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**MODULAR APPROACHES TO  
INITIAL VOCATIONAL EDUCATION  
AND TRAINING: THE SCOTTISH  
EXPERIENCE**

The University *of* Edinburgh



**MODULAR APPROACHES TO INITIAL VOCATIONAL  
EDUCATION AND TRAINING:  
THE SCOTTISH EXPERIENCE**

*A Report for the Petra Research Programme  
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# SUMMARY

## 1. CONTEXT AND FOCUS

In Scotland full-time education is compulsory up to age 16; most is provided in public, comprehensive schools. At 16, young people may: continue at school for either one or two years; enter a full-time course at a further education college; enter Youth Training (a two year programme of integrated work experience and training); find a job or an apprenticeship; or become unemployed.

The curriculum in schools is pre-dominantly academic but there is considerable overlap between the academic and vocational curricula. The traditional academic qualification is the subject-based Higher grade but many students also take other qualifications including vocational National Certificate modules. Most courses in further education colleges provide vocational and occupationally specific training for semi-skilled, craft and technician level jobs. Attendance can be full-time or part-time. Certification is mainly through National Certificate modules.

The Scottish Office Education Department (SOED) controls the system but local education authorities have considerable scope to determine organisational and curricula matters. The SOED shares responsibility with the Department of Employment of the UK government for vocational education and training.

The predominant concern of the British government over the last decade has been to raise the qualification and skill levels of 16-18 year olds by encouraging greater participation in education and training. Although participation has risen over the past decade, rates are still below government targets. In addition, the quality of some part-time training is questionable and participation at the 18 and 19 year old stage is particularly low in comparison with other industrialised countries.

The study focuses on non-advanced vocational education and training in Scotland; this was modularised in 1984 with the introduction of the National Certificate.

## 2. CHARACTERISTICS AND OBJECTIVES OF MODULARISATION

### 2.1 The scope of reform

Over the period 1983-85, all existing non-advanced vocational courses for post-compulsory students were reformed. The reforms moved the curriculum away from knowledge-based courses determined by nationally set syllabuses to a system of modules based on statements of competences. Teaching and assessment methods were also changed. There are now 3,000 modules covering all occupational areas. Although modules are essentially vocational in nature, there are also general modules and they can be taken in schools by students following a mainly general education as well as by students in further education. Modules are accredited through the National Certificate (NC); the system is the responsibility of the Scottish Vocational Education Council (Scotvec).

Modules can be taken by young people in school or on full-time courses in further education, but also on a part-time basis by those in a job, on a government training scheme or who are unemployed. The NC provides a single, cohesive national framework for this diverse client group, offering a common basis for curricular planning and for integration and progression.

Initial vocational education is concentrated at the 16-18 stage in Scotland; in 1989/90 approximately 44% of all 16-18 year olds were registered for the NC.

## **2.2 Reasons, aims and objectives of modularisation**

The NC was introduced because of low participation rates, a lack of suitable non-academic courses in the upper stages of secondary school and of certificated provision for young people on Youth Training, and a confusing range of outdated and inflexible courses in further education colleges.

Aims and objectives included: more choice for individuals; increased participation through easier access and progression and because of improved motivation through the new teaching and assessment methods; higher skills levels among the workforce; a system more responsive to industry's needs; rationalisation of provision; the extension of national certification to more students; the encouragement of more student-centred approaches to learning; and assessment to prescribed national standards.

The NC is part of the debate since the mid 70s about the need to reform education and training to improve Britain's economic performance. Central themes in this debate are: the need to design training on the basis of nationally agreed standards of competence; the concept of 'core skills' common in a wide range of tasks and central to skill transfer; the desirability of a flexible modular form of delivery to improve participation and bring in new groups of students.

## **2.3 Definition and main characteristics of modularisation**

NC modules are self-sufficient units of study that have a notional duration of 40 hours. Each module is defined in a 'module descriptor'. The learning outcomes which specify what is to be learned, assessed and certificated are the most important parts. Learning outcomes cover three areas: knowledge and its uses; key skills; and behaviour. The descriptor also includes performance criteria and recommends assessment procedures. Assessment is criterion-referenced, internally set and carried out on a continuous basis; modules are not graded. Participative, student-centred teaching and learning methods are suggested.

Single modules can be taken as free-standing units or combined in different ways to meet individual needs. In many cases students' programmes are largely determined by national agreements with employers groups but students in school can choose a few modules simply for interest. A National Certificate is awarded for even one module. Until 1990 Scotvec did not accredit a group of modules. Since then group awards of certain combinations of modules can be accredited. The most significant category of group awards are Scottish Vocational Qualifications (SVQs): nationally recognised qualifications for a particular occupational sector, made up of NC modules and other types of units. The move away from individual awards has continued with the development of General Scottish Vocational Qualifications (GSVQs). GSVQs, based mainly on NC modules, provide a broad foundation in a vocational area, and will be offered on a full-time basis in schools and colleges from September 1992. The introduction of SVQs and GSVQs is likely to have an impact on the design of students' programmes.

National standards are achieved through the learning outcomes specified for each module and through a process of validation and moderation carried out by Scotvec. This process is currently being changed to give institutions more responsibility for the standard of their provision.

## **2.4 Design and development of modules: roles and responsibilities**

Scotvec's Sector Boards, which include representatives from industry, commerce and education, are the executive level for decisions about the curriculum; they work through Development Groups which manage Writing Groups which produce new or revised modules. Each Writing Group includes staff from college and/or school, a Scotvec officer and, depending on the module area, a representative from industry. Initially difficulties were found in expressing learning outcomes in competence terms but with training and experience Writing Groups have become more expert in

how to write modules. Provision is regularly reviewed (300 modules each year); centres offering modules can submit comments to Scotvec which also actively seeks reaction.

With the introduction of SVQs, industry now has the responsibility for setting standards of competence so that where NC modules are being re-written to meet SVQ requirements, Scotvec must base their revision on these standards. Although industry has been involved in the development of NC modules from the outset, until the introduction of SVQs the process had been education-led.

The module descriptor is only a skeleton; the centres offering modules must develop learning, teaching and assessment materials. This might be done by individual lecturers or teachers or on a group basis within colleges, by education authorities, or by national agencies.

Local authority colleges and school are responsible for the bulk of NC provision. The extent of workplace delivery of NC has been limited but is likely to grow because of SVQs which stress assessment in workplace conditions. Initially the provision of modules in school was expected to be limited but it has grown dramatically (in 1989, school students made up 40% of NC candidates). Although the NC has enriched the school curriculum and weakened academic and vocational boundaries, there are problems about the low status of modules in school and the poor success rate of certain students.

## **2.5 Other relevant features: the Scottish context**

It has been argued that a desire to preserve Scotland's separate education and training system was one of the implicit objectives of the introduction of the NC. The more centralised nature of the Scottish system also meant the NC could be implemented rapidly. But Scotland has not been immune from developments in England and Wales. The introduction of SVQs has largely been brought about by the need to keep in line with developments in England and Wales.

# **3. PROBLEMS, CONSEQUENCES AND IMPLICATIONS OF MODULARISATION**

## **3.1 Access and progression**

The wide variety of students taking NC modules indicates some success in improving access. But access is limited by *external* factors such as employers' willingness to train their young workers.

It is possible to move within the NC system while changing statuses. In CES research we found that in 1989 more than a third of 19 year olds who had taken modules had studied modules in more than one status. We identified four main progression routes: school and full-time further education; school and Youth Training; school and employment; and Youth Training and employment. Our research revealed a high level of curriculum continuity between school and post-school modules. However we also found that a high proportion of students duplicated modules taken at school in a later status. The need both to structure modular provision in school and establish clearer routes of progression has been recognised and several projects are tackling this issue. We found a sharp fall off in participation and hence progression in the NC after the age of 18 especially among young women. It is at the 18-19 stage, rather than the 16-17 stage, that British participation rates are lowest by international standards but in Britain, priority in training matters is given to 16 and 17 year olds. A flexible and open modular system alone is not enough to overcome the social, economic and labour-market factors that control access to, and progression within, vocational education and training. The institutional context needs to be changed if modularisation is to realise its potential.

In our research we also examined progression *outwith* the NC system. We found major differences in the destinations of NC students depending on the status in which they had taken their modules

and the subjects they had studied. In general there was a reasonably strong match between subjects students had studied and their occupation or industry of employment. The reluctance of higher education and especially the universities to recognise NC modules has been a continuing problem although recently they have taken a more positive approach. NC students who did go on to higher education were most likely to go into full-time non-degree courses and few entered university. Scotvec has almost finished modularising its advanced courses which will enable smoother progression from the NC into this sector of higher education.

### **3.2 The planning of training programmes**

Flexibility and choice for both students and employers are key concepts in the NC although it is questionable whether these aims are compatible. Flexibility and choice for students depend partly on the availability of guidance. The NC has led to more systematic guidance provision in further education; most students now receive some guidance although the extent and quality varies across colleges. Schools already had a well-established guidance system before the NC and students' choices are not determined by employers' requirements although they are more likely to be restricted by the limited range of modules available in school and their secondary position in the school timetable. In further education, typically, 70-85% of modular programmes are fixed with the rest as elective elements. But students' choice of elective modules can vary from three to 100. A particular problem in modular programmes in further education is repetition of previous education and training, including repetition of NC modules already completed in school.

In general, the extent of choice and differentiated individual training programmes has been limited by institutional and organisational factors (timetabling problems, staff costs, etc); the demands of employers and industry bodies leading to the use of standard packages of modules; and the limited development of flexible learning systems. Although examples of flexible learning and innovative timetabling confirm the NC's potential for flexibility, the trend is moving away from student choice with the shift towards recognition of group awards of modules. The pressure from some industrial groups to devise mandatory sets of modules raises the question whether, in practice, flexibility is really valued by most employers.

The issue of 'whole programme' design is a continuing difficulty; some of the benefits of the NC relate to the availability of modules as free-standing units but the division of the curriculum into modules may lead to the fragmentation of learning. An SOED evaluation of the NC found that too often the module rather than the programme was the major focus of attention. The delivery of core skills was particularly affected by staff's focus on individual modules. They recommend the integrated delivery of modules.

### **3.3 Pedagogy and relations between students and teachers**

The SOED evaluation concluded that in further education colleges there had been a major shift from traditional to more practical, activity-based learning approaches under the NC although they found variation across colleges and, in particular, differences depending on subject area. The greatest single negative influence on learning and teaching was the way staff interpreted assessment requirements. In some subjects the main approach was to teach and test each learning outcome discretely, leading to a fragmented learning experience. Nevertheless, the NC had led to the use of a broader range of assessment instruments and coverage of more aspects of student achievement than had the previous system.

The NC has changed professional practice in relation to the planning of teaching and especially in relation to assessment. Before the NC, examinations were set and assessed externally; now lecturers and teachers devise and carry out assessments.

Although the NC reforms implied the need for extensive staff development, it had to be implemented within existing resources. This has had a negative effect on staff development although colleges have generally adopted a more systematic approach since the introduction of the NC. The large uptake of modules in secondary schools has had little impact on initial training courses for teachers.

### **3.4 The influence of different actors on modular programmes**

While the modular system may have allowed students more flexibility in their programmes, it has not increased their influence. The principal actors are still staff in colleges and schools and employers. Until recently industry exerted more influence on the construction of programmes than on individual modules. Such influence was not new. The NC has not itself radically changed the relative influence of education and industry on the vocational education and training. The recent changes result from deliberate government policy to give industry the central role in determining the content and standards of vocational training via SVQs.

### **3.5 Attitudes and reactions to the modular reforms**

Research indicates that in general students have responded positively to the active student-centred learning of the NC and to its assessment procedures, although students in school were inclined to question the status and value of modules compared with the main academic certification. Market research for Scotvec found a low level of awareness among employers about the NC. Other research with employers who used the NC found that they were generally positive about it. They thought it had improved the relationship between theory and practice and provided better assessment of students; there was some demand for graded assessment.

Both students and employers were more positive about the NC than lecturers in colleges (there has been little research on the attitudes of school teachers). But there were differences in lecturers' attitudes depending on their subject area, and also between staff in different colleges. It seems that staff's responses are determined as much by the managerial and training support they receive as by the modular reforms themselves. Some of the lecturers' criticisms of the NC were also misconceived, based on a misunderstanding of the system. In general staff welcomed the changes the NC had brought about in teaching and learning. Researchers found that lecturers accepted the principle of criterion-referenced assessment - a shift from earlier attitudes -and identified advantages to continuous assessment. Nevertheless, lecturers were critical of the NC assessment model because of excessive paperwork, the (perceived) negative effects on student learning and the lack of grading; they expressed concern about quality assurance and national standards. But under the NC, lecturers are much more directly involved in assessment and therefore more aware of its imperfections than under the previous system. They have also had insufficient training in this area. The SOED evaluation concluded that the low self-confidence of some staff about assessment was not well-founded.

Overall, while employers and students were more positive than lecturers, all three groups believed that the NC had resulted in a significant improvement on the system it replaced.

### **3.6 Other consequences, implications and problems**

The NC has meant that institutions have needed to develop responsive student record-keeping systems to keep track of students' progress through their modular programmes. The NC has also led to the development of a computerised guidance information system for users.

## **4. CRITERIA OF EFFECTIVENESS**

A starting point is the original aims and objectives of the modular reforms and the extent to which they

have been achieved. These aims can be categorised on the basis of the extent to which their achievement is subject to external factors or within the control of the 'actors' in the NC system. The compatibility of the various aims should also be considered. Additional criteria that could be used include: equal opportunities; the impact on staff; and the impact on institutions.

## **5. KEY ISSUES**

The NC has achieved considerable success and has generally been received positively by students, employers and, to a lesser extent, by staff in colleges. Nevertheless, there are a number of key issues that need to be addressed.

One issue is whether most employers value the potential of modular systems for constructing flexible training programmes; whether student choice is a realistic aim and the implications of the trend to specified groupings of modules.

Another issue concerns the decline in participation in the NC after the age of 18 after high levels at the 16-17 stage; the sharp gender differences in participation and progression; the poor NC achievements of young people with few formal qualifications; and the influence of external factors in limiting participation and progression.

While the extensive use of NC modules in schools is one of the NC's achievements, it also raises critical issues such as the relatively low status of modules in the school curriculum and the wider implications of this for the status of vocational education and training; the extent to which modules taken in school are recognised by colleges and the implications of this for the NC as a common currency across the different sectors of the education and training system.

The NC has resulted in major changes in pedagogy and assessment but staff in colleges are still concerned about assessment and national standards. Their concern is related to a lack of training and emphasises the importance of adequate staff development to the introduction of modular reforms. Staff also need to address issues of programme design; how to deliver modules in a more integrated way and to respond flexibly to students entering colleges with modules taken in school.

The likely impact of the introduction of SVQs with a consequent shift of influence from education to industry is another issue that faces the NC system.

## **PREFACE AND ACKNOWLEDGEMENTS**

This report was written for the EC Petra Research Partnership on 'The Effectiveness of New Curriculum Models for Initial Vocational Training: Modularisation'. The Partnership, which began in October 1991, involves research teams from six EC countries; each has produced a study of the experience of modularisation in initial vocational education and training in their country.

Details of the participating institutes are given in Appendix 6; copies of the full country reports can be obtained from each of the author(s). A Partnership Report 'Modularisation in Initial Vocational Education and Training: Recent Developments in Six European Countries', which includes summaries of the six country reports, is available from the Centre for Educational Sociology.

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## CHAPTER 1: CONTEXT

### 1.1 Context

In Scotland (as in England and Wales) full-time education is compulsory up to age 16; most is provided in public, comprehensive schools. The majority of schools provide education on an 'all-through' basis and students can remain in the same school until they finish secondary education, which may be after four, five or six years. The curriculum is pre-dominantly academic in nature although it does include vocational elements.

The 16-18 stage of education and training has been described as a 'mixed model', that is there is a variety of education and training options for 16 year olds:

- to continue at school for either one or two years;
- to enter a full-time course at a college of further education;
- enter Youth Training (YT), a two year programme of integrated work experience and training, some of the off-the-job training is likely to be provided by colleges of further education;
- to enter employment or an apprenticeship outside YT. For a minority this will also involve part-time education at a college of further education;
- become unemployed. The government would argue that this is not an option since all 16 and 17 year old school leavers who fail to find a job, training or education place are guaranteed the offer of a suitable place on YT. Since 1988, 16 and 17 year olds have no entitlement to state benefits. Unemployed young people may study at college part-time.

Young people may leave school at one of several points: at 16 after four years of schooling; halfway through the fifth year if they were too young to leave at the end of the previous year; at the end of fifth year; and at the end of sixth year. Just over a half of an age group stay on to complete a fifth year (ie the first year of post-compulsory education) and around a third for the sixth year. Appendix 1 shows the destinations of school leavers at each of the leaving stages.

The traditional general or academic qualification is the Higher grade which is the main university entrance qualification. It is subject-based; there is no group certificate. It is a one year course, examined in up to five subjects at the end of the fifth year of secondary schooling. However, many students spread at least some of their Highers over two years and combine them with study for other qualifications including lower level academic courses and vocational National Certificate modules. In Scotland, compared to most other countries, there is more overlap

between the academic and vocational curricula in secondary school and a less sharp distinction between academic and other educational routes after 16.

In Scotland, the majority of students who stay on in full-time education at 16 do so at school rather than transferring to college. School-leavers are more likely to enter full-time college courses at the end of the fifth or sixth years of secondary education. The majority of courses in further education colleges are vocational and occupationally specific. Although some further education colleges offer higher level courses, the majority of provision is 'non-advanced' that is, training mainly for semi-skilled, craft and technician level occupations. Attendance at colleges of further education can be full-time or part-time. Part-time students may be released from employment or Youth Training for one day a week or in blocks of a few weeks at a time; other part-time students may attend in the evening. Certification is mainly through National Certificate modules. Advanced level vocational courses (technician, technologist and professional) are provided in Central Institutions, colleges of education, universities and to a lesser extent, colleges of further education. Appendix 2 shows the structure of the Scottish system and its academic and training qualifications.

The system is under the control of the Scottish Office Education Department (SOED), previously called the Scottish Education Department (SED). It is part of the Scottish Office, a department of the UK government. It exercises formal oversight over much of the system, for example through its ultimate control over the two Scottish examination bodies and through its Inspectorate of schools and colleges (Her Majesty's Inspectorate (HMIs)). Local education authorities, however, have considerable scope to determine policy for organisation and curriculum in addition to their role as employers of staff in schools and colleges of further education. In relation to vocational education and training, the SED shares responsibility with the Department of Employment of the UK government.

Over the past decade an increasing proportion of young people have stayed on in full-time education and training, for example, rising from 46% in 1985 to 62% in 1989. Participation rates in part-time education and training have also risen. Nevertheless participation rates still fall below government targets and it is doubtful whether some part-time training, in particular through Youth Training, can be viewed as equivalent to full-time education. Certainly most other EC countries do not rely to such a large extent on part-time training as a means of ensuring participation. British participation rates are especially low at the 18 and 19 year old stage because initial vocational education and training is targetted at the younger age group. The predominant concern of the British government over the last decade has been to raise the qualification and skill levels of 16-18 year olds by improving participation rates. Central to this is the perceived need to bridge the academic/vocational divide and establish parity of esteem of vocational and academic qualifications.

## **Focus of the study**

1.2 This study focuses on non-advanced vocational education and training in Scotland. This was modularised in 1984 with the introduction of the Action Plan by the Scottish Education Department. Although individual courses or sectors had been modularised before this time, for example, apprenticeship training in the engineering industry, the Action Plan set out to reform the whole system of non-advanced vocational education and training. The modular system, the National Certificate, which was established by the Action Plan has been the subject of considerable evaluation and research: we therefore have substantial experience to draw on in relation to the issues and consequences surrounding the modularisation of vocational education and training. The report will deal mainly with the National Certificate but where relevant will refer to other modular developments.



## **CHAPTER 2: CHARACTERISTICS AND OBJECTIVES OF MODULARISATION**

### **The scope of reform**

2.1 In 1983 the Scottish Education Department published the document 'New Courses for 16-18s in Scotland: An Action Plan' which set out their plans for reforming non-advanced vocational education and training for young people in Scotland. All existing non-advanced vocational courses for post-compulsory students were to be replaced by a new system based on modules; the modules were to be accredited through a new certificate called the National Certificate (NC); the National Certificate was to become the responsibility of a new awarding body the Scottish Vocational Education Council (Scotvec), created through a merger of the two existing Scottish awarding bodies. The new system was implemented swiftly. The Action Plan document outlined an eighteen month implementation programme. By autumn 1984, over 700 modules were available for use in schools and colleges. The following year saw the full implementation of the NC system. There are now 3,000 modules available. The system, however, has not stood still; it has had to evolve and respond to a changing environment and new government initiatives.

National Certificate modules cover all occupational areas (Appendix 3 gives details of the main module categories). Both the technical and vocational streams are combined in the National Certificate. But the NC also has a role in general education since there are modules in general subjects and in other cases, the specification of modules allows for very substantial adaption to suit the needs of the particular group of students concerned and so certain modules can be given a less vocational emphasis. NC modules can be taken in school by students following a largely general education this is one of the distinctive features of the NC system. Scotvec has identified six broad categories of modules according to their purpose: modules that are employment-led and certificate occupational competence; ones that focus on preparation for employment; other modules which provide the basis for progression to more advanced courses; modules that provide the basis both for progression to advanced courses and to employment; modules that certificate core skills; and those that certificate learning activities, for example, study skill modules.

Within a specific area of study there is an upward progression in the levels of difficulty of the modules but across different areas of study, there are no formal distinctions of level within the National Certificate. The concept of level is most relevant in terms of different occupational levels: young people may follow a programme of modules geared to, for example, semi-skilled, skilled or technician level employment in a particular occupation.

### **Client groups**

Although the Action Plan was initially conceived as a reform of courses for 16-18 year olds, its relevance to the continuing education of adults was quickly realised and the programme retitled the 16+ Action Plan. The National Certificate is targetted at a wide range of students: young

people in school; young people and adults in full-time further education; young people and adults in employment, on government training schemes or who are unemployed. One of the notable features of the National Certificate is that it seeks to cater for a diverse client group who may have different reasons and purposes for studying NC modules who may follow different modes of study and who may do so in different locations. This feature of the NC model has been described as 'institutional versatility', that is its ability to cover 'not just school and college but education and training that is full- and part-time, pre-employment and in-service, education and work-based, and MSC and local [employment and training] initiatives with a single, integrated and coordinated framework' (Raffe 1988). The fact that the NC provides a single, national framework is central to the system: it allows for integration and progression across different institutions and provides a common currency for curricular planning.

Although the NC has quickly become the main non-advanced vocational qualification the question 'how many students are involved' is difficult to answer precisely with respect to initial vocational education and training. This is partly a reflection of the diversity of the NC client group, the range of possible uses of NC modules and the flexibility of delivery of the modular system. Regular official statistics on NC participation are produced by the Scottish Office; these are analysed in various ways but not on the basis of use of the NC for initial vocational training. Since initial vocational education is concentrated at the 16-18 stage in Scotland (and in Britain), the take-up of NC modules by this group is a reasonable proxy for its use for initial vocational education and training purposes. In 1989/90, there were just over 98,000 16-18 year olds registered for the National Certificate out of a total student figure of 244,000 (SOED 1991a). This is equivalent to about 44% of all 16-18 year olds. About 39% of NC students were school-based which gives some indication of the extent to which the NC has weakened the distinction between general and vocational education. In CES research on young people's experience of the NC, we found that in autumn 1989, 59% of 19 year olds had started at least one module at some stage over the past four years.

## **2.2 Reasons for modularisation**

The Action Plan was a response to a number of widely recognised shortcomings in post-16 education and training in Scotland in the early 80s.

°Low participation rates in education and training of 16-18s, especially in comparison with other industrialised countries. For example in 1981, 52% of British 16-18 year olds participated in education and training compared with 86% in Germany and 96% in Japan.

°A lack of suitable courses in school at the fifth and sixth year stage for students who did not want to study or were not suited to the academic qualifications available.

- °A confusing range of specialised vocational courses in further education colleges offered by a number of different awarding bodies. They were highly inflexible in terms of delivery, offered little choice to students or employers and provided few opportunities for credit transfer or for progression to more advanced courses.
- °Certain groups of young people, particularly those on government programmes such as Youth Training, had little access to nationally recognised qualifications. This was a matter of growing concern as numbers on YT increased with rising youth unemployment.
- °The inflexibility of the existing courses was seen as a barrier to providing the sort of training increasing required by the economy. Existing provision was not able to respond quickly or flexibly enough to industry's demands or to offer the more broad-based transferable skills needed by the workforce of the future.
- °Inefficiency resulting from the organisation of the vocational education and training curriculum into discrete large-scale courses with considerable duplication of common curricular elements in different courses. The need for greater efficiency was made more acute by demographic trends which indicated a sharp drop in the number of 16-18 year olds over the 1980s.
- °Concerns about learning and teaching styles and methods of assessment and certification. Existing learning and teaching were viewed as excessively didactic while traditional assessment based on the comparative performance of students (norm-referencing) was thought to be neither fair nor meaningful. It did not clearly state standards of performance or indicate whether a student had achieved a satisfactory performance in terms of any established standards or provide adequate feed-back on progress during a course.

### **Aims and objectives of modularisation**

In discussing the aims and objectives of the Action Plan and the modular National Certificate system it introduced, it is important to bear in mind that the idea of a finite list of objectives is misleading since a key feature of the NC was and continues to be its ability to provide a flexible framework within which changing policy objectives can be pursued; as we see below, the NC has indeed adapted to a changing policy environment. A second point is that because of the Action Plan is diverse client group, the various users of the NC each had and continue to have their own particular agendas and objectives for the system. This was evident in the marketing of the National Certificate by the SOED and Scotvec who tended to emphasise different aims to different groups. Thirdly the emphasis has also tended to change over time, for example, the economic aims of the National Certificate have become increasingly prominent.

The aims and objectives of the Action Plan covered a variety of areas.

- °The extension of choice for the individual students through greater opportunities to select their own programme of study, to vary their rate of progress, and to change their direction of study.
- °Increased participation because of greater choice; easier access, transfer and progression; and because of improved motivation through the new learning and teaching methods and certification arrangements.
- °A greater economic contribution from post-compulsory education and training through increased participation rates and so higher skill levels among the workforce and by establishing a system more responsive to the changing needs of industry.
- °The rationalisation of provision within the education system by replacing the plethora of courses in further education with a single framework eliminating duplication of provision and using resources more efficiently.
- °The extension of certification to more students. NC modules were seen as convenient units for organising the curriculum for diverse clients in different contexts, for example groups such as YTS trainees for whom longer courses were inappropriate, and for certain young people in school. NC modules would not only provide national certification for these groups but also bring them into a single framework which would provide opportunities for progression.
- °The encouragement of more active, practical and student-centred approaches to learning and teaching to promote greater self-reliance and independence.
- °The assessment of student performance against prescribed national standards.

### **The place of modularisation within policies and models for the curriculum**

Since the mid 1970s increased attention has been given to the possible contribution of education and training in reversing the decline in Britain's economic competitiveness. The education and training system has, however, been criticised for failing to fulfil this role. This criticism is partly about the low level of participation in post-compulsory education and training, but it is also related to the curriculum on offer in traditional vocational education and training. A central theme in a series of government reports has been the need to design training on the basis of identifiable, nationally agreed standards of competence to provide progressive, flexible and widely accessible opportunities and to deliver such training through a modular approach.

Allied to the idea of a curriculum defined in relation to specified standards of competence, another

feature over the past decade has been the development of the concept of core skills. These have been variously defined but generally refer to skills that are common in a wide range of tasks and which are central to the possibility of skill transfer. A common current definition includes: numeracy; communication; problem-solving; personal skills; and information technology. The concept of core skills was incorporated into the NC system. There are several approaches to developing core skills: through the systematic expression of core skills in the learning outcomes of modules; the use of particular modules which have the explicit aim of developing certain core skills; the use of certain learning and teaching approaches which encourage core skills within specific vocational modules.

The NC modular system reflects ideas about how the curriculum should be delivered to improve access and participation, especially the principle that the curriculum should not be tied to a particular mode and place of delivery. NC modules can be delivered on a part-time or full-time basis, via day- or block-release, in schools, colleges, community centres as well as in the workplace or by open and distance learning. Modularisation is also part of the attempt to re-model the curriculum to take account of the needs of new groups of students that have emerged because of rising youth unemployment and because of changes in work practices and training requirements.

## 2.3 Definition and main characteristics of modularisation

The years since the introduction of the National Certificate in 1984 have been ones of immense activity in vocational education and training, consequently a description of the main characteristics of the NC is also a description of how it has evolved to meet changing economic and political needs.

### Definition

NC modules are 'individual units of study which have a *notional* 40 hour duration' (Scotvec 1991). The curriculum philosophy behind modules emphasised the integration of education and training and challenged the assumption that the content of the curriculum of vocational courses should be restricted to the acquisition of specific vocational knowledge and skills.

### The module descriptor

Each module is defined in a document known as a module descriptor. The learning outcomes are the most important part of the descriptor; they specify what is to be learned, assessed and certificated. Learning outcomes have accompanying performance criteria that indicate the standard to be attained. Learning outcomes cover three areas: knowledge and its uses; key skills; and behaviour. The specification of the competencies that have to be achieved has both extended and sharpened what is assessed and replaced the concept of testing a general ability by the principle of assessing clear, specific and much smaller domains. Learning outcomes move the emphasis from the more basic cognitive aspects of knowledge and recall to that of understanding and application, including problem-solving.

The module descriptor also recommends assessment procedures. Assessment is criterion-referenced, internally set and carried out on a continuous basis. Modules are not graded, a student either achieves a module successfully, overtaking all the learning outcomes, or does not. In some cases modules in given fields are arranged in vertical sequences according to level of difficulty (eg typewriting 1, 2, 3 and 4) but each sequence is specific to that field and a sequence in one field does not equate to a sequence in another field.

The model descriptor suggests learning and teaching approaches. Participative, student-centred approaches are strongly emphasised and the use of a wide and varied range of learning methods is encouraged for example, individual study, project work, practical activities and computer assisted learning. The aim is both to provide a more stimulating and worthwhile learning experience and also to promote students' self-reliance and initiative.

The module descriptor only sets out a basic framework; it is the responsibility of the institution offering the module to expand it for teaching and assessment purposes.

## **Certification arrangements**

Modules can be taken singly as free-standing units or combined in a variety of ways into programmes of study to meet individual requirements. A National Certificate is awarded for the completion of even one module. Originally the National Certificate simply recorded the individual modules completed by students and did not give them any group title although as a transitional measure equivalences were published which related programmes of modules pre-existing certificates and other UK qualifications. But although a single module is certificated, the market value of one module is slight, it has always been the case that *modular programmes* rather than individual modules have been the significant level for many students. But modular programmes, as such, were not originally certificated under the NC system. There has, however, been a continuing demand from employers, from providers and from students for certification for *groupings* of modules.

In 1990 SCOTVEC introduced a new certification policy. Under this new policy, while the existing practice of recording the achievement of individual modules on a single National Certificate document was continued, additional group certification was introduced which enabled group awards to be given for certain combinations of NC modules. The possibility of certification for particular groups of NC modules was only one part of SCOTVEC's new certification policy. The new system extended the practice of named awards for particular groupings of modules or units to all levels of certification (eg SCOTVEC's Higher National Units, the level above NC modules) and introduced three categories of group awards of which the most significant were Scottish Vocational Qualifications (SVQs). SVQs are intended to attract recognition as the vocational qualifications for a particular occupational sector; they should be based on national standards of competence determined by industry and their outcomes should emphasise the application of skills, knowledge and understanding in the conditions of the workplace; they are available at five levels.

The move away from individual awards has continued with the development of General Scottish Vocational Qualifications (GSVQs) which are to be available for piloting by September 1992. GSVQs, based mainly on NC modules, are intended to provide students with a broad foundation in a vocational area to enable them to progress to higher level SVQs or to higher education. GSVQs are to be offered in full-time education since they are broadly based qualifications not designed for those in jobs or Youth Training wanting more vocationally specific training on a part-time basis. They are likely to be delivered in schools as well as colleges. As part of the trend towards identified groupings of modules, there are also several developments specific to the school sector; these will be discussed in chapter three.

## **Modular programmes**

The different types of students taking NC modules tend to study different numbers of modules and to do so in different modes. For example, in a year, full-time students in further education colleges might complete up to 24 modules, a student on day-release from employment around 6 modules, and a YT trainee between 6 and 10 on day or block release. The majority of school students take three or fewer modules. In many cases, students' programmes will have been largely determined by national training agreements with employers groups; the modular programmes of YT trainees have generally been negotiated between YT managing agents and colleges; in other cases a student at school may have chosen a few modules simply for interest or as an introduction to that area. The advent of SVQs and GSVQs is likely to bring some changes. Students who are training for particular occupations, whether full-time or part-time in employment or YT are likely to take SVQs some of which will specify the NC modules (and, if appropriate, the other units) that should be studied. SVQs might also increase the extent of accreditation of prior learning and of learning on-the-job, reducing the amount of time taken to achieve certification at college. But SVQs are still at an early stage of implementation and it is difficult to know how they will operate in practice.

### **National standards**

National standards are achieved in a number of ways: through the learning outcomes specified for each module; through a process of validation; and through moderation. Through the validation process Scotvec aims to ensure that centres are capable of delivering and supporting NC modules and programmes. Originally Scotvec was responsible for directly validating all centres but validation of local education authority centres has recently been devolved to the education authorities. Under its external moderation procedures, Scotvec checks that approved procedures for delivery have been properly operated and that common standards are being applied across centres. This work is done by Scotvec's full-time Field Officers and part-time Subject Verifiers. The Field Officers are responsible for overseeing NC provision in all centres in a particular geographical area. Subject Verifiers provide the necessary subject specialist element, ensure national standards are being applied, and provide information and advice to staff.

Scotvec is in the process of changing its validation and moderation policy. The new arrangements are being introduced in stages and should be completed by summer 1993. One of the central features of the new system is the move to give centres that deliver NC modules and other Scotvec provision as much devolved responsibility as possible while maintaining national standards. Under the new system, centres which have effective internal quality assurance systems (evaluated by a quality audit by Scotvec) will be able to take over devolved responsibility for quality elements normally administered by Scotvec.

### **The scope of modular reforms**

The scope of the reform introduced by the National Certificate should be evident from the earlier sections of this report and will not be repeated in detail. To re-cap: it has reformed the whole of the non-advanced sector of vocational education and training; it is available in schools as well as colleges; it has reorganised the curriculum, moving away from largely knowledge-based courses where the content was defined by nationally set syllabuses to a system of modules designed on the basis of statements of competence; the new system also embodied a change in learning and teaching styles and in methods of assessment.

## **2.4 Design and development of modules: roles and responsibilities**

The Action Plan was the creation of the SED which established a national implementation programme.

This involved the setting up of an SED Development Unit; three Task Groups (Curriculum and Assessment, Teacher Education, and Guidance); and Development Teams. The Development Teams covered broad subject areas and were staffed by personnel seconded mainly from further education. The SED drew up national guidelines from which members of the Development Teams in collaboration with Short Life Working Groups of staff from colleges and schools developed module descriptors. A central aspect of the development work was consultation with relevant educational, training and employer interests especially through sector boards of Scotec and Scotbec (these bodies merged in 1985 to form Scotvec).

Initially those involved in writing modules tended to start from the pre-existing courses and divide these up to create modules. At this stage, there was little experience of competence-based learning and so those involved in module writing had difficulty in expressing learning outcomes in competence terms ie 'can do' rather than 'knows or understands'. Since then, as new modules have been devised and existing modules revised, a three-tier writing/revision process has been developed and those involved have developed more expertise in writing modules.

Scotvec's eight Sector Boards are the executive level for decisions about the curriculum. These Sector Boards are defined in broad occupational terms eg Built Environment, and Business, Administration and Management and are composed of representatives from industry and commerce, professional bodies, local education authorities, colleges and the SOED. They can set up Development Groups to consider provision in a particular field eg Maths; in turn the Development Group will set up and manage Writing Groups for particular modules within this field. The Development Group acts as the first line of approval for the new or revised module which must eventually be approved by the Sector Board. The composition of the Working Groups varies depending on the module concerned, where it will be delivered and who the 'end-user' will be, for example, if a module is likely to be offered in school then a school teacher will be involved in that Writing Group. Generally Writing Groups include staff from college and/or school, a Scotvec officer, and depending on the module area, a representative from industry.

With experience and training, Writing Groups have become more expert in how to write modules; the process has become more function-based and learning outcomes more clearly expressed in terms of competencies.

Colleges, schools and other presenting centres can make comments and suggest adaptations or additions to Scotvec. These comments are then fed into the regular module review process. Around 300 modules are reviewed each year, that is about 10% of the module catalogue. In the last two years Scotvec have moved to a more proactive approach. They now indicate that an area is coming up for review and invite comments. One example of this has been the recent review of science modules. In this case Scotvec asked for comments; these were then given to the Writing Groups and subsequently the draft modules sent out to schools, colleges, universities, employers and professional associations for consultation before going to the relevant Sector Board for approval.

The introduction of Scottish Vocational Qualifications (SVQs) has added another dimension to the design of modules. An essential aspect of SVQs is that they clearly indicate competence in employment and that these competencies have been determined by industry through 'Industry Lead Bodies' (ILB). These are organisations designated by government to set the standards of competence for their particular sector or occupational area across the UK. There are currently about 155 ILBs; most are industry specific (120) while the others are either cross-sectoral for example Administration, or on a consortia basis for example the National Textile Training Group. In general these Lead Bodies operate through working groups of employers, trade unions and others. Once they have established the appropriate standards through a process of 'functional analysis', they must then work with an awarding body to develop vocational qualifications based on these standards. In Scotland the relevant awarding organisation is Scotvec. Scotvec has then to incorporate the standards set by the Lead Bodies into its provision and rewrite or create new NC modules, Higher National Units or Workplace-assessed Units as appropriate. In some cases Scotvec is represented on the Lead Body and on its various development groups which carry out the standards development work. Where an NC module has been re-written to meet SVQ requirements, this revised module may replace the original module but in other cases, both versions of the module might be retained if there is a demand for both.

Industry has been involved in the development of NC modules from the outset: Scotvec has consulted widely with employer groups and professional bodies who are also represented on its sector boards and other groups. Input from employers and industrial and professional groups into modular developments has also been possible at the college level since most colleges have a system of advisory committees or user-liaison groups which include representatives from industry and other relevant bodies. Nevertheless, it is probably fair to say that until the advent of SVQs, the development of NC modules has been education-led. Before this industry's main role was in the design of *modular programmes*. In some cases Scotvec and industry groups

designated 'agreed study programmes', in other cases broad multi-disciplinary programmes have been designed to suit a wide range of industrial sectors. Colleges have also worked with particular employers to produce tailor-made programmes for them. Now, with SVQs, industry and especially employers via Industry Lead Bodies have a direct responsibility for determining the content of individual NC modules through the specification of the relevant occupational standards.

It is important to remember that in the NC system when a module is written, or to be more precise, when the module descriptor is written, that this is only an outline, a skeleton. It is the responsibility of the colleges and other institutions who deliver the modules to develop learning, teaching and assessment materials. This development might be done individually by lecturers or teachers for their own use or organised across sections or departments in college which then share the pack of module materials that has been developed. There have been regional approaches either through meetings of staff from different colleges across the region or through the secondment of a member of staff to produce module packs. Lecturers have also been able to use curriculum packs devised by national agencies. While prime role, at least initially, for Scotvec's full-time Field Officers and part-time Subject Verifiers has been to ensure national standards across the various centres offering modules, they have also had an important role in advising staff on the development of module descriptors for teaching purposes.

### **Providers of modules**

Local authority colleges and schools are responsible for the bulk of NC provision; private training centres account for only a very small proportion. While in principle, NC modules can be delivered in the workplace, the extent of this has been limited although certain modules do require practical workplace experience to achieve the learning outcomes. The amount of workplace-based delivery is likely to grow substantially because of SVQs which stress occupational competence and assessment in conditions of the workplace.

Initially the use of NC modules in school was expected to be limited: the Action Plan was essentially a reform of the non-advanced further education sector. The main clients for NC modules in school were expected to be young people for whom traditional academic courses were not suitable. But the NC has not been confined to these groups. It has not become an alternative curriculum but it has instead added another dimension to the range of curricular possibilities for all types school students. It has been used not only for vocational purposes but also for general education and to add recreational elements to students' curriculum. In 1989, 56% of students had started an NC modules in fifth year and overall school students made up 40% of NC candidates. But although the NC may be enriching the school curriculum and weakening the boundaries between academic and vocational courses, there are problems, in particular the low status of NC modules in school and the poor success rate of certain fifth year students. These factors raise questions about the

ability of schools to provide modules and about young people's perceptions of the status of the NC and of vocational education and training.

## **2.5 Other relevant features: the Scottish context**

The Scottish context has been a continuing feature in the introduction and development of the National Certificate. Scotland has a different and separate education system from England and Wales. Its training system is also different although before the Action Plan, certain English vocational qualifications were available in Scotland. Although there are some differences between the youth labour market in Scotland and that of England and Wales, the two youth labour markets are very similar. Training and labour market policy is the responsibility of central government ie it is decided at a *British* level although many in Scotland would argue that British policies are essentially English policies which address issues and problems in England, ignoring any differences in Scotland. These factors have interacted at different times to influence developments in vocational education and training in Scotland.

It has been argued that Scottish determination to preserve its separate education and training system was one of the implicit objectives, at least for some, of the introduction of the National Certificate. The swift introduction of the Action Plan coincided with a time of expansion of the responsibility and activities of the MSC (the government agency responsible for training in Britain), in particular an increased role in vocational education and training. There was a widespread view in Scottish education that unless Scotland reformed its vocational education and training system, then reform would be imposed upon it by central government via the MSC. It was feared that this would result in the imposition of an illiberal interpretation of vocationalism on further education and an essentially English reform of Scottish vocational education and training.

Once the Scottish Education Department had decided to put the Action Plan into effect, another aspect of the Scottish context helped to achieve rapid implementation, that is the possibility in Scotland of swift and uniform change because of the more centralised nature of its education and training system compared to that of England and Wales. The Scottish capacity for centrally-led innovation was crucial to the rapid implementation of the National Certificate.

While the reform of non-advanced vocational education and training through the National Certificate warded off a British reform, the National Certificate has not been immune from developments in England and Wales. The introduction of SVQs and GSVQs has largely been brought about by the need to keep in line with developments in England and Wales. Although it was recognised by government that Scotland had made significant progress in reforming its vocational qualifications, nevertheless the introduction of National Vocational Qualifications (NVQs) in 1986 in England and Wales forced Scotvec, in the interests of UK-wide comparability of vocational qualifications, to develop SVQs on the same criteria as NVQs. Although Scotvec was

probably moving towards group awards of modules because of market demand, this would not necessarily have resulted in SVQs without the pressure of the NVQ development. There is some feeling in Scotland that while England needed NVQs to rationalise its provision Scotland had already done so through the National Certificate and did not need SVQs. This does not take into account one of the other reasons for the introduction of NVQs, that is the government's aim of persuading employers to accept the responsibility for providing and funding training by involving them in setting occupational standards. Whatever the merits of greater employer involvement, the need to work through Industry Lead Bodies, many of which are based in London with limited knowledge of the Scottish vocational training system and of the NC, is creating difficulties in the development of SVQs.

## CHAPTER 3: PROBLEMS, CONSEQUENCES AND IMPLICATIONS OF MODULARISATION

### 3.1 Access and progression

#### Access

Improved access to vocational education and training was a major objective of the Action Plan. Modules have no formal entry requirements, instead 'preferred entry levels' describe the pre-requisite knowledge and skills seen as necessary to complete the module; the intention is to avoid unnecessary or arbitrary requirements. Flexibility in where and how (ie institutions and modes) modules can be followed was seen as equally important in widening access. The wide variety of users of the NC is one mark of its success in improving access. Table 1 illustrates this. It shows the extent to which the year group who had been in the fourth year of secondary education in 1985/6 had participated in the NC by the age of 19 and the range of statuses in which they had studied modules (Croxford *et al* 1991).

**Table 1**  
**Young people's experience of NC modules by autumn 1989 (age 19)**

	all	males	females
% studied any module(s)	59	61	58
% studied any module(s):			
at school		34	31
in full-time further education		12	9
on Youth Training		22	17
on another government scheme		1	2
in full-time employment		15	21
while unemployed		3	4

Nevertheless, the intrinsic flexibility of the NC in terms of where and how it can be taken is mediated by institutional factors. For example, while the flexibility of the NC makes it open to someone in employment most employees rely on their employers to sponsor, or at least allow, their participation. The NC can offer an open, cross-institutional system but it cannot, in itself, overcome the practices within institutional statuses that limit participation in any form of vocational education and training. This is most evident in relation to young people in employment.

In CES research on the NC we found that only 12% of 16 year old school leavers who were in full-time jobs in spring 1989 had enrolled for NC modules while in employment (excluding those in YT). The proportion taking modules was not only low, it was also heavily skewed towards males and towards employees in the engineering and construction industries. These figures reflect the long-standing low level of participation in vocational education and training among young employees and the traditional pattern of training in Scotland in which males are more likely than females to receive part-time training while in employment. Young people with low levels of formal qualifications from school also seem to 'lose out' in the NC system; these young people were the group who were least likely to gain much in terms of NC qualifications. A flexible and formally open modular system is not, in itself, a sufficient condition either for widening access to vocational education and training for those groups who have not traditionally had access to it or to overcome the social, economic and labour market factors that shape and control participation in vocational education and training.

### **Progression within the National Certificate**

Progression was built into the National Certificate, the module catalogue includes a progressive series of modules in various areas and progression routes from and to other modules are made explicit in the module descriptor. Progression within the NC modular system has a particular dimension in that it is possible to stay within it while changing statuses, for example, leaving school, entering Youth Training then moving into full-time employment. In 1989, of the 59% of 19 year olds who had studied modules by then, more than a third had taken modules in more than one status. We identified four main progression routes within the NC system: school and full-time further education; school and Youth Training; school and employment; and Youth Training and employment (Croxford *et al.* 1991).

Our research also revealed a high level of curriculum continuity between school and post-school modules. Of students who took modules both at school and in a post-school status such as full-time further education, Youth Training or employment, about half had taken a school module in the main subject area of their post-school programme. The balance of the curriculum tended to change over time but the change was not dramatic. The curriculum trends did not readily support any simple model of curriculum progression. For example, there was no general trend for older students to take fewer general subjects and to become more specialised in their main occupational areas.

This curriculum continuity that we identified had its negative side in the extent of duplication of modules taken at school in a later status. Of the NC students in full-time further education and Youth Training who had taken modules at school, more than half repeated at least one module that they had already completed at school. As noted earlier, when the NC was introduced it was expected that modular provision in school would be limited. Too often however NC modules are

used to fill gaps in the timetable rather than with a clear purpose and plan. But it has grown enormously and has, in effect, added an extra level of progression. The need both to structure modular provision in schools and to establish clearer routes of progression has been recognised. There are currently several initiatives that seek to address this issue including work on developing 'clusters' of three NC modules that relate to a particular occupational area. Clusters of modules can stand alone but it is expected that many will also be used as components of General Scottish Vocational Qualifications (GSVQs). The intention is to provide clear routes of progression from GSVQs to either the relevant SVQ or on to higher education.

At the beginning of this report, it was stated that vocational education and training in Scotland (and Britain) is concentrated at the 16-18 stage. The CES research on participation and progression in the NC bears this out; we found a sharp fall off in participation and hence progression after the age of 18. Participation fell particularly rapidly among females. Few students, male or female, who did NC modules in full-time further education followed them with modules in employment. This lack of participation and progression is important because it is among 18 and 19 year olds, rather than 16 and 17 years old, that Scottish (and British) participation rates are most conspicuously low by international standards. Although higher levels of young people have taken NC modules and numbers are continuing to grow, participation rates still fall well below the targets suggested by the government, business leaders and other commentators. As we have already noted, the establishment of a flexible modular system cannot be the sole strategy in widening access and encouraging progression. Other action needs to be taken, in particular to move away from giving priority to 16 and 17 year olds in training and for the government to consider the current gender imbalance when planning any moves that might affect future patterns of progression within and outwith the NC. We need to change the institutional context of the modular system if it is to realise its potential; modularisation alone is not enough.

### **Progression outwith the NC system**

Another aspect of progression is the subsequent movements and destinations of students who have taken NC modules. In our research at CES we found that, by the age of 19, there were major differences in the destinations of NC students depending on the status in which they had taken their modules and the subjects they had studied. Students who had taken modules on Youth Training had higher rates of unemployment than those who had done modules in jobs or in full-time further education although there were large variations depending on the subject studied in Youth Training. Among those who were in full-time jobs at 19, there was a strong link between the status in which modules were taken and the occupation or industry of employment. For example, young people who had taken NC modules in full-time further education were more likely to be employed in the service industries and personal service occupations while NC students from Youth Training or employment were more often employed in manufacturing and construction. This largely reflected the main subjects that young people had studied in these

statuses; in general there was a reasonably strong match between their NC subjects and the occupation or industry of employment.

While our data suggest that in general there were relatively strong education/occupation and industry links, it cannot support detailed analysis. The SOED Inspectorate's evaluation of the NC which inspected specific modular programmes, found that for the most part, the content and outcomes of modular provision were meaningful and aligned to employment practice but that there was a need to develop a more market-oriented approach to programme design. They suggest that colleges should develop a more systematic approach to the collection of post-course student destination data and information about the career progression of employment-based students. Departments that serve a range of industries e.g. Business and Administration, were least well-informed. The Inspectorate also pointed to a failure by some programme leaders to distinguish between two broad purposes: progression into employment and progression into higher education. This could mean that programmes failed to do either adequately.

Progression from the National Certificate into higher education was most common among young people who had taken modules in full-time further education and in particular who had studied business and administration or engineering. Rates of progression into higher education were also greater among males than females. Those who went on to higher education were much more likely to go into full-time non-degree courses than to enter degree courses and few entered university. The National Certificate provides access to Scotvec advanced courses (Higher National Certificates and Diplomas) but the reluctance to recognise NC modules for entry purposes into other higher education and in particular to university degree courses has been a continuing problem. It has only been in the past year that the Scottish Universities' Council on Entrance has adopted a much more positive attitude to NC modules but it is still up to each University faculty to decide whether NC modules provide sufficient evidence of applicants' academic potential.

Over the past two years Scotvec has been modularising its advanced courses (Higher National Certificate/Diploma) and this process will be complete by the end of 1992. There should now therefore be greater articulation and smoother progression from the NC into this sector of higher education.

### **3.2 The planning of training programmes**

Flexibility and choice are key concepts in the Action Plan. They were seen as fundamental in improving student motivation, participation and as a way to encourage students to take more responsibility for their own learning and to develop their initiative and self-reliance. At the same time flexibility was also promoted to employers as a way to tailor vocational education and training more closely to their particular requirements and to be more responsive to changing skill needs. There is an obvious potential for tension and conflict between flexibility and choice for student

and flexibility and choice for employers. Equally the NC principle of broad-based vocational education and training and the opportunity for greater student choice are not necessarily compatible: there is no guarantee that given the opportunity to choose, students will select a broad programme of modules.

### **Guidance provision**

Flexibility and choice for students depend partly on the availability of effective pre-entry and on-course guidance. In respect of guidance in non-advanced further education, the NC marks a watershed. Before this no systematic or formal provision for guidance had existed in further education (Hart *et al.* 1987). The Action Plan acknowledged that a modular curriculum would need to be accompanied by an effective guidance system and an SED Task Group on Guidance was set up which subsequently issued advice and guidelines.

There was, however, considerable concern whether further education would be able to establish effective guidance systems since, apart from some initial pump-priming funding for in-service training and curriculum development, the NC was to be introduced within existing resources. Relatively early research on guidance and choice found considerable diversity of guidance provision in further education despite the recommendations by the SED Task Group (Hart *et al.* 1987). This research described a tendency for guidance to be organised on a reactive rather than proactive model and as such to be less likely to meet the needs of large numbers of students unaware of the help available to them or of their own guidance needs.

Looking at guidance in more quantitative terms, another study found that between around a quarter and a third of part-time students (employees and Youth Training trainees) had had pre-entry guidance (Taylor *et al.* 1986). The recent review of the NC by the SOED Inspectorate found that around two-thirds of students had some sort of guidance before entry to their programme although the quality and time given varied considerably: 'the time allocated ... ranged from five minutes to a half day. For some colleges, the process was ad hoc and minimal ... in others it was well planned, and relatively client-centred' (SOED 1991b). Pre-entry guidance was more common for full-time than part-time students. This level of pre-entry guidance, albeit of varying quality an improvement on the position in earlier years of the NC.

In relation to on-course guidance the Inspectorate found that while over 50% of students had opportunities for on-going guidance to review progress and discuss future options, there were considerable variations in practice across colleges. In some colleges the large majority of students had regular structured guidance but in others less than a quarter of students had such opportunities.

### **Extent of choice**

Before the NC students had very little opportunity to determine the content of their courses; the bulk of certificated courses in non-advanced vocational education and training was centrally planned and designed by the main certifying bodies. The only choices available to students were in deciding to enter further education and, at least for full-time students, to decide which course to take. In early research on guidance and choice in further education, 38% of full-time students who were surveyed in 1984-85 thought that they had had some choice in their modular programme while in the following year only 7% of part-time students responded that they had had an element of choice (Hart *et al.* 1987). The more recent Inspectorate evaluation of the NC found that most colleges now have some arrangements for elective modules although not for all programmes have access to such electives. They found that 70-85% of a typical modular programme was fixed with the rest as elective elements. However, the range of choice available because of timetabling and resource constraints varied between three and 100 modules. Where the principle of choice is presented to students but the actual choice very limited, this is likely to lead to some frustration.

### **Recognition of prior learning**

A significant issue in programme flexibility is the recognition of students' prior learning. There have been two national projects on the 'accreditation of prior learning' (APL) whereby students compile folios of evidence of previous learning and experience outwith the formal education system. APL is less relevant to younger students involved in initial vocational education and training; for these students the more relevant issue is the extent to which previous achievement in school - SCE awards and NC modules - is recognised.

In principle, the clearly specified outcomes of the NC should make such recognition much easier. In practice there are many examples of college staff failing to take account of previous certification. Complaints from students about repetition of work are common. For example, 34% of the year group currently enrolled for modules in spring 1989 said that the modules they had studied repeated work already done at school (Howieson *et al.* 1990; Croxford *et al.* 1991). Of particular concern is the extent to which young people repeat NC modules already successfully completed. As noted earlier (3.1), of NC students in full-time further education and Youth Training who had taken modules at school, more than half repeated at least one module they had already completed. With increasing proportions of students entering further education with NC modules, colleges must develop clear policies on how prior achievement will be handled. The development of coherent packages of modules in school may make this easier.

### **Factors inhibiting choice and flexibility**

The Inspectorate report concluded that genuine choice and negotiation is 'not yet very prevalent'. This can be explained by a combination of factors. In the earlier research on guidance and choice in FE (Hart *et al.*), the researchers identified a range of factors affecting choice: the financial implications - more module options mean increased demands on staff, accommodation and specialist equipment and more staff time for negotiations; inflexible timetabling patterns; staff who felt that they were best able to judge what was most appropriate programme for students; the demands of employers and Youth Training Managing Agents either through specific modular requirements or as perceived by further education staff constructing vocationally coherent programmes. The more recent Inspectorate report found that the same factors still applied. In respect of the effect of employer demands for the inclusion of certain modules, they note that the extent of 'agreed study programmes' between Scotvec and relevant industry groups varied across occupational sectors. The report also pointed out that the 'typical study programmes' produced by Scotvec to help staff plan programmes in other study areas are treated by some staff as mandatory, limiting choice where this is not necessary. It is not yet clear what impact SVQs will have in terms of flexibility and choice.

Flexibility incurs costs and the Inspectorate report points to a lack of expertise in most colleges in timetabling techniques necessary 'to achieve the optimum balance of choice and economy'. However, the Inspectorate did find a few examples of innovative timetabling practices which indicate that negotiated choice is possible. They identified the development of flexible learning systems as the most important factor in providing a truly responsive system. (Flexible or open learning is learning that is not tied to a particular mode, time or place of study or the presence of a lecturer/trainer. It covers distance learning, locally based learning; college based private study; and other open learning or directed private study systems.) Currently, the main barrier to progress in flexible learning is the relative lack of open or self-supported self-study learning materials.

The Inspectorate conclude that examples of flexible learning and of innovative timetabling confirm the potential for flexibility in the NC but that more staff development is needed to help staff acquire the necessary timetabling techniques and that national and local collaboration is required to produce self-study learning packages to facilitate open learning.

### **Choice and flexibility in the school sector**

Discussion about flexibility, choice and negotiation has so far concentrated on the position in non-advanced further education but modules are, of course, also taken in school. Here the situation is different. On the one hand schools have a well-established guidance system and modules are not determined by employers' requirements; students study modules for vocational education rather than vocational training purposes. On the other hand, flexibility and choice are restricted by the more limited range of modules available to school students and the secondary position of

modules in the school timetable which is determined by the requirements of the main academic SCE provision. As we noted earlier, this has meant that too often modules have been taken in a haphazard way rather than with a clear and coherent rationale; it is this situation that has led to development of clusters of modules and GSVQs which Scotvec hope will provide a coherent framework to help students and staff plan modular programmes in school.

In practice, the extent of differentiated individual training programmes has been limited because of institutional and organisational factors; the demands of employers and industry bodies leading to the use of standard packages of modules; and the limited development of flexible learning systems. It also seems that despite improvements in guidance and in the provision of electives that the trend is moving away from student choice with the shift towards group awards. Although increased flexibility was promoted as a major advantage of the NC, the pressure from some industrial groups to devise mandatory sets of modules does raise questions whether flexibility to devise tailor-made programmes for particular students or groups of students to meet specific needs is really valued by most employers.

### **Programme design**

The issue of 'whole programme' design is a continuing source of difficulty in the National Certificate. On the one hand some of the benefits of modularisation relate to the availability of modules as free-standing units, for example, greater access to the system, certificated exit points, credit transfer and increased student motivation through short-term targets and early successes. On the other hand the division of the curriculum into chunks may lead to the fragmentation of learning and hinder the development of skills and understanding across the whole field of learning.

The Inspectorate concluded in their review of teaching, learning and assessment that often the module rather than the programme is the major focus of attention. They suggest that rather than setting out a sequence of discrete modules, programmes can be designed so that several modules are delivered in an integrated way. The Inspectorate found examples of such integration where up to four modules had been combined to provide a more meaningful learning experience. But they also discovered that many staff seemed to believe that the integration of modules is not allowed under the NC system. Nevertheless, there are difficulties with such an integrated approach to programme design. For example, the integration of one module with others might prevent certain students from taking that particular module, it also means that if a student leaves early s/he will only have achieved parts of several modules. There can also be administrative problems - while the assessment of the modules may be integrated, staff still have to provide evidence of the assessment for the learning outcomes of each individual module. Staff therefore have to try to balance the various advantages and disadvantages of discrete and integrated provision.

The delivery of core skills (see 2.2) in modular programmes has caused some difficulty. Where the approach has been to use particular modules, eg communications modules, to develop core skills, this has sometimes compartmentalised them and failed to make an impact across students' programmes. Another approach has been to embed core skill learning in all modules, but this has frequently lacked any clear focus or rigour. The delivery of core skills is probably one of the areas most affected by staff's focus on individual modules rather whole programmes and where the need for a 'whole-programme' approach is greatest.

### **3.3 Pedagogy and relations between students and teachers**

The Action Plan advocated radical changes in learning and teaching approaches (see 2.3). To what extent has the National Certificate been able to achieve the proposed new methods? There have been several studies of teaching and learning in the National Certificate which have been examined how far practice reflects the Action Plan theory. These studies have concentrated on further education colleges; we know far less about practice in the school sector.

In their evaluation, the Inspectorate concluded that there had been a major shift from didactic teaching to practical approaches and that the extent of activity-based learning had increased significantly under the National Certificate. Nevertheless, the evaluation found variation across colleges and, in particular, differences depending on the subject area. In general staff teaching modules concerned with knowledge were more likely to use didactic methods such as lectures than student-centred than more practical approaches such as role play, projects, case-studies and student-led seminars. Other research has found that while the large majority of lecturers in further education colleges were highly committed to the principles of student-centred learning, they also felt that pressure of time and resources prevented its full use, and so, for example, reverted to whole-class teaching to get through certain module in the time available.

The Inspectorate's evaluation also highlighted the importance of the learning environment to activity based learning. Such an approach needs, for example, accommodation that can be adapted and used in different ways and also more extensive practical training facilities. The lack of a suitable learning environment could and did have adverse effects on the learning and teaching process.

The Inspectorate pointed to the critical role of the module learning outcomes in influencing the learning and teaching approach. Where the learning outcomes were poorly written and emphasised the acquisition rather than the application of knowledge, then this tended to encourage a didactic approach. This is something which Scotvec is trying to remedy in its revision of module descriptors by expressing the learning outcomes in such a way as to ensure student-centred learning. The Inspectorate also found, however, that not all staff are skilled in using a student-centred approach, indicating a continuing need for staff development.

Self-paced learning, another of the NC aims, was in evidence but the Inspectorate felt that frequently the pace of learning was predetermined by the lecturer's plan or the average pace of the class. They also noted that while the great majority of students were active in their learning, that this did not usually mean that they were taking responsibility for their own learning and developing as independent learners. Instead much student activity was pre-programmed by staff.

The Action Plan emphasised the importance of realism and of the integration of theory and practice in contributing to effective learning. The Inspectorate thought that most teaching and learning was satisfactory and identified the realistic nature of the learning activities as the most important factor in this. Related to this was the extent to which theory was integrated into practice. They found cases where theory was still too divorced from practice and where there was an undue emphasis on knowledge divorced from vocational applications. Once again, this was sometimes the result of poorly specified learning outcomes. Work experience was one strategy used to integrate theory and practice. Delivering several modules in an integrated way was another way to combine theory and practice to provide more realistic tasks and more generally to offer a more cohesive educational experience. But as noted earlier, this approach could have drawbacks in terms of limiting access to individual modules.

The Inspectorate identified several areas which they saw as critical in achieving the NC aims in respect of teaching and learning. One was the need to develop flexible learning approaches further and in particular the production of more flexible learning materials. But most important of all, they concluded that the greatest single negative influence on learning and teaching was the manner in which staff interpreted assessment requirements. The National Certificate assessment model is criterion-referenced, based in most cases on continuous assessment during the teaching of the module and it assesses students against clearly defined criteria (learning outcomes). It also places considerable emphasis on diagnostic assessment and thus is closely linked to the teaching and learning process as well as providing summative assessment for certification purposes. The Inspectorate found that in some subjects the dominant approach was to teach and then test each learning outcome discretely. Such as 'teach-test' approach led to a fragmented learning experience and sometimes trivialised it. They point to the need to develop assessment approaches that are more sympathetic to the learning process, for example by assessing performance as it occurs in the process of learning or assessing a number of outcomes through one instrument.

The Inspectorate found that the National Certificate had led to the use of a broader range of assessment instruments than before. Assessment in the NC also covered more aspects of student achievement than had the previous system. Staff almost universally used the assessment instrument recommended in the module descriptor so that, in practice, there was national control over the type of assessment instrument used and this ensured that the assessment method was

appropriate. Some weaknesses in assessment were found, for example, lack of weighting of test items and lack of alternative means of obtaining evidence for re-assessment purposes.

### **Changes in the role of teachers and lecturers**

The changes in programme design, guidance, learning, teaching and assessment introduced by the National Certificate have made different demands on lecturers and teachers and altered their role.

The change of emphasis to student-centred, active learning methods means that staff have had to act much more as tutors and 'facilitators' of learning. The NC has also changed professional practice in relation to the planning of teaching. Before the NC staff normally produced a teaching plan in the form of a scheme of work or a set of lecture notes. Under the NC, they have had new demands made on them by the need to develop teaching materials and assessment instruments on the basis of the module descriptor.

But it has probably been their new role in relation to assessment that has caused greatest concern and where staff need most support. Before the National Certificate, examinations were set and assessed externally. Under the National Certificate, lecturers and teachers are responsible for devising the assessment and for carrying it out. This has put staff into a different position in relation to their students and meant they have had to develop new skills. Assessment has been the area where staff have felt most uncertain and in need of support, especially in dealing with the most technical aspects of assessment. But while the changes brought about by the National Certificate implied the need for extensive staff development as a general principle, it was to be implemented within existing resources. This has had a negative impact on staff development and also on the extent to which local authorities have participated in the quality control process. Consequently staff have perhaps not had as much training and support as they needed, especially to cope with their new role in assessment. (Staff attitude to assessment is covered below in 3.5.)

Since the introduction of the National Certificate colleges have generally adopted a more systematic approach to staff development although limited by financial constraints. Most colleges now have staff development programmes run by local staff development tutors with contributions from national agencies. There has also been an increase in nationally and locally produced staff development material to support the work of staff development tutors. Staff development is particularly important since a substantial proportion of further education staff are recruited directly from industry with no teaching qualifications. The induction of new staff has become more common, in some cases induction was introduced in the response to the NC. Most induction is carried out in-house. The Inspectorate found, however, that induction varied widely in scope and quality. Ongoing staff development can consist of in-house programmes, regional programmes as well as attendance at external courses offered by national agencies.

The Scottish School of Further Education is responsible for the only formal teacher qualification course for lecturers in further education (Teaching Qualification, Further Education). Most new staff have to wait several years before going on this course due to education authorities' financial constraints. This course has itself been re-structured because of the National Certificate. The modular timetabling arrangements made it much more difficult for staff to be released for a full term and the course was remodelled to increase the proportion of on-the-job training at staff's own college.

A characteristic of staffing in further education colleges is the high proportion of part-time lecturers. About a fifth of all new staff (that is of those with no previous teaching experience in further education) are employed part-time. They are not eligible to take the Teaching Qualification Further Education course and can sometimes miss out on staff training or have to attend in their own time, ie, unpaid.

In their evaluation of the NC the Inspectorate found that most staff reported a lack of time for staff development activities, particularly for meetings with colleagues. They felt that while staff development tutors play a vital role, they themselves do not receive enough training and the question of more systematic training for staff development tutors needs to be considered. This is particularly important since they believe that most colleges will have to use in-house provision to meet their staff development needs.

The large uptake of modules in secondary schools has had little impact on initial training courses for secondary school teachers: there is only a very limited input about the National Certificate in these courses. The syllabus of the courses is very crowded which is one reason for this. Another part of the explanation probably lies in the perception amongst some teacher training staff that although NC modules are offered in school they are secondary in importance to the mainstream general education provision, and as vocational qualifications do not 'belong' to secondary education.

### **3.4 The influence of different actors on modular programmes**

#### **Content and standards**

The Action Plan set out to establish a modular system that would be more responsive to students and to the needs of industry; this implied changes in the influence of these groups on the vocational education and training system. But as we have already noted there is a potential tension between extending the influence of industry and that of students. While the modular system has allowed student more flexibility in their programmes, it has not increased their influence: the principal actors are still staff in schools and colleges and employers. From the beginning, the issue of students' rights to determine their own modular programmes was never given the same

prominence as other aspects of the Action Plan and subsequent developments have further undermined the extension of student choice and influence, especially in further education.

Earlier in this report the distinction was made between industry's influence on the design and content of individual modules and on the content of modular programmes. It was suggested that, until recently, industry exerted more influence on the construction of programmes than on individual modules. Such influence is not new, before the Action Plan industry groups made agreements with examining bodies about course syllabi and further education colleges had links with employers both informally and through advisory committees. As well as making industry level agreements, the flexibility of the NC system has also enabled individual employers to negotiate special programmes for their own employees. The extent to which firms have been able to take advantage of this has varied, mainly in relation to size: smaller companies have less influence in this respect.

The influence of course organisers in determining programmes has been greatest where the curriculum has not been prescribed by industry. The National Certificate has enabled staff to develop certificated training in occupational areas which previously had none.

The modular system, while offering more flexibility in programme design, has not itself radically changed the relative influence of education and industry on the vocational education and training system. The recent changes to this relationship are the result of government policy which aims to give industry the central role in determining the content and standards of vocational training. Sections 2.3 and 2.5 have outlined the introduction of Scottish Vocational Qualifications (SVQs) which has give industry the responsibility for determining the content and standards of individual NC modules that are to be accredited as SVQs. This has led to concern in the further education sector about its lack of influence in the content and structure of SVQs.

Another strand in the government policy to put industry at the centre of vocational education and training has been the promotion of workbased learning and assessment. The delivery and assessment of NC modules in the workplace is still limited but is likely to grow as SVQs come into operation. Initially there were perhaps unrealistic expectations of the extent to which employers could deliver workplace learning and assessment. There have been several projects on work-based learning which have moved the emphasis to partnerships between further education colleges and employers. Such partnerships might take various forms, for example, in one model college staff might go to students' workplace to assess them whereas in another model they might train the firm's supervisors in assessment. In all of the partnership models some or all of the training takes place in students' place of work. Such partnerships are at an early stage but are likely to increase industry's influence on modular programmes; indeed they are designed to do so.

Discussion has concentrated on the relative influence of further education and industry but recently higher education has started to exert more influence on the modular curriculum. This has largely happened because special courses to give adults access to higher education have been based on NC modules. Higher education has therefore become an end-user of NC modules and Scotvec has to take their needs in account. Higher education has been particularly influential in the design of some of the less occupationally specific modules eg those in the social sciences.

### **Influences on participation**

It was noted in section 3.1 that, while in principle a modular system makes participation easier, in practice participation is largely determined by institutional factors. Participation is influenced in particular by employers' willingness to train their employees. There is little evidence to suggest that a modular system in itself increases employers' willingness to do so; it will be interesting to see whether the current efforts to give industry more influence in the training system will have any impact in this respect. Participation is also influenced by central government policy that gives priority to 16 and 17 year olds in training.

## **3.5 Attitudes and reactions to the modular reforms**

### **Students' reactions**

In general students have responded positively to the National Certificate. It should be remembered, however, that few students in further education would be in a position to compare their experience of NC modules with the previous system of non-advanced further education. In research at CES, we found that a very large majority thought that their modules had been interesting and useful, had given them confidence in their work, been well taught and fitted well together to make a good course. Most also expressed approval of the pedagogy and assessment procedures associated with the modular system. Students enjoyed the more active student-centred teaching which they felt improved their motivation. Students were also generally positive about the NC assessment system. They thought that continuous assessment relieved the pressure of end exams and was a fairer method of assessment; that it provided feedback about progress; gave the opportunity to re-sit assessments; and helped build their confidence. A very small proportion of students were more negative; a few identified a lack of stimulus without the pressure of a final exam while others wondered whether an exam might encourage greater retention of knowledge and skills.

On the less positive side, in our research we found that a substantial proportion of young people thought that their modules had been easy, at least to some extent. In some cases, the reason appeared to be that the learning and assessment methods made the modules seem easy to students used to more traditional methods. But in other cases, some young people seemed to think that some

modules were not sufficiently challenging. Young people in school were most likely to think that their modules had been easy.

Young people taking modules in school were also more inclined than other students to question the status and value of modules compared with the main academic certification available in school (Scottish Certificate of Education). The delivery of vocational NC modules in schools whose major focus is general academic education is one of the marks of the NC's flexibility. But while the provision of NC modules in school offers students the potential to combine academic and vocational qualifications, it is clear that where vocational qualifications are set alongside academic ones, the vocational ones suffer in the comparison and are seen as second best and second class qualifications. A major factor in this is young people's perception that employers and especially higher education prefer traditional academic certification to vocational qualifications, in this instance the NC. In the case of employers the distinction has to be made between their attitude respectively to *school* leavers and *college* leavers with vocational qualifications. In colleges of further education, vocational qualifications via the NC is the norm but schools are still primarily seen as offering general academic education. Therefore, a young person leaving school is expected to have traditional academic certification.

### **Employers' reactions**

The first point that needs to be made is employers' low level of awareness of the system. Market research carried out for Scotvec found that about a quarter of employers did not know about the NC and another quarter felt unable to comment on the system. The highest level of awareness was in large companies (over 100 employees). In general employers are confused about the rapid changes in vocational education and training and do not understand the transition from a traditional norm-referenced approach to the modular, competence-based system. It is hoped that the involvement of employers in determining occupational standards in SVQs will improve their awareness of the changes to the training system. In considering employers' reactions to the NC, we are therefore really talking about the responses of employers who have traditionally used further education colleges on a part-time basis for training or who recruit students from full-time college programmes.

Research on the views of employers found that many approved of the broad learning aims of the NC and were positive about the effects of the NC on learning (SCRE 1991). Only a few employers expressed an extreme 'vocationalist view' of training as limited to directly job-specific learning. But while employers saw the role of colleges as supplying the 'theory' and recognised that this role differed from the role of in-company training, they wanted the theory to be relevant and grounded in practice. The NC was seen as an improvement on the previous system in this respect. Employers also thought that the NC offered greater flexibility in constructing 'tailor-

made' courses and that NC modules are easier to update compared with the time and effort required to revise the previous courses.

On the whole, SCRE found that employers were positive about the NC assessment system. They saw considerable advantages over the previous arrangements, in particular the guarantee that the whole syllabus had been covered. They were reasonably confident that although assessment was internal, a national standard existed and was applied. There was some demand for graded assessment. Although some employers simply wanted to know whether their trainees had passed or failed others, who planned to send their trainees on to more advanced training, wanted some form of grading or merit award to enable them to differentiate between them. There was also some concern about the availability of resit assessments and whether modular programmes of short 'chunks' of work based on continuous assessment offer the same challenge to students as traditional one or two year courses in terms of 'staying power'. Lack of retention of what had been learned was also mentioned by some employers as a problem.

### **Lecturers' reactions**

There has been little research on the attitudes and reactions of teachers in school; most research has concentrated on staff in further education colleges.

In their research on students, staff and employers attitudes to the NC, SCRE found that staff in colleges were both the most vociferous and also the most negative in their reactions. In particular assessment overshadowed their views on other aspects of the NC. But there were differences in staff's responses according to subject discipline, for example, those teaching Caring modules were more in favour of the NC system than other groups and Maths and Electronics staff least well disposed. Consistent differences also emerged between staff in different colleges. These differences would seem to indicate that staff's responses to the NC are determined as much by the administrative, managerial and staff development support they receive as by the intrinsic characteristics of the modular reforms themselves. The researchers also made the point that many of the lecturers' perceptions of the NC were open to challenge. This echoes the findings of the SOED Inspectorate's evaluation of the NC. It seems that various aspects of the NC which are only suggestions or recommendations are seen by lecturers as mandatory. Thus some features that they criticise are, in fact, open to change.

In general staff welcomed the changes that the NC had brought about in teaching and learning. They supported the broad learning aims of the Action Plan. However some staff thought it was inappropriate to expect many of their students to take too much responsibility for their own learning which was felt to be appropriate only for the more mature and self-motivated students. On the whole, lecturers were positive about the changes in teaching methods. Student-centred learning and the teaching techniques implied by it had become an accepted part of the landscape.

But while staff accepted the aims of student-centred learning, they also felt that various factors inhibited its operation in practice: pressures to cover the syllabus within limited time and resources; module descriptors that were too prescriptive; the difficulty of managing individualised learning; and the administrative workload. Nevertheless, they thought that the NC had been successful in introducing a much wider range of teaching methods into normal use than was previously the case.

The researchers found that lecturing staff generally accepted the principle of criterion-referenced assessment; a shift in attitudes from that reported in earlier research on the NC. Staff also identified a number of advantages of continuous assessment, for example ensuring coverage of the syllabus. They thought that the NC had led to the use of a wider variety of assessment methods than had been used before; this was seen as a positive development. Nevertheless, lecturers made some severe criticisms of the assessment system introduced by the NC.

In considering lecturers' reaction to assessment there are several points that need to be made. One is that under the NC, lecturers are much more directly involved in the process of assessment and are therefore much more aware of its imperfections than they were under the previous system of external examinations. A second point is concerned with the amount of staff development that has been available to staff to support them in their new assessment role. This is the area where staff development has perhaps been most required but has not been sufficient.

Lecturers' negative reactions to the assessment introduced by the NC fell into four main areas. One area concerned the pressure that it put on staff, in particular the amount of time spent on the associated paperwork and administration to the detriment of their teaching.

A second area of complaint was that assessment could have adverse effects on student learning: that the assessment system combined with the division of the curriculum into 40 hour 'chunks' encouraged a passive, superficial and short-term approach to learning by students. Although staff thought that continuous assessment had various benefits, many doubted that it was sufficient in itself and wanted the re-introduction of some form of exam to encourage a longer-term approach to learning and greater retention.

Examinations were also seen as a way to overcome the third aspect of staff's criticism of the NC assessment - the lack of differentiation and grading between students; seen by staff as demotivating for the more able students and unhelpful in relation to selection for higher education. But although staff saw the re-introduction of examinations to achieve this, there are other ways of meeting these criticisms, for example differentiated performance criteria for learning outcomes or special additional 'merit' learning outcomes. In the modularisation of its advanced courses, Scotvec has introduced two grades of awards based on differentiated

performance for the same learning outcome although developing the appropriate performance criteria is a difficult process. More generally, a shift of focus from the delivery of individual modules to a more integrated approach which emphasises the 'whole-programme' as discussed in section 3.2 would help to overcome some of the criticisms of a superficial and short-term approach to learning.

The fourth area of lecturers' criticism of the assessment system concerned a lack of confidence in the system of moderation or quality assurance. There was a widespread lack of confidence that clearly understood standards were applied consistently in all colleges. (This opinion was not shared by students or employers.) To a large extent this reflected the fact that teaching staff simply did not know what was happening in other colleges. Nevertheless there was also a feeling that some of the Subject Verifiers responsible for ensuring equal standards were inconsistent in their approach. The Inspectorate evaluation of the NC noted that Scotvec's subject verification system did not always meet the needs and expectations of staff. In particular, it did not provide the reassurance that they were applying national standards. But while some problems in the interpretation of standards were found, the extent of such problems did not justify the low self-confidence of some staff and it should be remembered that employers and students did not agree with staff's views about standards. The Inspectorate identified the development of local quality assurance systems and a higher level of delegated responsibility to colleges for assessment as the way to improve staff's confidence in the system. Greater independence and delegated authority is, in fact, central to Scotvec's new Quality Assurance Programme although it is only in the early stages of implementation.

Overall, the SCRE researchers concluded that while students' and employers' attitudes were more favourable than those held by lecturers, nevertheless, all three groups thought that the modular reform had brought about a significant improvement on the system it was designed to replace.

### **3.6 Other consequences/implications/problems**

Lecturers' complaints about increased administration has already been referred to; modular systems are likely to increase paperwork if records have to be kept on the basis of individual modules rather than on courses. An internally assessed, criterion-referenced assessment system also requires evidence to be generated and kept. But there is another side to the administrative consequences of a modular system, that is the necessity for institutions delivering modules to develop a responsive administrative and student record-keeping system which can keep track of students' progress through their modular programmes. Equally, if users of the system are to get the most out of it, then information about the range of modules available needs to be readily accessible. This need has prompted the development of a computerised guidance information system which contains information about NC modules and modular programmes as well as more general guidance information.



## **CHAPTER 4: CRITERIA OF EFFECTIVENESS**

An obvious starting point in considering how effective a modular approach has been is to look at the original aims and objectives of the modular reforms (see 2.2) and the extent to which they have been achieved. But the aims of modularisation are varied in nature and scope so that it may be useful to consider them on the basis of whether their achievement is subject to external factors or within the control of Scotvec, lecturers and teachers and other 'actors' in the NC system. Some aims, for example, the reform of teaching and learning methods are internal to the NC system and within the power of Scotvec, lecturers, teachers and others involved in the NC to implement. But other aims such as improving participation rates are subject to external factors, for example, employers' willingness to train their employees or government policy on student numbers. While the modular system might make access easier and improve opportunities for transfer it, alone, cannot achieve higher participation. The same applies to some of the other aims set for the NC.

In addition to the aims and objectives that were originally set out for modularisation, there are other criteria that could be used, for example, whether modularisation supports equal opportunities, the impact on teachers and lecturers, for example, in terms of autonomy, professional development, security; the impact of modularisation on institutions, for example, on departmental structures and on the control, deployment and appraisal of staff. The question of the compatibility of the various aims of modularisation is also an area that needs to be taken into account.

Chapter 5 considers the extent to which the NC has succeeded and the issues currently facing it.



## CHAPTER 5: KEY ISSUES

The NC was a radical reform of the Scottish VET system. It has achieved considerable success, not least a generally favourable response from students, employers and, to a lesser extent, from lecturers. But unsurprisingly there are various issues that require attention.

Flexibility is one of the commonly advanced benefits of modularisation and was one of the reasons for the introduction of the NC. Although employers, especially larger companies, believe that the NC offers flexibility in programme design and the opportunity to change the curriculum, there has been considerable pressure from some in industry for mandatory groupings of modules and for group awards. Such a trend raises the question whether the flexibility to devise tailor-made modular programmes is widely recognised and appreciated by employers. If this is so, what are the reasons? Are employers failing to assess their training needs? Is it due to employers' low level of awareness and understanding of the NC? Is it, in practice, too difficult or time-consuming to achieve? Or do we need to re-think some of our assumptions about the value of modular systems' potential flexibility? Do the perceived benefits of set packages of modules outweigh the perceived benefits of customised but varying (and therefore confusing) modular programmes, especially in initial VET. If set groups of modules are seen as the most appropriate approach in initial VET, in particular to ensure a minimum level of occupational competence, is there a danger that such packages of modules will become ossified and the NC become as inflexible as the system of long courses that it replaced?

Related to the issue of flexibility is that of choice and, with the growth of group awards, the issue of student choice. Although students still have more choice than previously, the trend is moving away from student choice, especially for those taking occupationally specific modular programmes. Is genuine student choice a realistic aim or, in the area of vocational education and training will and should, the wishes and needs of industry predominate? Does a lack of choice for students matter if modules are being used for vocational training where it is important that students take modules that are recognised by industry? In addition, there are also issues about the appropriateness of some programmes of modules, in particular, a concern whether they offer a sufficiently broad-based education and training to enable young people to meet ever changing occupational requirements. Lack of student choice certainly undermines another objective of the NC, that of increasing choice for students and giving them more responsibility for their own learning. This raises a basic question about the compatibility of some of the objectives of the NC.

Despite the growing proportion of young people taking modules, especially in school, there are important issues relating to participation and progression. There are still certain industrial sectors where take up of modules is low and generally participation drops off rapidly after the age of 18; there are sharp gender differences in participation and progression, working to the disadvantage

of young women and those with few formal qualifications from school; and progression from NC into higher education is limited. These issues highlight the limitations of modularisation; this point has been made several times in this report, modularisation alone cannot overcome the various social, economic and political factors that shape participation and progression in education and training and which need to be addressed.

The extensive use of NC modules in schools has helped to extend the curriculum beyond the purely academic and to erode the distinction between academic and vocational education but it does raise some critical issues. The NC in school still occupies second place to the traditional academic curriculum and suffers from a second class status. If most young people first encounter NC modules at school, how does this mould their perceptions of the NC and its status and, more generally, their perceptions of vocational education and training? A recent official report on upper secondary school education in Scotland has proposed a radical reform for schools that would establish two separate pathways in the upper years. One path would be based on NC modules and be pre-dominantly vocational in emphasis although with academic elements. The other pathway would be mainly academic in nature but with vocational aspects; it would be the main qualification for entry to higher education. The report sees this approach as the best way to raise the status of vocational education and achieve parity of esteem for academic and vocational qualifications. One of the key questions in terms of the NC is whether these proposals for separate streams will do so, or instead reinforce the academic/vocational division.

A related question is how well equipped are schools to offer modules and especially to offer coherent programmes of modules? The current proposals for reform make this a particularly important question. At the moment it seems that suspicion about the quality of modules taken in school is one factor leading to the repetition of modules in further education. The standing of modules taken in school is critical because a system such as the NC is designed on the principle of a single, national framework based on a common currency. For this system to operate successfully the currency (the NC) must have equal value regardless of the institution where it has been taken. Young people are unlikely to have faith in the NC as a worthwhile qualification if colleges disregard the NCs that they have already achieved.

The NC has led to a major shift in teaching and learning methods from traditional didactic methods towards more active, student-centred approaches. Students and employers have responded positively to this new pedagogy. There are, nevertheless, some problems, in particular the negative impact of some lecturers' interpretation of assessment requirements on the teaching process. Assessment is the aspect of the NC that has attracted the strongest criticism from lecturers. Yet although recent studies found some problems, they concluded that the extent of lecturers' concerns was unwarranted. But it is critical when any new VET system is introduced that everyone concerned is assured that standards are being maintained. Staff in colleges are not

yet convinced that this is the case - even if their concern is not justified. Will Scotvec's new quality assurance system help to increase their confidence?

Programme design is another issue: in particular how to balance the benefits of modules as free-standing units and the benefits of modules delivered in a more integrated way as part of an overall programme. Further education also needs to consider how to design programmes that can respond flexibly to the large and increasing number of students entering further education with modules from school and avoid the duplication of modules that is currently happening.

The introduction of SVQs and GSVQs is undoubtedly changing the NC scene. SVQs in particular mark a shift in the relative influence of education and industry; the government's intention is to increase the influence of industry in vocational education and training. Will industry be able and willing to take on a greater role and what will the effect be, for example, on the curriculum, on programme design and on the delivery of modules?



## **Appendix 1**

### **DESTINATIONS OF SCHOOL LEAVERS**



**Status in spring 1989 of school leavers  
from the previous session by stage  
of leaving (percentages)**

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<b>Stage left: 4<sup>th</sup> year</b>	
full-time higher education	0
full-time further education	9
full-time job	30
Youth Opportunities/ Youth Training	48
unemployed	9
others	5
total	101
<b>Stage left: 5<sup>th</sup> year (winter)</b>	
full-time higher education	0
full-time further education	1
full-time job	40
Youth Opportunities/ Youth Training	44
unemployed	10
others	5
total	100
<b>Stage left: 5<sup>th</sup> year (spring or summer)</b>	
full-time higher education	12
full-time further education	14
full-time job	39
Youth Opportunities/ Youth Training	27
unemployed	4
others	3
total	99
<b>Stage left: 6<sup>th</sup> year</b>	
full-time higher education	52
full-time further education	11
full-time job	25
Youth Opportunities/ Youth Training	2
unemployed	4
others	7
total	101

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## **Appendix 2**

### **THE SCOTTISH EDUCATION AND TRAINING SYSTEM**



## **Appendix 3**

### **INDEX TO THE SCOTVEC CATALOGUE OF MODULES**



# INDEX TO CATALOGUE

## **A BUSINESS AND MANAGEMENT**

- A2 Small/New Businesses
- A3 Management Skills Systems and Techniques
- A4 Human Resources Management
- A5 Financial Management and Accounting
- A6 Marketing Sales and Distribution
- A7 Information and Library Management
- A8 Office and Secretarial Skills
- A9 Public Administration

## **B LAW POLITICS AND ECONOMICS**

- B1 Politics
- B2 Economics
- B3 Law

## **C ARTS CRAFTS AND HOBBIES**

- C1 Fine and Graphic Arts
- C2 Design (Non-Industrial)
- C3 Crafts (General) Collecting and Antiques
- C5 Woodwork and Basketry Crafts
- C7 Glass Ceramics and Stone Crafts
- C8 Fabric Crafts

## **D CULTURE SOCIETY AND EDUCATION**

- D1 Social and Cultural Studies
- D2 Literature
- D5 Religious Studies
- D7 Social and Welfare Work
- D8 Education and Training

## **E LANGUAGE COMMUNICATION AND SELF HELP**

- E2 Career Change
- E3 Self Help and Personal Development
- E4 Communication For and With Disabled People
- E5 Languages and Language Studies
- E6 Communication and Mass Media
- E7 Audio and Visual Media
- E8 Print and Publishing

## **F MUSIC AND PERFORMING ARTS**

- F1 Dance
- F2 Theatre and Dramatic Arts
- F4 Theatre Production
- F5 Music History and Theory
- F9 Music Performance

## **G SPORTS GAMES AND RECREATION**

- G1 Sports Studies and Combined Sports
- G3 Water Sports
- G4 Athletic Gymnastics and Combat Sports
- G6 Winter Sports
- G7 Ball and Related Games
- G8 Country and Animal Sports
- G9 Indoor Games

## **H FOOD CATERING LEISURE TOURISM**

- H1 Hotel and Commercial Catering
- H2 Cooking and food and Drink Preparation
- H3 Home Economics
- H5 Food Manufacture and Distribution
- H6 Tourism Leisure and Arts Management

## **J ENVIRONMENT SECURITY HEALTH AND SAFETY**

- J2 Public Health and Safety
- J3 Cleansing
- J4 Security

## **K AGRICULTURE HORTICULTURE AND ANIMAL CARE**

- K1 Agricultural and Horticultural Studies (General)
- K2 Agricultural Sciences
- K3 Crop Production
- K4 Gardening Floristry and Amenity Horticulture
- K5 Forestry
- K6 Animal Husbandry
- K7 Agricultural Engineering and Farm Machinery
- K8 Agricultural and Horticultural management and Maintenance

## **L SCIENCES AND MATHEMATICS**

- L1 Science and Technology (General)
- L2 Physics
- L3 Chemistry
- L4 Mathematics
- L7 Surveying and Cartography
- L8 Life Sciences

## **M HEALTH AND PERSONAL CARE**

- M1 Health (General) and Health Administration
- M3 Medical Technology and Pharmacology
- M4 Dental Ophthalmic and Audiology Services
- M6 Nursing
- M8 Personal Care Services
- M9 Personal Health Care and Fitness

## **N ARCHITECTURE AND CONSTRUCTION**

- N1 Architecture
- N2 Planning
- N3 Building Construction Studies: General
- N4 Construction and Property management
- N5 Building and Construction Operations
- N6 Wood and Woodworking
- N7 Construction Site Practice
- N8 Civil Engineering
- N9 Structural Engineering

## **P COMPUTERS ELECTRICAL AND ELECTRONIC ENGINEERING**

- P1 Electrical Engineering
- P2 Electronic Engineering
- P3 Control Engineering
- P4 Computer Systems and Software Engineering
- P5 Information Technology/Computer Applications

## **R ENGINEERING PRODUCTION AND INDUSTRIAL DESIGN**

- R2 Engineering Systems and Services
- R3 Production Management/Quality and Reliability
- R4 Industrial Design
- R5 Engineering and Plant Safety
- R6 Production Process Work
- R7 Testing Measurement and Precision Engineering
- R8 Mechanical Engineering

## **S MINERALS MATERIALS AND FABRICS**

- S1 Mining Oil and Minerals Technology
- S2 Materials Engineering and Technology
- S4 Textiles Fashion and Furnishings
- S6 Furniture Manufacture
- S7 Paper and Board

## **T TRANSPORT SERVICES AND VEHICLE ENGINEERING**

- T2 Aviation
- T3 Marine and Waterway Transport
- T8 Vehicle Maintenance and Repair
- T9 Vehicle Manufacture and Sales



## **Appendix 4**

### **STRUCTURE OF A NATIONAL CERTIFICATE MODULE DESCRIPTOR**



## STRUCTURE OF MODULE DESCRIPTORS

Module Descriptors have been designed as Curricular Frameworks consisting of eight sectors:-

<b>REFERENCE NUMBER and DATE</b>	to ensure that the correct module descriptor is being used.
<b>TITLE</b>	to give a clear idea of what the module is about.
<b>PURPOSE</b>	to give a clear guide of the general changes in the learner which are to be brought about. An explanation is given of the uses for which the module was designed and the ways in which it can best be used and any limitations on its use or recognition.
<b>PREFERRED ENTRY LEVEL</b>	to show the level of previous achievement without which it is likely that a student will have difficulty in successfully completing the module.
<b>LEARNING OUTCOMES</b>	to specify clearly the key competences which are to be accredited. <b>These cannot be changed.</b>
<b>CONTENT/CONTEXT</b>	to give an indication to tutors of the range of contexts within which a module could be offered and the subject matter which would assist in the achievement of the Learning Outcomes.
<b>LEARNING AND TEACHING APPROACHES</b>	to suggest learning strategies which enable the Learning Outcomes to be achieved in as student-centred, participative and practical a way as possible.
<b>ASSESSMENT PROCEDURES</b>	to suggest the most appropriate way in which the Learning Outcomes can be assessed and to specify the required standards of student performance. <b>Recommended Assessment Procedures may not be altered without prior approval of the Council.</b>



## **Appendix 5**

### **EXAMPLE OF A NATIONAL CERTIFICATE MODULE DESCRIPTOR**



SCOTTISH VOCATIONAL EDUCATION COUNCIL

Hanover House  
24 Douglas Street  
GLASGOW G2 7NG

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NATIONAL CERTIFICATE MODULE DESCRIPTOR

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Ref No.                      84693    Session 1988-  
89

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Title COMPUTER AIDED DRAUGHTING AND CNC MANUFACTURING PROJECT  
(X2)

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Purpose This module is designed to reinforce the knowledge and skill elements of a range of computer aided engineering modules by converting a design specification into a manufactured product.

The module is particularly appropriate to mechanical engineering technicians following a two year CAD/CAM illustrative scheme. It would also be appropriate for those with only CNC setting and operating or computer aided draughting experience who wished to develop their knowledge and skills.

Typically, this module would be taken in parallel with a programme of modules which could include: 74694 CNC Part Programming 2, 74697 CNC Machining 2, 74811 Computer Aided Draughting (CAD).

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Preferred                      74807 Introduction to Computer Aided Draughting  
Entry Level                      74698 CNC Part Programming

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Learning                      The student should:  
Outcomes

1. translate a given design specification into drawings on a CAD system;
2. write manual part programmes;
3. manufacture components;
4. synthesise the project activity elements.

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Content/Safety regulations and safe working practices and Contextprocedures should be observed at all times.

Corresponding to Learning Outcomes 1-4:

- 1.The computer system could either be micro or mainframe based. The CAD software should be of an appropriate industrial standard, eg. AUTOCAD, DAXCAD, GDS, DOGS, or other suitable software package. The design specification should translate into an assembly drawing of not less than three components with functional fits. The individual components should have rotational, prismatic and drilled features. Manufacturing component drawings should be prepared with regard to the appropriate British Standards, eg., BS308, BS4500.
- 2.The completion of a process planning sheet for each assembly component. This should involve establishing the sequence of operations to achieve the cutter path and ensure collision free operation, minimise tool and workholding changes, selecting speeds, feeds and depths of cut; selecting ISO tooling - shape and grade; selecting the work locating and clamping devices. Manual part programmes should be written for each component part. The creation of the part programme could involve the use of software for the graphical simulation of the cutter or tool path.
- 3.For each operation the CNC machine tool should be set up with tooling and work holding devices as required by the process planned sheet. The part programme should be entered or downloaded into the machine tool controller and proved by dry running. It should be noted that the part programme could be proved by simulation off the machine tool. The part programme should be edited and procedures modified as required. The required components should be produced, inspected and compared against the design specification. Appropriate inspection/metrology equipment should be used. Any deviations from the design quality requirements should be recorded and appropriate action taken.
- 4.At the start of the project an explanation should be given of the following: aims and objectives; scope and constraints; procedures to be observed; roles of student

and project tutor; sources of information; pro formas and documentation; standards required; assessment procedures. A diary of events, decisions taken hard copies of pro formas and documentation should be kept. This will assist in the production of the project report.

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Suggested Learning and Teaching Approaches encouraged as this

Formal lectures and demonstrations should not be a feature of this module. The student should be encouraged to reach a personal solution to any problem arising. Discussion between students should be encouraged as this will develop interpersonal, social and life skills.

The tutor should adopt a supervisory role except in aspects of health and safety. Easy access should be made available to a CAD work station, CNC machine tools, basic materials, inspection/metrology equipment and reference materials to enable the student to have a minimum 80% of the module time as "hands on" experience.

In addition to the need for the student to be aware of his/her responsibility for personal health and safety, it is important that the student is aware of his/her responsibility for the safe use of the machine tools and equipment used.

Assessment satisfactory Procedures achieved

Acceptable performance in the module will be achieved if all the performance criteria specified for each Learning Outcome.

The following abbreviations are used below:

LO Learning Outcome  
 PC Performance Criteria  
 IA Instrument of Assessment

L01TRANSLATE A GIVEN DESIGN SPECIFICATION INTO DRAWINGS ON A CAD SYSTEM

PC The student:

(a) produces an assembly drawing to BS308 and BS4500 specifications using the CAD system;  
 (b) prepares manufacturing component drawings to BS308 and BS4500 specifications using a CAD system.

L02 WRITE MANUAL PART PROGRAMMES

PC The student:

(a) plan the sequence of operations and manufacturing data to produce each component;

(b) writes a manual part programme for each component.

L03

MANUFACTURE COMPONENTS

PC The student:

(a) enters the part programme;  
(b) sets up the CNC machine tool;  
(c) produces, inspects and assembles the components.

## LO's 1,2,3      IA    Project

The student will be presented with a design specification that should translate into an assembly drawing of not less than three components with functional fits. The individual components to have rotational, prismatic and drilled features.

The student will have access to a CAD system, CNC machine tools, cutting tools and equipment, raw materials and inspection/metrology equipment. The task is to produce an assembly of not less than three component parts. The project activity will test the application of CAD and CNC machining manual part programming knowledge and skills in an integrative way.

Satisfactory achievement of Learning Outcome 1 will be demonstrated by the student producing a hard copy of all drawings using the CAD system and ensuring that the information on the drawings meets the design specifications.

Satisfactory achievement of Learning Outcome 2 will be demonstrated by the student producing a hard copy of the following items:

- (a) process planning sheets indicating the sequence of operations, speed, feeds and depths of cut, ISO tooling, work locating and work clamping devices;
- (b) part programmes for the CNC operations which will produce the required shape or feature on the component and ensure collision free operation of the cutter or tool.

Satisfactory achievement of Learning Outcome 3 will be demonstrated by the student producing components using the CAD machine tool to the required quality standard specified in the manufacturing component drawings.

## L04                      SYNTHESISE THE PROJECT ACTIVITY ELEMENTS

PC    The student:

- (a) composes written material to record all project activities, decisions made and action taken;
- (b) organises written material, planning sheets, part programmes and drawings into a structured format.

## IA Project Report

The student submits a project report which synthesises the project activity elements.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student submitting a project report containing all items on the following checklist.

## CHECKLIST

1. The design specification
2. Statement of the definition of the problem
3. A time schedule for the project activity elements considered drawings
4. Description of alternative solutions
5. All planning sheets, part programmes and drawings
6. A structured format
7. Descriptions and information which are neatly written and legible
8. Sources of reference identified



## **Appendix 6**

### **THE PETRA RESEARCH PARTNERSHIP**



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## REFERENCES

- Black H, Hall J, Yates J (1988) *Assessing Modules: Staff Perceptions of Assessment for the National Certificate*. Scottish Council for Research in Education, Edinburgh.
- Black H, Hall J, Martin S (1991) "Modules: Teaching, Learning and Assessment: The Views of Students, Staff and Employers Involved in the National Certificate". Scottish Council for Research in Education, Edinburgh.
- Clarke S (forthcoming 1992) *Scottish Outcomes, The Changing Role of Vocational Education and Training in Scotland*. OECD.
- Croxford L, Howieson C, Raffe D (1991) *Young People's Experience of National Certificate Modules*. Centre for Educational Sociology, University of Edinburgh.
- Hart J, Roger A, Mulvie A, Munn P (1987) *Managing Modules: Guidance and Choice in Further Education Colleges*. Scottish Council for Research in Education, Edinburgh.
- Howieson C, Croxford L, Raffe D (1990) *After the Action: Young People's Reactions to the National Certificate*. Centre for Educational Sociology, University of Edinburgh.
- Raffe D (1988) 'Modules and the strategy of institutional versatility: The first two years of the 16-plus Action Plan in Scotland'. In D.Raffe (ed.) *Education and the Youth Labour Market*. Falmer, Lewes.
- Scottish Education Department (1979) *16-18s in Scotland: The First Two Years of Post-Compulsory Education*. SED, Edinburgh.
- Scottish Education Department (1983) *16-18s in Scotland: An Action Plan*. SED, Edinburgh.
- Scottish Office Education Department (1991a) *The National Certificate 1989-90*. Statistical Bulletin No. Edn. F5/1991/15. SOED, Edinburgh.
- Scottish Office Education Department (1991b) *Six Years On: Teaching, Learning and Assessment in National Certificate Programmes in Scottish Further Education Colleges*. HMSO, Edinburgh.
- Scottish Vocational Education Council (1988) *Credit Where Credit's Due*. The Report of the Accreditation of Work-Based Learning Project. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1989) *Advanced Courses Development Programme*. A Policy Paper. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (Oct 1989) *Open Learning in the National Certificate*. Research and Development Update No. 9. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1990) *Survey of Employers' Attitudes to Vocational Education*. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (Jan 1990) *New Certification Policy*. Awards Framework Update No. 12. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (Mar 1990) *Accreditation of Prior Learning*. Research and Development Update No. 13. SCOTVEC, Glasgow.

- Scottish Vocational Education Council (Jun 1990) *Assessment in the Workplace*. Research and Development Update No. 16. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1991) *General Scottish Vocational Qualifications*. A Consultative Paper. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1991) *Guide to Scotvec Procedures*. 1<sup>st</sup> edition. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1991) *Quality Framework*. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1991) "No Lead Body is an Island". Paper presented to the CBI conference: *Leading Standards Forward: National Qualifications and Standards*. Dec 1991 by T McCool, Chief Executive, SCOTVEC.
- Scottish Vocational Education Council (1992) *A Guide to Training Partnerships*. SCOTVEC, Glasgow.
- Scottish Vocational Education Council (1992) "The Scottish Action Plan - Past, Present and Future. Paper presented to the conference *Qualifications for the 21<sup>st</sup> Century*. New Zealand, Jan 1992 by T McCool, Chief Executive, SCOTVEC.
- Taylor D, Clarke S, Ford I, Gray E (1986) *Articulation between Employer Demands and Modular Vocational Provision*. Report No. 1. SED funded Research Project on the Articulation of the 16+ Development Programme. School of Further Education, Jordanhill College, Glasgow.
- Taylor D, *et al.* (1986) *Student Perception of the Articulation of their Modular Vocational Provision and their Work Experience*. Report No. 2. SED funded Research Project on the Articulation of the 16+ Development Programme. School of Further Education, Jordanhill College, Glasgow.

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