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Timetabling and Space Consultants

Types of modular courses and their timetabling implications

An automatic scheduling system produces student, staff and room timetables as the result of a single integrated process. It is possible to accommodate all timetabling requirements regardless of their complexity. One university has scheduled 30,000 individual student timetables based on a free choice modular scheme extending across the entire institution.

The modification of a scheduling system provides the basis for an important management tool. The development of appropriate algorithms enables the modelling of curriculum innovations or estate scenarios based on feasible student, staff and room timetables. Timetables represent predicted space needs. The use of timetable data for planning purposes must always be proceeded by a survey of actual space utilisation.

The software that forms the heart of the modelling system is ideally suited to the planning of flexible modular programmes. The ability of the software to support the provision of complex course designs is a major strength that should prove of increasing importance.

1. A number of factors ensure that the introduction of modular courses will continue to be a distinctive feature of contemporary developments in colleges and universities.

1.1 It is essential that institutions are responsive to the varying needs of their students and the wider community at a time of rapid technical, social and economic change. Modular course structures provide the flexibility to organise previously separate subject elements into new study programmes. For example, subjects such as physics and accounting that have traditionally been unrelated could readily become important elements in a study programme based on the theme of energy production and conservation. Similarly law and chemistry may be an appropriate combination relating to waste management, recycling and disposal.

1.2 Modular course structures enables institutions to organise previously separate subject elements into new study programmes. The ability of institutions to be responsive to new needs is essential at a time of rapid technical, social and economic change.

1.3 Specialist courses involving small groups of students are often not financially viable. The provision of such courses can become economic when they form part of a modular course structure.

1.4 Students can enjoy the opportunity of selecting a study programme that reflects personal interest and ambitions within a modular course structure. The ability to cater for the needs of individual students clearly offers institutions considerable marketing advantages.

The ability to improve the level of student recruitment and the income of an institution must, however, be balanced against the costs associated with the provision of student choice. The aim of this paper is to classify types of modular courses and to explore the resource implications of modular course designs.

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2. Co-ordinated timetabling enables an acceptable compromise to be achieved that balances the interest of courses and departments against the need to maximise space utilisation for the benefit of institutions.

2.1 General teaching spaces suitable for use by a variety of courses can be prioritised to ensure that the activities of course teams and their students are focused in defined areas of a campus.

2.2 Specialist space can continue to be owned by departments. Traditionally the ownership of rooms has been regarded as synonymous with the control, or timetabling, of the spaces. Central timetabling involves the co-ordinated use of all space in the interests of the cost effective use of resources. The strategy, therefore, qualifies the ability of teaching staff to choose the precise time and location of every class, but options are within constraints the staff have agreed as appropriate.

2.3 The ownership of space remains subject to the policies of an institution. Space costs can be calculated using the system and this helps heads of departments and senior managers to review the specialist space requirements in relation to income from course fees and research.

The software combines the best features of established timetabling systems with an approach that facilitates effective space utilisation and research.

3. Types of modular courses

Discussions with colleagues in many colleges and universities generate insights into the principles of course designs and timetabling procedures. The following classification of modular courses is used to describe the ability of the software to support the scheduling of modular programmes.

3.1 Credit modules

Courses are divided into subsections equivalent to the duration of standard modules but their delivery does not conform to the timetable template used to support an extended modular scheme. The attractions of such a course design are that it:

3.1.1 is consistent with the credit accumulation system associated with a modular scheme;

3.1.2 establishes a degree of convergence which may eventually result in the course being integrated into a full modular programme.

As the primary aim is to facilitate credit accumulation rather than student choice the timetabling implications for this type of course are generally limited.

3.2 Slot modules

Courses may involve periods within the week, term or semester that are reserved for optional modules. Student choice is defined by the slot mechanism. Students establish combinations of modules by selecting from the list of study units available in each of the relevant slots. The range of available combinations is widened by increasing the number of slots or providing a given module in several slots. This type of modular course offers a number of advantages.

3.2.1 Academic staff can guide student choice on the basis of subject combinations considered to offer the greatest vocational value or intellectual coherence.

3.2.2 The slot system is readily understood by staff and students and the constraints placed on choice by timetabling requirements are known and accepted prior to the commencement of a course.

3.2.3 The planning of possible combinations of modules can help to ensure that course groups are a viable size and can be accommodated.

This type of modular course provides limited opportunities for improvements in space utilisation. A problem may arise regarding specialist accommodation, such as lecture theatres, laboratories or studios which may be simultaneously required by a variety of course modules.

3.3 Choice modules

This type of study can be considered under two sub headings.

3.3.1 Free choice modules

Students are allowed to choose freely between available modules. The modules forming elements in popular combinations of subjects are timetabled in different slots. Conversely, modules that form part of infrequently selected combinations are placed in identical slots.

The aim is to ensure that the combinations of modules that cannot be timetabled affect the smallest possible number of students. The largest possible number of students are provided with a study programme involving their first choice of modules.

A consequence of offering a wide choice of modules is that it cannot be guaranteed that all combinations of choice are possible. The aim is to ensure that the largest possible number of students is provided with a study programme involving their first choice of modules. The converse is also true that the combinations of modules that cannot be timetabled affect the smallest possible number of students.

3.3.2 Guided choice modules

Student choice is constrained by selected combinations of modules not being allowed on the basis of established practice or educational principles. An important feature of guided choice modules is that they may be of different lengths. As a result this type of modular course makes additional demands on a timetabling system.

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4. The resource implication of modular courses

4.1 Student choice and required course time

In a traditional type of study programme involving no student choice, the **timetabled course hours** are equal to **student contact hours**. In contrast, on a modular course the number of timetable hours are normally greater that the class hours of any individual student. The greater amount of timetabled time normally associated with a modular course reflects the nature of the options comprising a flexible study programme.

A modular course generally consists of a combination of the following elements:

4.1.1 core modules which are not optional and are studied by all students;

4.1.2 choice modules which represent one or more units of study selected from a number of possibilities.

A modular course may involve modules of a fixed or variable length. A further factor to be considered is that modules generally involve both once only and repeated activities. These modular course elements have significant timetabling implications.

4.2 A course with modules of fixed length and no repeated activities illustrates most clearly the consequences of increased student choice for timetable course hours.

Courses	Core hours	Choice 1	Choice 2	Total hours
A	20	no choice	no choice	20
B	10	1 from 3 5 hrs	1 from 3 5 hrs	20
C	5	1 from 6 5 hrs	5 from 6 30 hrs	35
D	5	any 3 from 12 60 hours		65

4.3 The following observations based on the illustration help to identify some of the consequences of offering student choice within modular courses.

4.3.1 The **student contact hours** are, in every course, the same and represent four 5 hour modules of timetable time. The increase in **timetable course hours** is a direct consequence of extending student choice. It is apparent that even a modest degree of choice such as any 3 from 12 modules involves scheduling classes for five twelve hour days and for part of the weekend.

4.3.2 The guiding of student choice by requiring the selection of options from clusters of modules represents a strategy which offers choice within acceptable timetable course hours.

4.3.3 Students must be able to plan ahead regarding their choice of modules. A consequence of this requirement is that modular courses should evolve slowly so that students do not find themselves trapped by previous choice patterns. Conversely the cancellation of modules due to low enrolments should be considered a last resort. Surveys of planned choices can be a useful guide to developing modular structures.

It has recently been reported by students attending the University of Greenwich that options selected on their applications are not available when commencing their degrees. This situation can accompany the lack of long term planning for modular degree studies.

The use of barcode reader has been developed to support the rapid input of module combinations chosen by individual students. The data is subjected to conflict analysis and the results used to provide module combinations and the creation of individual timetables.

5. Research and administrative responsibilities can be supported by the system

The pursuit of research is generally considered to be an essential element of staff responsibilities in higher education. The system can provide favourable working conditions conducive to study by scheduling days or half days uninterrupted by teaching responsibilities.

The need for staff to be allocated time for administration, staff development and regular meetings can be addressed by the system. Such facilities assist the smooth operation of departments, schools and entire institutions.

Stellae has extensive experience of planning and timetabling long term modular study programmes. The consultancy can ensure the provision of viable modular schemes. The nature of the potential choice available to students is controlled by the duration of core and optional modules. The design of a modular course is primarily shaped by the available timetable hours comprising the teaching week.

Institutions need to see improvements in space management as an opportunity, not a threat. A smaller and better-designed estate, better matched to users' needs, can considerably enhance the success of an institution, both in terms of student achievements and research activities.