guidance of NCVQ)

- qualifications to be endorsed by NCVQ require assessment: this should be valid, reliable, criterion-referenced and viable. Standards agreed should influence what is to be assessed, which in turn should influence assessment techniques [93].

- "assessment must increasingly take place at the workplace and be operated by those who supervise at that workplace" and "it is they who judge on a day-to-day basis the competence or otherwise of the people for whom they have responsibility" [94]. Ridley argues, however, that every supervisor does not need an in-depth knowledge of assessment techniques: "quite limited training coupled with supportive moderation will be adequate to meet the requirements".

So much for general comment about the new NVQs, but how will activities within YTS fit with the new system of levels. Initially a four level framework will operate to incorporate qualifications up to Higher National awards and their equivalent, and it is feasible that YTS trainees may be involved at any of the first three levels [95]. How CIT activities in YTS could relate to each of these levels is considered below. A definition of each level is coupled with examples of possible CIT applications appropriate to that level, together with illustrations of how these could relate to different types of CIT activities, which could be involved in the development of trainees `IT capability'.

[96] NCVQ, op cit

[97] Ridley, op cit

[98] Ridley, op cit, explicitly acknowledges that "there are requirements specific to YTS which may go beyond purely employment oriented competences". It is clear then that NCVQ expects YTS to reflect broader criteria. This in turn means that even if initially level 1 qualifications (duly endorsed by NCVQ) in a particular industry have **no** CIT components whatsoever, this is **not** an argument to exclude CIT from YTS schemes in that industry. YTS has a broader remit, and in particular it needs to take cognisance of NTI objective 2: the need for comprehensive vocational preparation. That involves, consideration of future as well as present requirements, and a recognition that some trainees and many ex-trainees will not remain within the industry within which they receive initial training.

[99] See commentary notes 62 and 63 as to how NCVQ could broaden their interpretation of occupational competence to include an openness towards the use of IT as one of its fundamental (and universal) components.

Level 1: Basic Level

"The ability to perform a minimum number of work activities, within realistic time constraints to specified standards (usually under supervision and in a restricted range of working conditions and contexts) necessary for employment in a generic group of activities or occupations and may be preparatory to the development of further employment competence" [96].

Further elaboration makes clear that competence at this level is designed not only to be relevant to some jobs and occupations and as an entry into employment in others. It should also help those "people who may not be as yet committed, either due to circumstances or inclination, to a particular field of employment" [97].

The implication of this is, once again, to reinforce the importance of being able to make comments in relation to CIT that are widely, not narrowly, applicable. Competences need to be framed so as to give meaning to that desire [98].

Additionally an NVQ Level 1 qualification may not only match a "minimum job requirement", but also "may be preparatory to development of further employment competence". Thus Level 1 should contain not only what is required for Level 1 `jobs' but also the facilitating competences required for Level 2. This links with the aims of YTS, since YTS is supposed to go `beyond' purely employment-oriented competences'. Hence MSC may seek a broader interpretation of occupational competence than that initially adopted by NCVQ [99].

Some possible `Level 1 CIT applications'

- data entry (where material has been pre-prepared or anything other than the routine is referred elsewhere: e.g. updating; EPOS; credit authorisation etc.)
- information retrieval (looking up part numbers-locations; microfiches etc.)
- electronic till
- CNC operation
- building societies -- terminal operation for updating balances
- use of computerized equipment for short duration, repetitive tasks
- straight-forward stock control

Illustrations of possible CIT activities appropriate to this level

1) data entry (text/data : various input devices)
2) information retrieval (from 2 types : simple searching)
3) non-text manipulation (design of menus, posters) (spread sheets : painting and decorating - materials costing)
4) simple para-programming in relation to applications (appreciation of need for structure and sequencing)
5) simple report production: checking (pre-prepared) documents for errors

[00] Our work with CIT support groups based on the West Wales and Lancashire Accredited Centres showed just how successful such approaches could be. Further detail about use of CIT for `special needs' is given in Report 3.

[01] With the partial exception of those seriously deficient in basic skills.

[02] NCVQ, op cit

6) electronic mail : transmission and receipt of messages
7) use of CBT/CAL (if a trainee is deficient in basic skills, then main thrust should be to support their development [00]
8) critical analysis: relevance and limitations of different types of approach
9) on-job use : likely to be limited in time, complexity and/or variety.

The above is not intended as a syllabus, trainees may go into fewer areas but at greater depth. Practical skills should be covered in context and as appropriate but undue emphasis should not be given to formatting etc. Design and problem-solving activities (e.g. with Logo) should only be undertaken if there is sufficient time and/or some previous experience. This should be the minimum level of achievement for all YTS trainees [01], even if they have no prior CIT experience and few opportunities on-job. The achievement of competences demonstrating an `IT capability' would presumably be of more value than knowledge-based CIT certificates or of only partial completion of specialist CIT qualifications. The above illustrations could be used to check whether performance on qualifications (especially those with an embedded CIT component) really do measure up to `developing a trainee's IT capability'.

Level 2: Standard Level

These will typically include the ability to perform, at normal rates and performance levels, common work-related activities to specified standards including some activities that may be complex and difficult" [02].

This will relate to significant achievements but primarily of a routine and predictable character. They will involve:

- some transferable competences between contexts
- degree of flexibility in adapting to new situations.

Note: the applications given can only be illustrative, and it is important to acknowledge that `level' at which someone is operating depends upon a range of factors. Hence a higher level qualification may involve combinations of some of following factors: (breadth and range of competences; complexity; degree of skill; abilities to: undertake specialist activities, organise and plan work, transfer competences, innovate and cope with non-routine activities and supervise others). One task does not `deliver' Level 2, rather these type of on-job applications can make a significant contribution to achievement of more advanced CIT competences, especially if at an appropriate level of complexity.

Some possible `Level 2 CIT applications'

1) word processing (depth: skilled operations at speed; or in relation to breadth - proof reading, reorganization, error correction etc.)
2) payroll (compiling; input and retrieval; also dealing with queries)
3) CNC (fuller understanding of applications; characteristics, controls, setting, operating, tooling, high performance cutting fluids etc.)
4) programmable computerized welding equipment (similarly for fabrication)
5) spread-sheets: (operations, formula manipulation etc.)
6) milking parlour (analysis of records etc.)
7) fault-finding and circuit work
8) hotel reception (full range)
9) building society terminal operation (full range)
10) travel agents (distributed viewdata systems; also possibly in-company, private viewdata facilties, closed user group and computerized booking systems)
11) retail: explanations of use of microprocessor-controlled goods
12) computerized fault-finding (motor vehicle repair)- exhaust gas analysers etc.
13) computerized mechanical handling
14) account entries (updating ledgers - when decision already been taken about relevant accounts)
15) sales accounts : input and retrieval, reconciliation, planning
16) marketing : input and retrieval, forecasts, compiling trade statistics
17) personnel : input and retrieval, and dealing with queries
18) finance : input and authorisation of inter-divisional debit notes (e.g. one morning's work every 3 weeks)
19) accounts : entry and dealing with special accounts procedures
20) report production : simple reports about characteristics of returned mail (arrange, format, produce)
21) several organizations (e.g. finance department of head office of large retail organization; sales accounts of a brewers) expressly mentioned teamwork : duties were not expressed in individual terms but as part of a group activity "help make up a database; creation of tables and reports; updating of trade figures etc."

Illustrations of possible CIT activities appropriate to this level

1) data entry (data may be reasonably complex and/or not presented in a final form: e.g invoice handling; ordering etc.)
2) information retrieval (from 3 or more sources; use of complex searching criteria; or complete mastery of use of one source, including substantial on-job use e.g. ABTA)

Combination of (1) and (2) may be in use of a stock-control system, where this includes data origination,

[03] NCVQ, op cit

data output and interpretation. Thus an essential element is not isolated demonstrations of being able to add and/or output a few records, but rather to maintain and use a system over a period of time (e.g. milking parlour).

3) design (production of brochures, advertising material; kitchen/shop layout; garment design, shoes, weaving etc;
spread-sheets (painting and decorating: full job costing and time-management)
4) para-programming: able to manipulate and use variety of functions on applications packages to `set it' for a particular operation
5) report production (able to `import' from different documents; production of graphical information from numerical data e.g. from spreadsheets)
6) electronic mail : page-design etc.
7) use of CBT on simulations, especially if have an IT content (plant or process control; practice on financial transactions etc.)
8) critical analysis: more extensive
9) on-job use : greater scope in relation to time, complexity and/or variety

This level is likely to be delivered through vocational qualifications with `embedded' IT skills or full CLAIT certificate or similar. In the absence of the above, recording process should demonstrate significant achievement (use of portfolio etc. could be important here). Where on-job opportunities are limited, collection of material from workplace for a project may be one means of `linking' (e.g. mapping of crop occurrence in a local area etc.). However, if `link' is likely to be artificial or strained then other material could be utilized; for example, setting up a database on local eating and drinking establishments sometimes proves popular!

Level 3: Advanced Level

"Qualifications at this level will be awarded for competences needed for occupations which are not of a routine character and which may require application in a variety of contexts and roles. They will indicate ability to perform a broad range of work-related activities, including many that are complex, difficult and non-routine, appropriate to sustaining regular processes and outputs. to specified standards" [03].

As a guide this could relate to craft and technician levels (occupations that require or in the past required a full apprenticeship)) or be a demonstration of supervisory potential ("the skills achieved at this level may be of such a nature as to indicate capability in supervisory and junior management roles, or to progress into advanced further education and training").

[04] How the illustrations given match with other curricular developments can be gleaned from the following comparison. "Computers in science-based industry" J. Douek, FEU 1986. This looked at the curriculum implications for science technicians. The following quotations from the report illustrate the similarities in approach with that advocated in this report:

"emphasis should be on the use of software packages and dedicated equipment rather than programming"

"Recurring themes from the interviews were that technician courses in colleges should contain as a minimum core element:

- a component or components which develop confidence and competence to use and understand the capabilities of computing/micro-electronic equipment

- basic computer familiarisation with opportunities for interaction with up-to-date equipment and software- this should also develop keyboard skills

- information and data retrieval and use of file handling systems

- the statistical theory underlying software packages

- some programming in BASIC, but with emphasis placed on more durable skills such as program structure and systems analysis (as related to modelling in some cases) so that scientists can more closely direct the activities of specialist programmers".

FEU have sponsored projects looking at curricular implications of IT developments in a number of industries, including garages, electrical services and construction. These could relate to a number of NVQ levels, but particularly the advanced level (level 3).

Some possible `Level 3 CIT applications'

- implementation of a computer-based information system to replace existing manual record-keeping systems
- motor vehicle repair: diagnosis, decision-support (best tools to use etc.) for technicians (help in defining nature of problem etc.)
- finance: fuller range of accounting techniques, less pre-preparation of materials etc.

Illustrations of possible CIT activities appropriate to this level

1) data origination and entry: (use of full range of accounting techniques with spreadsheets)
2) information retrieval (grasp of large number of sources, detail, circumstances when to use etc.); database planning and design
3) higher-level design and control (use of sensors, robotics etc.); numerical analysis (management tools- e.g. on farms); design to specifications etc.
4) para-programming: able to use full range of facilities to `customize' application packages to particular requirements
5) report production: high quality (e.g. use of desktop publishing techniques)
6) communications: grasp of range of telecommunications facilities, including when appropriate to use etc.
7) CBT: high level simulations (e.g. decision-making system simulation)
8) critical analysis: appreciation of cost-benefit analysis, but particularly of recognition of significance of human factors
9) on-job use: likely to be extensive, including use of powerful tools and techniques

From above it is clear that a trainee's `IT capability' has to be well developed. Again this is most likely to be delivered through vocational qualifications with an `embedded' CIT component, most likely at technician level [04].

[05] Our report "Criteria for good practice in CIT in YTS" goes into this in considerable detail. That report also contains a summary of all our policy recommendations for the development of CIT in YTS.

[06] This classification was originally used by H.G. Macintosh and D.E. Hale, "Assessment and the Secondary School Teacher" 1976. A further discussion, based on these issues, can be found in "Measuring Learning Outcomes", H.G. Macintosh et al, O.U. E364, 1981.

[07] A fuller discussion of this can be found in P. Broadfoot "Public Assessment Policy". O.U. E333 Module 5 Part 2, 1986.

[08] The enthusiasm for and pace of change varies: for example, in relation to recognition afforded to work-based learning and credit given to prior learning experience. However, what is noteworthy is the recognition of the need to change (whether that motivation is internal or a response to external developments, for example pressure from NCVQ or YCB, need not concern us here).

6 CONCLUSION

This report has of necessity contained a good deal of detail and debate about standards, accreditation processes and progression routes. It is desirable, however, to view the developments covered in this report from a broader perspective than the narrow confines of assessment policy and to look at underlying purposes. To this end, this section will seek to pull together some general comment upon the assessment process.

Firstly, and most importantly, it should be remembered that assessment processes should always be considered in the light of the overall aims and objectives. Without that, there is a danger that the assessment processs could become too mechanical: following the letter of the regulations rather than the spirit. It is vital then to keep in mind the underlying aim for CIT in YTS which should be "to develop an IT capability" for all trainees [05].

In addition, it should be remembered that `good assessment` as well as being technically sound (i.e. valid and reliable) has the following characteristics. It should be:

- practicable (simple to understand and implement)
- comprehensive (covering the full range of relevant understanding, skills, abilities and attitudes)
- dynamic (able to reflect change and adapt)
- unobtrusive (not involving people behaving in an `unnatural' manner, nor publicly reinforcing failure) [06].

The extent to which people may feel that particular qualifications measure up to these criteria will reflect individual judgements (especially as there may be a `trade-off' between criteria), but what is encouraging is that the developments, taken together, show a willingness to pay greater attention to all the criteria. In particular, while account has often been taken of practicability and comprehensiveness, it is significant that examining and validating bodies have become increasingly concerned that assessment processes should be unobtrusive and dynamic.

This leads to a consideration of the role of examining and validating bodies themselves. The options open to policy-makers are partly governed by the flexibility of existing provision and what is likely to be acceptable in the eyes of all interested parties [07]. As argued above, provision has become much more flexible in recent years, but equally important is the perception of the examining and validating bodies themselves that change is desirable [08]. Indeed the

[09] Even the A level system is under pressure to change: the current review group being likely to recommend a broadening of A Level curricula. It could be argued that, in any case, the barrier to change in relation to A levels has not been the examining boards, but rather the universities themselves.

[10] This applies to all locations and in relation to the full range of activities; at work, on or off-job training or in further education.

[11] For example, M. McAllister argues that "the assessment of process has staffing implications" and similarly "although there are many advantages to criterion referencing, the practicalities of moving in that direction are many and complex" ["Current developments in BTEC assessment policy" in "Action on assessment in BTEC", Coombe Lodge report 19, FESC, 1987]. By the same token, the volume of assessment and associated administrative tasks may themselves start to become daunting.

[12] Thus the dominant reason behind MSC's change of emphasis from an input model to an outcomes model for YTS was a need to control quality. From a perspective of the accountability of how YTS was being run, MSC recognised that they would be judged upon provision as a whole, rather than just on the basis of what was achieved in the 'best schemes'.

[13] NTI sought to develop a more flexible and adaptable workforce. Objective 2 related to the development of a system of comprehensive vocational preparation, with Objective 3 drawing attention to adult training: the need for adults to "acquire, increase or update their skills". ["A New Training Initiative; An Agenda for Action", MSC, December 1981].

[14] "We must develop skill training including apprenticeship in such a way as to enable young people entering at different ages and with different educational attainments to acquire agreed standards of skill appropriate to the jobs available and to provide them with a basis for progression through further learning", MSC, op cit.

[15] The FEU defined competence as "the possession and development of sufficient skills, knowledge, appropriate attitudes and experience for successful performance in life roles" ["Towards a competence-based system: an FEU view", FEU, August 1984]. It is important to note that the FEU definition does not focus narrowly upon competence in performing job-roles; this adds further weight to the argument advanced earlier in the report that occupational competence should not be narrowly defined.

constraints imposed by examining and validating bodies are much less likely to be viewed as a major barrier to change [09]. However, acceptability was mentioned in terms of all interested parties. There is a feeling by some assessors [10] that the moves towards dynamic and unobtrusive assessment processes, while desirable, are starting to prove burdensome in other respects. Thus flexibility, in the context of static or declining resources and support, itself becomes a double-edged weapon [11]. This leads on to a further consideration, and one essential to any judgement of whether the benefits of particular assessment practices outweigh the costs, of the uses to be made of the assessment information.

Assessment is not an exact science, and as such assessment processes need to be judged against how they are intended to be used rather than against absolute criteria. Assessment of CIT in YTS should be seen as fulfilling a number of functions. At the outset, it should be recognised that one of the functions of the move towards externally-recognised qualifications, the development of competence objectives etc. in YTS generally (as well as in CIT in particular) is to exercise a degree of control over the system as a whole. In a decentralized system like YTS, with programmes being agreed locally and being necessarily different from one another, attempts to implement policy by controlling the inputs to the system are extraordinarily difficult [12].

Further the changes were seen as consonant with the objectives of the New Training Initiative. This is where CIT assumes significance: developing an IT capability for each trainee in YTS is an essential component not only of a system of more comprehensive vocational prepration, but also in order to facilitate future education and training. Hence there is a transparent link with objectives 2 and 3 of NTI [13], with the assessment approaches and associated recording and certification methods for CIT being of prime importance given CIT's position as an enabling technology in helping to bring about change in relation to skills, knowledge and technology more generally. This in turn generates the link with NTI objective 1: the modernisation of skills training and the development of more appropriate (competence-based) standards [14]. The RVQ and the subsequent set-up of NCVQ, sought to promote new ideas about occupational competence, with particular emphasis on standards and progression. Such notions reinforce the need for an IT capability not only to be developed, but also to be accredited [15].

The accreditation of CIT competence then acknowledges achievement and critically plays a vital role in facilitating progression in future further education and

[16] One of the conditions that the new national vocational qualifications have to satisfy before they can receive the NCVQ "hallmark" is that there are routes for progression. As one of the nine specific tasks the government set the NCVQ was to "promote the interests of vocational education and training, and in particular, of vocational qualifications, and to disseminate good practice", it is to be hoped that NCVQ will actively promote the view that vocational qualifications should incorporate an embedded CIT component. This would be particularly appropriate for the lower level NVQs, since achievement at these levels should facilitate development of further employment competence, and possession of an IT capability would help this process.

[17] In exceptional circumstances (for example, where a trainee already possesses a specialist CIT qualification and is undertaking substantial CIT activities at work) such a portfolio may take the place of more formal qualifications.

[18] Evidence to support his assertion have been given to in the body of this report and in report 3.

[19] This line of argument was taken up by A. Wolf and R. Silver "Work-based learning: Trainee assessment by supervisors", MSC R & D series 33, May 1986. The authors argued that workplace assessment **processes** by focusing upon the use of many items; different facets of jobs and tasks; use of explicit criteria; repeat demonstrations etc. were more likely to produce fair and valid descriptions of achievement than "perfect" test exercises. This view was echoed in an Appendix to the above report by D. Nuttall: test exercises are often artificial and remote, and their preponderance was due to considerations of utility and reliability prevailing over validity.

[20] Much progress has been made, but staff development and support remains of critical importance. How practitioners can get support is covered in report 3 "Criteria for good practice in CIT in YTS".

training. As argued in the body of the report, the accreditation can relate either to specialist CIT qualifications or those vocational qualifications with an embedded CIT component [16]. Some providers may additionally wish to encourage trainees to keep a portfolio of their achievements in CIT [17]. The value of accrediting CIT competences can readily be seen by making reference to the uses which may be made of the assessment information. Clearly such information may help guide the trainee in making decisions about possible future directions in employment and/or education and training. Similarly prospective employers are often interested in whether (ex) trainees possess such competences [18]. It is also in the interests of trainees, employers and other interested parties that such assessment information be avilable when decisions are made about progression, whether for selection, diagnostic or guidance purposes: such information being particularly useful in helping identify potential.

We hope that the above arguments indicate that exhortations to accredit achievements in CIT in YTS are firmly based upon the prospective usefulness of such information. Indeed, by utilizing opportunities for workplace assessment there is the possibility that such information will be particularly valuable [19]. However, we also acknowledge that the last few years has seen unprecedented activity on assessment, and that it is important that staff are supported in the type of activities we are seeking to encourage [20]. One final comment about assessment processes relates to the issue of **transferability.** Whether accredited performance in one area relates or transfers to another context depends not only on the quality of the assessment processes, but also upon whether trainees (or others) are taught to **analyse** contexts (do they recognise they are in a different context? are they aware that certain competences may transfer?) This then is one last argument for the necessity to promote, develop and accredit in all trainees a broad IT capability. It lies at the heart of issues of progression and transfer, and as we move towards better identification of standards and competence, we should acknowledge that the development of an IT capability is a fundamental component of occupational competence.

APPENDIX 1: ACCREDITATION OF PRIOR LEARNING EXPERIENCE IN I.T.

Possibility of recording prior achievement in CIT upon entry to YTS.

Aim:
To record achievements/experiences/competences of those entering YTS so as to inform decisions about what they should do in CIT in YTS.

Context:
1. Some entrants may have formal qualifications in IT or Computer Studies (GCSE, RSA, etc.) others may have used CIT across the curriculum in other subjects; some may have undertaken CIT awareness courses; others may have varying degrees of CIT experience at home or at work or during work experience.

2. Some providers do not necessarily see `duplication' as a problem, hence without some general means of acknowledging prior learring they may not take this issue any further.

Possibilities:
1. Some form of self-complete checklist could be devised, incorporating a number of actions which would demonstrate familiarity/competence (for example, of information retrieval/text processing etc., use of viewdata systems). This could be used as a general guide - opportunities to develop and demonstrate competences could be given subsequently.

2. An attempt could be made to develop a more comprehensive profiling/recording/testing tool.

Problems:
1. Level/extent of experience (e.g. viewdata systems could have been demonstrated or `taught' at an `awareness level' or entrants could have had substantial experience of using a teletex simulation.) How do we differentiate?

2. Incompatibility of hardware/software: entrants previous experience may have been with BBCs and provider may use PCs.

3. Complexity of `branching' in that there are many different avenues to CIT, might this then make a self-test package rather daunting?

4. Some of the `key' skills in relation to CIT may not be amenable to such an approach: e.g. approaches to problems, problem-decompositions, working as a member of a team.

Reminder:
It is not necessary to seek a `perfect' solution, but rather one which gives youngsters the chance to build on rather than duplicate previous experience.

Further Comment:
It is not possible at this stage to pre-judge lines of development, indeed ideas would be welcomed ideas about what 16 year olds have/should have achieved etc. However, the following gives an idea of the types of competences youngsters may be moving towards. These are some profile statements taken from the RSA CLAIT schemes and skills in CIT which are incorporated in the new RSA qualifications in clerical and retail (that is those vocational qualifications with an embedded CIT component).

Some RSA CLAIT profiles sentences:

- WP: - enter, load and save text;
  - insert/delete/replace words; insert/delete paragraphs,
  - change margins.
- SS: - enter and edit text and numeric data;
  - change the format
- DB: - set up a DB;
  - enter data and edit the database;
  - formulate selection procedures for target records

CIT skills in vocational qualifications with embedded CIT:

- use DB spreadsheets to forecast requirements (as part of `estimate stock requirements')
- use a WP package (to order ... document ...)
- operate a computerized stock control system
- retrieve information from a computer-based information system
- update a price list/ ... on a computer package
- use accounting package to receive and record payments/issue invoices/statements etc.
- use computer based sources of information
- correct printed/screen-based material
- present information using a printer
- store/retrieve information from a DB (eg. select and order)
- maintain records (stock control).

Options/ideas about `instrument'

a. initially attention was focussed upon prior (to YTS) experience, but given existence of separate `islands' of IT education, would it be more appropriate to opt for an

instrument with more general applicability?

b. 3 options for discovering previous relevant experience:

i. interviews/discussions to identify prior experience, knowledge and skills
ii. profiles/records of achievement: these could either be detailed (e.g. specifying standards of competence) or more general
iii. formal testing/assessment.

Clearly these approaches could also be mixed.

c. profiling: "Progression from Engineering" (Surrey, 1987) showed that large numbers of profiles are already in existence but there is little standardization. They need to be easy to use and understand; specify levels of competence and be in sufficient detail to inform further focused assessments before they can be used in anything other than a very general way.

d. all this debate is predicated upon the capacity to deliver individualized training/flexible programmes. [The key to this is perhaps in setting the `fall-back position' sufficiently high, so that it is in the interests of the trainer/provider to do this: shorten training time, build upon prior achievement and/or attainments etc. As argued previously, the `fall-back position' should be attainment of a recognised vocational qualification with embedded CIT or else a specialist IT qualification e.g. RSA CLAIT]

e. any attempt to set `baseline' attainment levels should bear in mind the goal is to develop an `IT capability', and as such it would be inappropriate to concentrate upon narrow or disaggregated skills.

f. any instrument could seek information in a number of different ways. It could focus upon all or some combination of the following:

- Qualifications
- Extent of existing `IT capability'
- Performance/experience in relation to any YTS CIT-based modules or part-achievement of competences with an IT component within vocational qualifications
- Interests

g. some areas in which trainees may have had prior experience (whether at school, during part-time work or work experience or at home) could include:

- viewdata systems
- electronic mail
- facsimile

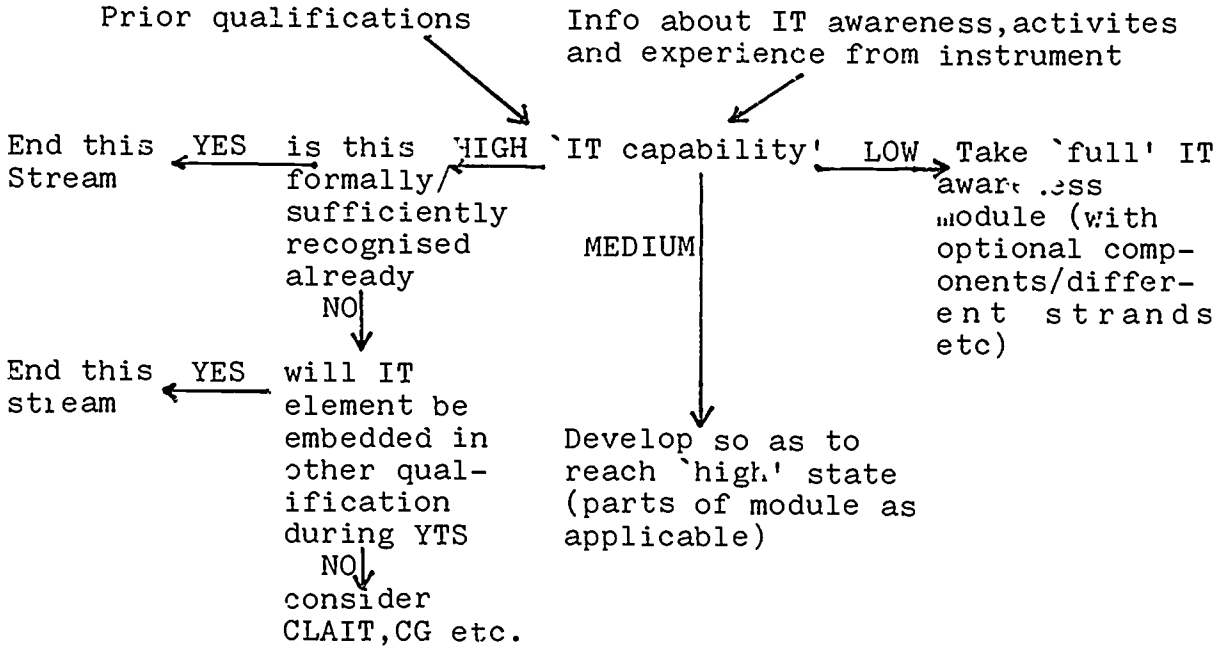
- videodiscs
- EPOS systems
- electronic payment services
- information retrieval (including remote access?)
- industrial applications (eg CNC ; use of sensors; warehouse control; ordering; sc ; CAD/CAM)
- information systems (produc ders, stocks, finance, personnel etc.)
- aid to decision-making (pla ning etc.)
- use of spread-sheets (cash flows; production rates, etc; ability to ask `what if .....')
- text processing
- data protection and security
- expert systems
- hardware (machine peripherals)
- programming (Basic, Pascal etc. also in terms of operations: loops, decisions, lists, tables, sub-routines, etc.)
- Logo (as a separate strand)
- Data Bases: information retrieval
  organizing data/information
  flowcharts
  accessing remote data bases
  (experience of applications: libraries, payslips, mail order, banking, accounts, census, airline/hotel reservations).
- data communications
- networks
- music
- graphics
- CDT
- robotics (control)
- word processing
- simulation
- CAL

h. Use of information the type of information mentioned above could be used as a guide in the following ways:
   - recognition that trainee is already `IT aware'
   - may be significant `gaps' which could then be covered
   - may wish to go into particular areas in greater detail, because of circumstances of placement/industrial context etc.
   - may highlight very low level of `IT awareness'

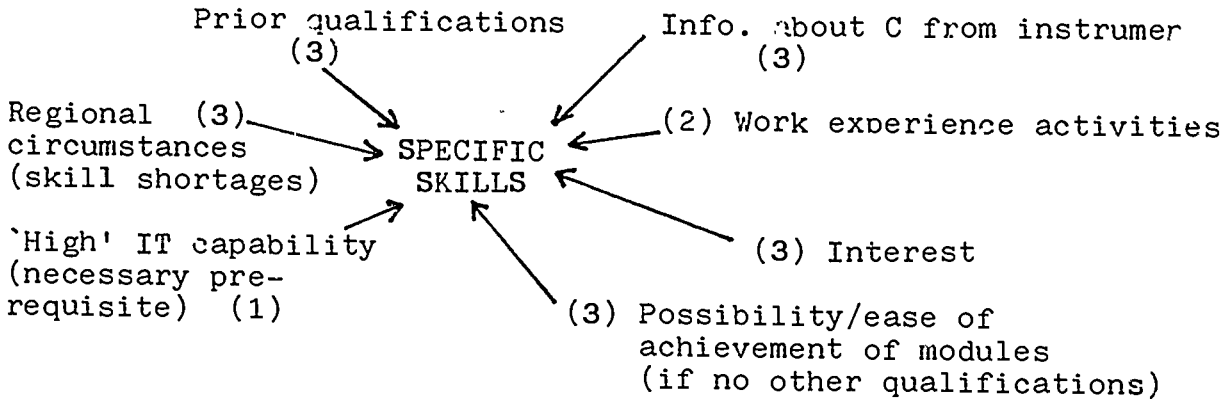
i. Problems: one key problem relates to what is a `reasonable' balance of activities for a trainee to have undertaken such that it can be considered he/she has demonstrated an `IT capability'. The danger is, of course, that they have gone on a `Cook's tour' of activities, without understanding. [This problem of course is not just confined to prior experience, the issue will have to be tackled within YTS as well]. Consider:

- whether trainee has an understanding of underlying issues [concept of information; importance/power of selection of information; communication of information; quality of information (reliability/accuracy; up-to-date; content); value of information dependent upon its purpose; cost of information etc.]
- whether to ask about experience/ask some `key' questions/seek a demonstration of competence through a test.

j. The relationship between the instrument and what they should do on YTS has to be clarified. One possible link could be as follows:



Following on from this, decisions about `specific' IT skills: factors affecting whether to undertake activities in a particular area.



(1), (2), (3) gives priority rating

k. To what exten should instrument seek to test achievement?
   - could use computer-aided self-testing to demonstrate:
   i. familiarity/awareness - even an `IT capability'?
   ii. put together a CIT record of experience, which could be updated for post-YTS etc.

APPENDIX 2: REVIEW OF A TYPICAL AWARENESS CERTIFICATE

Cambridge Computer Literacy.

This provides for certification of computer literacy, but is itself part of a larger modular scheme. Each module has a certificate and for five modules (selected from about a dozen) a further "Certificate in Information Technology" is available.

Assessment
The modules themselves are expressed in terms of competence with a detailed assessment and recording scheme for the tutor. The modules are short and of no fixed time duration.

Staff are required to complete "Student Assessment Records", in the form of lists of completed objectives. The record and assignments must be kept so that they can be sent to the syndicate for certification.

The assignments will be moderated by the syndicate before a certificate is issued and possibly a visiting assessor will come to the centre to inspect the conduct of the scheme.

Aims of Module 001 Computer Literacy
Aims to assess the candidate's competence to

1 Recognise the nature of a computer system and describe the hardware and software components normally included, using appropriate terminology.

2 Connect, initialise and close down a computer system and use a keyboard, VDU, filing system, backing store and a printer to input, edit, save, retrieve and produce hard copy of text or other data.

3 Use a systematic method for the identification and documentation of data and program files and for the maintenance of security system backup copies.

4 Take care of micro-electronic equipment and magnetic media and adopt safe methods of working.

5 Display a practical appreciation of the nature of a computer program.

6 Appreciate the range of computer applications in industry, commerce and communications etc and use

(1) a computer controlled external device
(2) at least one applications package simulating a commercial activity
(3) applications software producing a graphics display.
(4) computer communication with an information source.

Objectives and assessment notes:
Learning objectives are specified in 5 areas (computer systems; computer operations: security; computer programs and CIT applications), with keyboard skills being an optional additional area.

Examples of some objectives are as follows:

B4 Input Use the keyboard and suitable word-processing or other software to input a supplied text accurately.

(Any software which enables candidates to input text conveniently is suitable for use in assessing objective B4. Centres should supply each candidate with a text of at least 500 characters, including a range of alphabetic (upper and lower case), numeric and special characters. Candidates should enter the text with 100% accuracy. No time constraints should be imposed and candidates should be allowed further opportunities to enter the text should they fail to meet the accuracy criterion initially. A copy of the text supplied should be retained for inspection should a visiting assessor require to see it.)

B5 Editing Use cursor control and delete key etc. to edit a document according to instructions supplied.

(For the assessment of objective B5 centres should supply each candidate with a text, on screen, of at least 500 characters, together with instructions for editing by use of facilities available on the computer system.This could be the text derived from B4. At least 125 characters should be affected by the editing instructions required. Candidates should effect the editing with 100% accuracy. No time limit should be imposed)

The learning objectives relating to Computer and information technology applications are intended to encourage candidates to realise the variety of uses to which computers may be put. Detailed case studies are not expected. Assignment 3, described below, should be completed as part of the assessment.

(Candidates should be asked to make use of applications software in satisfying some of these objectives to perform some pre-set task. The intention here is to illustrate the different uses to which computers may be put by practical activity, whilst at the same time providing an opportunity to become more practised in the use of computers. The tasks set may be simple ones.)

Assignments

The assessment scheme provides for a series of assignments to be performed and the results recorded. They generally are text based descriptions of a process or an application.

eg Assignment 3: Computer applications

Candidates should produce short written descriptions of a total of four applications, at least one from each of the fields of industry, commerce and communications. Word processed descriptions are welcome.

Comments about assessment scheme:

The major drawback of the scheme is that it has a very limited practical emphasis in using computers (industry applications are taken in 001 Computer literacy as "short written descriptions of a total of four applications" where "wordprocessed descriptions are welcome.") The knowledge based objectives are substantial but seem in the main to be names of items or processes. Thus despite the frequent use of the term 'competence', it is only partly based upon attainment and demonstration of practical competences.

The course booklet contains clear instructions for the implementation of this course. The content of the 001 (Computer literacy) course has some unusual, but praiseworthy, features: the emphasis on the documentation of files, the recourse to program manuals for guidance, the specification of computer control elements, communication with an information source.

Other modules
Some of the other modules available include:

101 Wordprocessing
102 Spreadsheets
103 Databases
104 Videotext and Information systems
105 Programming
106 Computer control technology
107 Micro-electronics

Each of the modules has an introductory section in the 001 Computer literacy module.

General Comment
The Cambridge IT awareness approach has found a niche in the market (for example, in adult education) whereby popular courses in CIT can receive external certification. The initial module is frequently used in schools, and has perhaps a slightly more practical approach than the equivalent AEB certificate. However, as argued in the text they were probably inhibited from a more fully committed practical approach because of an awareness of resource (and hence market) constraints. As a result, it does nnot appear suitable for use in YTS. Possession of the full certificate (5 modules) should however be construed as constituting a sufficiently broad-based approach with sufficient practical applications, so as to preclude the need for further work at an introductory level. If in a particular locality, a large number of trainees enter YTS with a number of modules (perhaps 3 or 4), then a case could be made for allowing them to take the remaining modules necessary to complete a full certificate.

APPENDIX 3: CASE STUDY OF A TYPICAL COMPUTER STUDIES GCSE

Aims intended to be enabled by a GCSE Computer studies course:

1 the stimulation and fostering of an interest in and an enjoyment of the use of computers;

2 the development of confidence and practical skills in the use of computers

3 the fostering of an awareness of what characterises information, information processing and computer systems;

4 the development of the skills of reasoning, judgement and persistence in applying information methods to solving problems;

5 the development of a broad and balanced perspective of the application of computers in order to provide an understanding of their capabilities and limitations;

6 the development of an awareness of the ethical, social and economic implications of the use of computers for individuals, organisations and society through the study of meaningful applications;

7 the development of skills of communication and interpretation relevant to computing, including a working knowledge of a high level general purpose computer language;

8 the attainment of a basis of knowledge and experience sufficient for further study.

Assessment objectives
The assessment takes the form of three externally assessed written papers, (common to all candidates but without choice of questions) together with an internally assessed project report.

One application area is set by the board as a topic for the year (eg. Retail Stock and Account system).

The assessment objectives are given as:-

1. demonstrate a knowledge and understanding of the techniques needed to solve problems related to practical applications;

2. use computers sensibly to solve appropriate problems, by writing programs or making use of available software, and to document those solutions;

3. demonstrate a knowledge and understanding of the functions of the main hardware and software components of a computer system and their relationship with the representations of stored data and programs;

4. demonstrate a knowledge and understanding of the range and scope of computer applications:

5. demonstrate an understanding of the social and economic effects of the use of computerised systems on individuals, organisations and society.

Externally assessed papers
The three written papers test recall and the use of concepts. The third written paper contains mainly short answer and structured questions concerning the specific application area.

eg Paper 1 question: Objective test of recall

7 Which of these is a process control application?

A Producing pay slips
B Maintaining a Building Society's customer files
C Designing a bridge
D Running a motor at constant speed

Paper 2 Structured questions about concepts

6 Give three tasks that a system analyst normally does.

.....

.....

..... (3 marks)

Paper 3 Structured questions about the application

7 (a) What is the purpose of the CREDIT-LIMIT field in the CUSTOMER file?

....

.....(1 mark)
(b) Describe how this field could affect the processing of an order.

.....

.....

.....

.....(4 marks)

The project

Specification
"In deriving a solution which involves the use of a computer the candidate is required

either

a) to design, implement and test a single program or suite of programs;
or
b) to modify existing software to make it applicable to the problem being solved;
or
c) to make use of existing software."

"The candidates report should contain the following setions:

1 a definition of the problem indicating its scope and limitations.

2 an analysis of the way the computer is to be used.

3 the communication of the complete solution.

4 evidence that the solution works either in part or whole and that the solution has been tested fully.

5 an evaluation of the success (or failure) of the solution.

The report should be of maximum length 10 sides of A4 (excluding computer output)"

The project has to be completed under supervision and it is to be marked by the teacher, taking into account any material help given.

Some of the criteria for the assessment are given here :

Section 1 A definition of the problem indicating its scope and limitations. (6 marks)

a definition showing little appreciation of limitations	1-2
a coherent definition, showing some appreciation of the limitations	3-4
a precise, well set out definition with most of the problem's bounds clearly stated	5-6

Section 2 An analysis of the way the computer was used (12)

Section 3 Communication of the complete solution (16)

Section 5 An evaluation of the success or failure of the solution (8)

After the evaluation is a carried out, the mark is scaled to account for assitance given.

-No material assistance given
-Some assistance but much own work
-Assistance at many stages
-Considerable assistance at most stages

The process is fairly complicated as it takes into account the difficulty of the project ("Project likely to be sufficiently demanding for candidates of grade A/B B/C C/D D/E E/F F/G")

The marks for the project are filled in by the teacher on a form. The projects are externally moderated, some of the project reports are sent out for the moderator as a sample.

The levels and criteria are often very difficult to apply in practice, with real projects from candidates; the interpretation of the form of words for various criteria is often a matter of opinion, the "accepted" interpretation is often not available to the teachers at the time they have to mark the projects.

e.g. How is the teacher to judge between the use of an application program, writing their own program, adapting another program in terms of grading the difficulty?

What are the objective criteria to differentiate between a "coherent definition" and a "precise definition" ? What if the project was of no great complexity and required little in the way of definition? Compare this to a student of high ability who is motivated by a project of much greater complexity.

There is no easy (accurate)answer to evaluation problems of this kind. However, this particular board (AEB) has one of the best reputations for devising schemes to ameliorate these difficulties.

Summary GCSE Computer studies case study

The emphasis is on knowledge, analysis and synthesis rather than skill in the use of computers in practical situations. It would be possible to get a top grade in this examination only using the computer to edit and run the students's own programs. The knowledge and concepts are tested by written tests externally marked.

The course work element is covered by a project. The project is concerned with the specification, investigation and synthesis of a solution to a "problem" in conjunction with an evaluation of

the solution. The solution can be a candidate written (or adapted) program or the use of an applications program. This does mean that the use of computers is significant : it carries 25-30% of the total marks. Also encouraging is the move away from an over-emphasis on the internal workings of the computer which typified many earlier computer studies courses (especially as knowledge rapidly dated). The position of programming is also re-assessed: "most students will learn some programming but it will be firmly based on good practice arising from problem-solving" and "candidates are encouraged to make use of pre-written software and software packages - including spreadsheets and word processors - which in the real world would be used to minimize the need for programming" [GCSE: Employers Information Pack : DES 1987]. The domain of `computer studies' has therefore been re-oriented to give it a much stronger practical problem-solving ethos.

Overall then, the projects are only indirectly assessed for practical skill but are more directly assessed for practical use of concepts, analysis of problems, and communication of solutions. There is therefore a much stronger practical emphasis than in most of the exams which the GCSE has replaced, but the orientation is still clearly upon `computer studies': as distinct from those qualifications which take a much more thoroughly applications-based approach. (The project process also puts a premium on the ability of teachers to steer students to projects concomitant with their abilities and the project assessment scheme.)

APPENDIX 4: STANDARDS FOR GCSE GRADES A, C AND F

A candidate who has been awarded the following grades in a GCSE examination is likely to have shown the following general abilities, i.e. the ability to:

GRADE F

Recall and demonstrate basic information and knowledge;

Comprehend straightforward ideas and relationships;

Communicate intelligibly in spoken, written, graphical and numerical terms as appropriate;

Tackle a problem, within a guiding framework, by planning and implementing a course of action to reach a successful conclusion;

Appraise a completed task in a general way.

GRADE C

Recall and demonstrate a wide range of information and knowledge with reasonable accuracy;

Comprehend ideas, concepts and processes in different situations;

Communicate clearly and accurately in appropriate forms;

Tackly a problem, with only limited guidance, by selecting and implementing the most appropriate course of action to reach a successful conclusion;

Draw reasoned conclusions and suggest further lines of enquiry.

GRADE A

Recall and demonstrate an extensive and complex range of information and knowledge accurately;

Apply and interrelate ideas, concepts and processes;

Communicate using elaborate techniques which convey an understanding in depth;

Identify problems and, without supervision, be capable of selecting and implementing the most appropriate course of action to reach a successful conclusion;

Draw all appropriate conclusions before suggesting and initiating further lines of enquiry.

A candidate will have displayed other skills which are subject specific, and which can be found in the national subject criteria and/or individual syllabuses.

APPENDIX 5: CERTIFICATE OF PRE-VOCATIONAL EDUCATION (CPVE)

Core competences in IT:

AWARENESS OF IT:	Can recognise the developing impact of IT on individuals and society
MICRO-COMPUTERS:	Can use a VDU/Terminal to retrieve information from an IT system
	Can load and use an applications package in a practical situation
	Can identify, set up and use an appropriate IT system for a given purpose
	Can use IT equipment in controlling a simple mechanical device
MICRO-COMPUTER ROBOTICS	Can use IT equipment in controlling a simple mechanical device
DATA PROCESSING	Can prepare data for input to IT equipment and interpret output data
	Can write, debug and run a simple computer programme based on given specification
	Can write, debug and run a complex computer programme based on a given specification
	Can write, debug and run a computer programme based on own specification
APPLICATION OF IT	Can give examples of the application of IT in everyday life

These relate to 21 learning objectives for the core area of IT, with the over-riding aim being "to develop an appreciation of the implications of IT for society and the individual and to acquire a practical introduction to its basic applications".

If a student/trainee is accredited with some or all these statements, these are aggregated in a summative profile. This profile details performance in the 10 core areas, together with a

record of modules undertaken in vocational studies. Supplementary information from a `summary of experience' and `selected items of work' chosen from the student's portfolio could throw further light on the core statements made on the profile, and as such also have a CIT component.

Taken together then there may be sufficient information to judge that a student has started to develop an awareness and familiarity with IT, but it would be difficult to gauge the extent of practical experience. Achievement in the core area IT in CPVE is then most likely to be seen as a general background, which should facilitate the acquisition of skills and competences required either for specialist CIT or general vocational qualifications with an embedded CIT component. However, achievement here would be unlikely to lead to any particular exemptions from subsequent qualifications. It is possible within CPVE to take modules in the `vocational studies' component which act as credits towards vocational qualifications. That performance in IT does not link directly into such qualifications is not, however, an argument to overlook it completely. On the contrary, where a trainee is entering YTS in the second year from CPVE, in IT as in other areas such accreditation and documentation should be scrutinized to ensure:

i. that off-job provision is not duplicated and
ii. to build upon any particular interests which have been developed

Where a trainee is doing CPVE part-time within HYTS, it is similarly important that IT is fully integrated with the rest of the curriculum and scheme (the evaluation of the pilot schemes highlighted the necessity for this).

Use of IT in CPVE within `vocational studies' component:

As indicated above, some of CIT undertaken within the `vocational studies' component of CPVE could be significant in `developing an IT capability' and in allowing possibilities and opportunities for progression. For example, one of the clusters of the technical services category relates to IT and micro-electronic systems. Other clusters and categories also contain an embedded CIT component, and additionally could be used in the accumulation of credits towards further qualifications (particularly of course those of BTEC and CGLI). Details of some CIT related modules are given below:

i. IT and Microelectrorics systems:
Exploratory module - theory and practice.
The scope of the module is fairly specialist (with as the name implies a heavy emphasis on microelectronics), with progression possibilities into preparatory module or direct entry into specialist craft or technician courses.

ii. **Microcomputers and their applications:**
Preparatory module.
This module, which aims to enable students/trainees "to become competent in the use of microcomputer systems for data handling", is the one which would be most appropriate as a general CIT qualification either prior to or during YTS.

SCOPE:
Scope is defined in the form of competences from which enabling objectives relating to knowledge, skills and attitudes can be developed. The student should be able to:

1. Input data using a QWERTY keyboard at 5 words per minute with an accuracy of 98%.
2. Use a QWERTY keyboard to edit a screen full of text;
3. Copy a given layout using the majority of keys and some combination of keys on a QWERTY keyboard;
4. Use other forms of keyboard;
5. Identify the most important electronic sub-units within a computer;
6. Identify the peripherals of a computer system;
7. Connect up the peripherals to form a micro-computer system;
8. Diagnose a faulty peripheral unit by peripheral replacement procedures;
9. Make correct responses to common screer prompts;
10. Recognise or interpret from appropriate manuals, simple error messages;
11. Operate a simple disc based system;
12. Operate a simple tape based system;
13. Operate printer;
14. Identify different types of printer;
15. Use a word processing package;
16. Enter data into a spreadsheet package;
17. Use a data base package;
18. Use a teletext or viewdata system to obtain information;
19. Use a computer to control a device or environment according to sensed inputs;
20. Use equipment safely.

ASSESSMENT REQUIREMENTS:

Formative Assessment
The student will maintain a progressive record of experiences and complete a self-assessment profile based on the listed competences above. Recrods of background studies and assignements completed will also be maintained for inclusion in the portfolio. Progress tests of knowledge should be provided to support the records and portfolio.

Summative Assessment
A tutor-assessed profile based on the formative profile will be completed. A progressively completed and agreed record will allow the formative profile also to provide the summative profile. The external moderator will sample profiles and portfolios including assignments and discuss them with tutors and students.

iii. Other modules with some element of CIT include preparatory modules on stodk control, design and graphics, and in clerical and retail areas. However, except in word processing, the extent of the CIT component is not extensive. Additional work would have to be undertaken either in specialist CIT qualifications or in vocational qualifications with a more substantial embedded CIT component, before trainees could be considered to have developed an IT capability.

APPENDIX 6: RSA VOCATIONAL QUALIFICATIONS WITH AN EMBEDDED CIT COMPONENT IN THE CLERICAL AND RETAIL FIELDS.

i. RSA vocational certificates

Profile sentences where the contexts may include use of CIT:
- use everyday reference sources
- store information using appropriate classification systems
- retrieve information as required from files and records
- select and transfer information as required
- operate alpha and numeric keyboards accurately
- follow the correct procedures for the acceptance or rejection of credit cards (retail scheme only)
- operate point of sole equipment (retail scheme only)
- use and maintain stock records, delivery notes, stores requisition forms (retail scheme only)

Profile sentences which do relate directly to CIT:
- identify the applications of computer based information processing (clerical scheme only)
- input and access information using computer-based sources
- identify the uses of computers in the distributive trades (retail scheme only)

Assessment criteria for vocational certificates:

The profile sentences are intended to be assessed through the completion of occupational tasks. To reflect the differing nature of the profile sentences, they have different criteria for success. Also as skills can be demonstrated in a range of contexts (RSA provide examples of possible contexts, but these are only indicative, and sufficient detail of how skills have been demonstrated should be included in the cumulative assessment/evidence of achievement record), then RSA specify minimum "threshold" standards of performance for each profile sentence. These standards are identified in terms of:

knowledge/awareness elements necessary for performance of a skill;
accuracy required;
consistency - activities carried out without variation in performance;
constraints applying to performance of a skill, especially in relation to time and accuracy.

The criteria for assessment are mandatory and consist of statements about what trainees can do in terms of skills and abilities. The skills should be demonstrated through the performance of a range of practical activities relevant to present or future vocational experience. The trainee's record allows the criteria to be achieved over a number of

entries, and for different accreditors to contribute to the record. The trainees themselves play an active role in recognising and recording achievement. An external assessor usually visiting the centre three times a year, will check consistency of application of criteria and that standards are maintained. They also play a role in the corroboration of the final assessment records, from which profile certificates and memoranda are produced. Perhaps the key role of the assessor is in "talking through" with trainees their achievement of the profile sentences. The developmental and corroborative roles of the assessor are critical to the whole scheme, as the criteria themselves are often expressed only in general terms. For example, the criteria relating to "input and access information using computer based sources" are as follows:

- knowledge/awareness elements:
  functions of computer bases system within the establishment; keyboard skills; command, control and security language, recognition of obvious errors

- accuracy:
  sufficient to enable junior employee to work on simple tasks with minimum of supervision

- consistency:
  evidence of competence within a range of contexts

- constraints:
  within time limits appropriate to context.

  The suggestions for possible examples for appropriate activities/range of contexts included: work placement, centre devised assignments, customer records, stock control, wages, word processing, mailing lists and own profile assessment records.

From the above it should be clear that a trainee possessing a vocational certificate (or a memorandum including most of the above profile sentences) has a number of skills and abilities which are relevant to the development of an `IT capability'. The extent of that capability is, however, almost impossible to determine. Because the record of cumulative assessment and evidence of achievement does not necessarily detail the context (and even where it does this is effectively `buried' deep in the record), then the profile sentences by themselves do not reveal the extent to which the trainee has actually **used** CIT in the performance of occupational tasks (only one profile sentence unequivocably requires use of CIT, although one other requires knowledge and awareness of CIT applications). The overall `level' of the qualification, together with the lack of specificity about CIT achievement, is such that the trainees would probably still benefit from the separate

accreditation of their achievements in this area (for example, through CLAIT or IT Stage II), if they were not going on to further qualifications, which did have a much more substantial CIT component.

ii. RSA Certificates in office procedures and retail distribution

These have the same underlying philosophy and similar design criteria as the vocational certificates, but the embedded CIT component is more substantial, explicit and likely to increase in significance. It is expected that teaching and learning approaches will be completed integrated: with the core skills of communication, numeracy and computer literacy being achieved through the medium of tasks; and the educational/training activities complementing activities undertaken at the work placement. Accreditation of skills should be available either on or off-job, with the demonstration of competence in tasks taking place over a period of time. This is intended to indicate an ability of candidates to sustain performance to the specified criteria. A cumulative assessment/evidence of achievement of tasks is used as a formative and cumulative summary of the achievement of tasks. The tasks themselves may be grouped into `modules' for student/trainee activity.

Each task has criteria of achievement, which are specified in terms of "constraints; accuracy/consistency and overall performance". The underlying knowledge and skill components are indicated as are suggestions for possible learning contexts. As the CIT component is embedded in the tasks, elements of CIT can and do occur under a number of headings. Thus a task, common to both the clerical and retail areas, could detail the following:

Task: Store and retrieve information

Knowledge: know the different systems of filing and indexing and the types of equipment available, including computerised systems.

Skills: Computer literacy: use computer-based facilities to store and retrieve information; use appropriate keyboard skills; use a database package.

[note all the skills mentioned in the other categories have important implications for CIT (i.e. those skills detailed under number; communication and other) - this is another aspect to the entreety for integration].

Criteria for achievement: again there are some directly related to computer-based systems [accuracy/consistency in relation to database packages involve (i) set up of data

base (ii) enter and edit the data (iii) formulate selection (iv) print selected prints and (v) search on more than more criterion], but all the other criteria are applicable to computer-based or other systems (e.g. information retrieved quickly and efficiently; information presented in an organized form).

The criteria relating to overall performance of the task should also be given: "demonstration of the ability to store and retrieve a range of appropriate information using a variety of formats to ensure the efficient operation of the company. Ability to perform the task should be demonstrated over a period of time sufficient to ensure a range of compary procedures/requirements for information and storage is encountered".

Other tasks involve use of other packages (word processing; stock control; accounting etc.), use of computer-based systems for reference, problem-solving and communications. The embedded CIT component is clearly already sufficient to serve as a guarantee that a successful student/trainee will have demonstrated an IT capability, but what is particularly encouraging is that the system allows a flexibility such that increasing use of CIT can be easily accommodated (in this respect it is similar to the Scottish 16+ modular system).

APPENDIX 7: LEARNING OUTCOMES, CONTENT AND ASSESSMENT FOR SCOTVEC MODULES

This is an illustration of the way that the SCOTVEC modules deal with assessment of competence. The module chosen is at a General level and would be suitable for YTS trainees.

Introduction to computers 61091 (for 1986-87)

Learning outcomes:
The student should:

1 know the reasons for the growth in computer usage.
2 know the use of computers in meeting the needs of different categories of user;
3 know the components (processor and peripherals) of a microcomputer system;
4 use an alphanumeric keyboard in the context of computing;
5 load and run programs related to his/her occupation or special interests, programs as learning aids and programs related to life skills.

Content/context:
This includes use of packages; correct handling procedures; keyboard control etc. Also "application programs related to the student's occupation or special interest should be used to emphasise the applications of computers in the workplace ... in most cases the programs will be menu-driven".

Assessment procedures:
The assessment procedures for learning outcomes are as follows. Assessment will be by practical exercise and the performance criteria:

The student correctly:

(a) loads and runs two programs, related to each of the following:

- (i) his/her occupation or special interest;
- (ii) learning aids;
- (iii) life skills;

(b) performs the following tasks:

- (i) initialise the system;
- (ii) insert disk or cassette;
- (iii) load programs from disk or cassette;
- (iv) interpret menu of program;
- (v) load printer with stationery;
- (vi) enable printer;
- (vii) produce printed output from program;
- (viii) remove printed output (from printer)
- (ix) remove media and close down system as per recognised procedure.

The performance of these tasks is judged by the tutor as continual assessment, but there is an extensive monitoring programme for course administration and quality of assessment.

Other comment:
Included in the SCOTVEC modular system are a large number of CIT related modules. These can either be introductory or can be based on prerequisites (expressed in terms of other modules and `O' grades). There are general modules, intended for those specifically interested in CIT or those students/trainees requiring or choosing to follow a general path; specialist modules aimed at mainstream computing students; and vocationally oriented modules with an embedded CIT component. The overall result is a flexible system, which facilitates progression, allows for the individualization of learning programmes and is capable of rapid up-dating.

APPENDIX 8: RSA CLAIT ASSESSMENT SCHEME

This scheme has practical assignments to test competence in a list of objectives. The major difference between this scheme and the CGLI 726 is that all of the competences are tested by practical exercises.

Here are the assessment objectives and profile sentences specified for the wordprocessing application:

"Candidates must be able to demonstrate the ability to use:

A wordprocessing package

01	Enter text	
02	Load text	P1 Enter, load and save text
03	Save text	
04	Insert words	
05	Insert paragraph	
06	Delete words	P2 Insert/delete/replace words; insert/delete paragraphs
07	Delete paragraph	
08	Replace words	
09	Change margins	P3 Change margins
	Format printout	
*010	Line spacing	*P4 Change layout
*011	Justification (on/off)".	

These are assessed by the performance of assignments. These assignments allow competence in both application specific and general skills to be tested. The application specific skill numbers have been added in brackets.

Here is an abbreviated account of a wordprocessing assignment:

1 Start the system and load the wordprocessing program (01)
2 Open a file and enter the following text: (about 200 words of text)
3 Save the text (03)
4 Print a copy of the text
5 Go back to the text (02)
6-10 A series of insertions and deletions of text and paragraphs (06, 08, 04, 05, 07)
11-12 Re-format paragraph, change margins, justification and line spacing, (09, *010, *011, 03)
13 Save the text
14 Print the text
15 Connect the computer to another computer (or user area)
16 Using an appropriate program send a copy of your file to the other computer (or user area)
17 Delete the file
18 Close down the system.

APPENDIX 9: CGLI 726/212 ASSESSMENT SCHEME

The scheme contains elements covering :

1 Electronics and Hardware

2 Computer programming and software

3 Computer applications.
The computer applications module covers:
3.1 Use and care of microcomputers
3.2 Applications of computers
3.3 Word processing
3.4 Spreadsheets
3.5 Database

Keyboard skills, system and connections, operation and care of microcomputers, access to computers, need for timesharing and distinction between interactive, real time and batch processing.

Awareness of the following applications of computers: CAL, CAD,CAM, robotics, simulations/modelling, and electronic communications.

Information retrieval, stock control, video, expert systems, graphs and artificial intelligence. Experience of wordprocessing, spreadsheets and databases.

Many of the tasks are knowledge based and are tested by short written tests, others are tested by some means devised by the tutor. Most of the use of applications programs are tested by practical assignments. One of these areas is the section in this module that introduces wordprocessing. Wordprocessing is divided into competence objectives, the following is a selection of these practical competences:

3.3.1 Load a wordprocessing program
3.3.2 Load a prepared file
3.3.3 Move the cursor to any position on the screen
3.3.4 Insert a character, word and line to a specified position.
3.3.5 Insert a paragraph
3.3.6 Delete a specified character, word, and line
3.3.7 Delete a paragraph
3.3.8 Set left and right margins
3.3.9 Right justify and unjustify text
3.3.10 Save text as a file
3.3.11 Print a file
3.3.12 Exit the wordprocessor program in the correct manner.

These would be tested by practical assignments, here is the marking scheme for the practical test:

4.1 Changed printer ribbon
4.2 Set up and powered system
4.3 Loaded printer with paper
4.4 Loaded wordprocessing program
4.5 Loaded file "WP2"
4.6 Made additions and changes as per instructions without error
4.7 Saved "WP2" amended as a file
4.8 Printed the file
4.9 Exited and closed down the system in the correct manner
4.10 Completed in two hours

The assignment is satisfactorily completed if success is recorded in 4.2-4.8 and one of 4.1,4.9,4.10

The amendments to the file include inserting a date, inserting and deleting letters, punctuation, paragraphs as well as changing the justification.

The assignment test can be retaken after a gap of seven days.

APPENDIX 10 : GLOSSARY OF ABBREVIATIONS

ABTA	Association of British Travel Agents
AEB	Associated Examining Board
AS	Advanced Supplementary Level
BST	British School of Technology
BTEC	Business and Technician Education Council
CAL	Computer Assisted Learning
CBT	Computer Based Training
CGLI	City and Guilds of London Institute
CIT	Computer and Information Technology
CLAIT	(RSA) Computer Literacy and Information Technology
CNC	Computer numerically controlled
CPVE	Certificate of Pre-vocational Education
DES	Department of Education and Science
DTI	Department of Trade and Industry
EPOS	Electronic Point of Sale
FCIS	Further Education Curriculum Information System
FE	Further Education
FESC	Further Education Staff College
FEU	Further Education Unit
GCSE	General Certificate of Secondary Education
IT	Information Technology
LCCI	London Chamber of Commerce and Industry
MSC	Manpower Services Commission
NCC	National Computing Centre
NCVQ	National Council for Vocational Qualifications
NEDC	National Economic Development Council
NTI	New Training Initiative
NVQ	National Vocational Qualification
OC	Open College
RSA	Royal Society of Arts
RVQ	Review of Vocational Qualifications
SATRO	Science and Technology Regional Organization
SCIP	Schools Curriculum Industry Project
SCOTVEC	Scottish Technical and Vocational Education Council
SED	Scottish Education Department
TVEI	Technical and Vocational Education Initiative
UBI	Understanding British Industry
YCB	YTS Certificate Board
YHAFHE	Yorkshire and Humberside Association for Further and Higher Education
YTS	Youth Training Scheme

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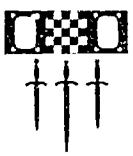

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