MODULE FOUR

UNIT TWO

Timetabling

Introduction

Timetabling is the method by which the curriculum is brought to the pupils. The head of a school has a number of resources at his or her command - teachers, teaching areas, finance and time. A timetable is the means by which these resources are marshalled to provide the greatest possible educational opportunities and alternatives for pupils in the most cost-effective manner. In the developing world the emphasis on cost-effectiveness cannot be overstated. The more efficiently resources are utilised the better the education for the greater number of children. Decisions expressed by the timetable affect the entire school population and reflect the educational programme and philosophy of the school.

Individual study time : 3 hours

Learning outcomes

By the end of this unit you should be able to:
• have a basic understanding of timetable construction
• appreciate the timetable as a device enabling better education
• realise the amount of time and complexity of thought that goes into the production of a good timetable
• recognise the limits and constraints of a timetable
• comply with the period allocations prescribed by the Ministry of Education
• be aware of the need to :
- make full use of all teaching and specialist areas in the school;
- ensure the workloads of all teachers comply with ministry requirements;
- allow for immediate changes to meet emergency situations;
- give pupils a choice of optional subjects to fit their career prospects.

Principles and constraints of timetable design

Let us first of all identify some of the principles upon which you should base your timetable design.

1 In essence a timetable should be pupil-centred to maximise learning opportunities: arranged with a variety of activities, with subjects spaced to sustain the children's interests and motivation, and taking into account age, concentration span, ability range, single grouping, class sizes and pupil career ambitions.

2 The best and most efficient deployment of teachers can be achieved if:
• the teaching establishment of the school has been correctly determined
• all the subjects are fully covered
• there is a staffing equilibrium in terms of experience, sex and age
• the frequency of transfer of teachers is minimised
• teaching loads are balanced across the timetable.

3 The pupil capacity of a school is controlled by its buildings; as far as possible all teaching stations should be fully utilised. An important decision has to be made whether teachers move from teaching area to teaching area, whether pupils move, or whether both move.
4 Emergencies will lead to timetable adjustment. A good timetable should be flexible, allowing adjustments to be made with the minimum disruption to school life.
5 Allowance has to be made within the timetable organisation, including non-teaching time for:
• pupil registration, assemblies, time between periods to change books and materials, pupil guidance and welfare
• staff development including departmental meetings, staff meetings and in-service workshops.
6 Staff should be deployed vertically and horizontally across the timetable; this means that teachers should teach at different levels and not just be allocated completing or beginning classes.
7 Teachers should be timetabled to teach the subjects in which they are trained.
8 There should be a balance in the timetable in the sense that not too many double periods or practical subjects should follow one after the other.

Constraints
The following are some of the factors which will limit your freedom in your design of the school timetable.

Time: 'Restricted time' is time determined by ministry policies over which the head has no control, for example, the number of periods per day, the number of periods per subject, the length of a period, and the time of school broadcasts.
'Disposable time' is controlled by the school and reflected in the timetable,such as when a subject is taught, when registration occurs, the length of formal study time, the allocation of non-teaching time, and the use of double, single or triple periods.

Teacher availability: This can seriously affect a timetable, determining class sizes, subject choice and the quality of education offered.

School buildings: The design, type and number of these directly affects the timetable in the number and variety of subjects offered, the number of classes, the size of classes, the size of the school, the quality of study opportunity, library access and usage, and teacher/pupil ratios.

Traditional attitudes: These can militate against the innovative use of resources which would add to the school's efficiency, such as how the school hall is used, and the time of

registration and assembly.

Lack of public utilities: This can restrict the timetable, for example, no electricity can mean no evening work; a lack of water can affect Art, Science, Agriculture and Home Economics.

The timing of the school day: This is related to the size of the school's catchment area. The greater the walking distance for pupils the shorter the school day.

Adhering to the timetable: If teachers do not adhere to the timetable this will reduce its effectiveness as the framework for planning the time available for learning.

In this unit we consider timetabling only for formal lessons in primary, junior secondary and senior secondary schools. As the degree of timetabling complexity differs for the various levels of primary and secondary education, it is better to consider each level separately.

Timetable preparation in primary schools
Under normal circumstances there is one classroom or teaching area, and one teacher for each class.

It is quite common in lower classes for teachers to draw up the timetable themselves, adopting a flexible approach to the day's activities, whereas in the remaining classes teachers follow a formal timetable.

Step 1: Collect and have available all relevant ministry directives on time and subject allocations. It is important to ensure that the timetable meets all the requirements of these directives.

Step 2 : List all the teaching areas in your school.
classrooms
science room
library
hall
playing fields
garden
other spaces

How many classes may be accommodated in your school at one time? You should note that a class working for a period of time in the school garden, or on the playing field may be regarded as accommodated for that period. However, the extent to which it is necessary to plan with such attention to the full use of every space will depend upon the pressure of numbers of pupils.

Step 3: How many class teachers are on your establishment? Allocate teachers and classes to classrooms or teaching spaces.

Step 4: Special education teachers, if available, will have to be timetabled separately to serve the needs of pupils with special needs whilst they are part of a class. Individual class timetables will have to be consulted and possibly adjusted to remove clashes.

Responsibilities of the head
In the lower classes of primary schools timetabling is often an integral part of the classroom teachers' duties. The head approves the timetable and then prepares the general timetable for the school.

The overall responsibilities of the head are to ensure that :
• government directives and policies are complied with
• each teacher makes the fullest use of school resources
• clashes between individual teacher's timetabling demands are resolved amicably and fairly
• special education teachers are used appropriately.

Double session primary schools
Double session arrangements occur where the number of pupils in a school catchment area exceeds its pupil capacity. It is therefore necessary to maximise the use of the physical plant and facilities by operating the school in two sessions. As many primary schools do not have electricity, the time when the school can operate is determined by the daylight hours. The first session usually begins at 07.00 hours and continues till 12.00; the second session is from 12.30 to 17.30. In some primary schools the two sessions overlap. Two sessions do not mean two schools; one head is in charge of the school for both sessions. Opportunities for co-curricular activities are reduced, but can exist for each session provided there is a timetabling plan to make use of the recreational and game facilities, the school garden and library. Without such timetables (one for each session) classroom instruction and learning will remain the sole means of education and many of the wider values of schooling will be lost.

Timetable preparation in secondary schools
A secondary school timetable consists of three major components which in themselves can be the bases of separate timetables, namely: teachers, classes or teaching groups, and rooms.

Step 1: List the number of teaching areas in the school.

	Number	Limiting factors
classrooms		
laboratories		
workshops		
outdoor teaching areas		
gymnasium		
library		
(if classes are held there)		
school garden		
school hall		

Step 2: Note any limiting factors: the teaching space can only accommodate half a class, cannot be used for academic work or examinations, or can only be used for certain types of lesson.

Step 3: List the number of teaching subjects and identify each as either 'core' or 'optional'.

A core subject is one which all pupils must study; an optional subject is one which a pupil can opt to study.

SUBJECT	CORE	OPTIONAL

Step 4: Ensure that the time allotments prescribed by the Ministry of Education are adhered to. Perhaps the most common pattern is 40 minute teaching periods, an eight period day, and a five day week with each covering 40 periods a week. What are the equivalent standards set in your school?

Step 5: List your teachers by name and subject. Include the classes to be covered and the expected teaching loads. Note any teacher shortages or surpluses.

NAME	TEACHING SUBJECTS		CLASSES	LOAD
	SUBJECT 1	SUBJECT 2		

Areas with teacher shortages :
surpluses :

Step 6: Collect data on pupil preference in optional subjects, and modify in terms of step 5 above.

PUPIL'S NAME	OPTIONAL SUBJECTS AVAILABLE								
	ENG LIT	GEOG	HIST	D & T	HE	AGRIC	COMM	ART	RE

(Note: D & T = Design and Technology; HE = Home Economics; RE = Religious Education)

If Geography is the most popular subject and Commerce the least popular, are there enough teachers of Geography? If not, some pupils opting for Geography will have to be encouraged to choose Commerce instead. Are there sufficient pupils to make up a class of D & T? (Remember in some subjects, such as D & T, usually half the normal sized class can be accommodated at one time.)

Step 7: Using the above information adjust your optional subject programme to ease the teacher shortage if this is possible. If not, there are alternative methods which could be used to ensure as many options are available as possible. For example, you could reduce the number of weekly teaching periods.

Suggest two other ways you could ensure a broad optional subject programme.

Step 8: Meet subject department heads to find their timetabling needs with regard to:
• preferred teaching time during the day
• subject weekly timetable distribution
• single, double, or triple periods
• study time requirements
• departmental meeting time requirements.

Remember to involve all the teachers in timetable compilation whenever possible.

Step 9: Identify the amount of non-teaching time which should be timetabled,to allow for registration or extended registration, for student welfare and guidance, for assemblies and for meals.

Timetable compilation in junior secondary schools
In a number of countries there are differences between junior and senior secondary curricular provisions and so we need to consider each level separately here.

In some countries the junior secondary programme takes place in schools specifically designed and built for this level of education. Each school has a standard number of buildings determined by the size of the school pupil population, and a common academic programme over two or three years which is set by the Ministry of Education, and which is completed by the Junior Certificate examination.

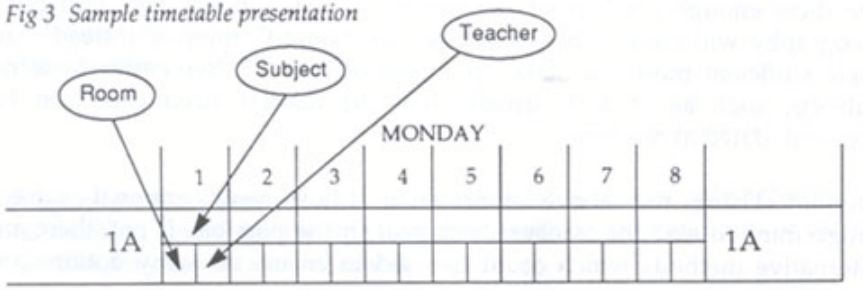
A major difference between schools is in staffing. Some teachers are qualified to teach two subjects, others are not. The permutation of teaching subjects offered often varies a lot and this distinguishes one junior secondary school from the next.

Step 1: Complete the nine steps outlined in the section on 'Timetable preparation in secondary schools'.

S**tep 2:** There are several ways of presenting a timetable, for example a large sheet of paper using colour coding, magnetic board, peg board, pin board. Choose the most convenient way for your situation.

Study the sample shown in Fig 3.

Fig 3 Sample timetable presentation



A margin along the left hand side is left for the name of each class. On each line, each column has space for three entries, namely, 'subject', 'room' and 'teacher'. All this information is essential. The teacher timetables and room timetables should be compiled simultaneously.

Note that the sample given in Fig 3 is limited in that it can only be used for a weekly, five day timetable. No allowance is made for six, seven or eight day timetables preferred by some heads. Comments on this type of timetable are made later in this unit. See page 18.

Step 3 : Determine the order in which information is going to be entered on the timetable. Priorities will be decided by demand. If there is great demand on specialist teaching facilities, then the subjects, teachers and classes using these rooms should be entered first.

Case study
A school has two science rooms and 18 classes, with each class having six periods of science in the form of three double periods a week.

The school operates a 40 period per week timetable.
With two rooms this means 80 periods a week can be taught in the science rooms each week.

But there are 18 classes, each of which has six periods of science a week. So the total demand on the science rooms is:
18 classes x 6 periods a week = 108 science periods a week.

(1) If the science rooms are fully utilised how many science periods will have to be taught in non-science rooms?
(2) If a double period was added to the timetable every afternoon would this solve the problem?
(3) Which classes should receive priority for accommodation in the science rooms?

You should now see the reason for timetabling subjects with specialist rooms and a large number of periods, such as science, before any other subject.

Step 4: If the school is just opening, or for some reason its facilities are under-utilised, then it might be best to timetable first a teacher teaching two subjects, or a subject which has the greatest number of teaching periods.

Step 5: Work across the timetable entering three pieces of information at the same time : 'subject', 'teacher' and 'room'.

Do not try to complete one day and then move onto the next - such an approach will lead to chaos!

Step 6: After entering a subject across the timetable, check teacher and room timetables to ensure that all the information matches.

Step 7: In making entries think both laterally and vertically so that the final entries will cause fewer problems.

Timetable compilation in senior secondary schools
The senior secondary course is usually either a two or three year programme. In a three year programme the first year could be an exploratory year in which pupils are introduced to a wide spectrum of subjects in order to identify interests, aptitudes and abilities which can then be translated into subjects to be studied during the last two years.

A typical first year programme, on a 40 period cycle, may be built up of English (Language and Literature) 8, Mathematics 6, African Language 5, Science 6, History 3, Geography 3, Careers/Guidance 2, Agriculture 3, and Technical/Home Economics/Art 4.

The element of subject rotation arises in Technical/Art/Home Economics where rotation between these subjects may take place to enable pupils to experience each subject and decide (with guidance) which subject to study in depth. Rotation may take place throughout the course or for a limited period of time in the first few weeks in these particular subject areas.

At the end of the first year, pupils, with guidance, opt for the Certificate subjects they will study. Pupil choice, within the other parameters we have identified, will help to determine the character of the timetable.

In a two year senior secondary school programme pupils enter the final stage of their secondary course immediately. Subject choice would then be governed by:
• leaving results from the junior secondary school
• external examination requirements
• local regulations (for example, in Botswana students should offer Setswana, a Science and Mathematics)

• availability of staff and specialist rooms
• pupil aptitude and interests.

The time frame

Length of periods

The 40 minute period fits well with recent research that the attention span of the average secondary pupil begins to decline after 30/40 minutes. Double periods of 80 minutes reduce the amount of work for timetablers but their desirability must be carefully considered, taking into account the amount of project and practical work in a subject. Multiple periods suit practical subjects but create problems when dealing with option blocks.

Length of day / number of periods per day

Usually the morning hours are timetabled for teaching and learning with the afternoons devoted to individual study and co-curricular activities. Climatic conditions are a major factor in deciding this arrangement. Eight 40 minute periods fit well into the morning session beginning at 07.00 and ending at approximately 13.00, depending on the number and length of intervals. However, a timetable based on nine 35 minute periods gives greater flexibility for the timetabler.

Length cycle

Instead of the conventional five day week, it is possible to have six, seven or eight day weeks, an arrangement which gives more flexibility in subject/period allocations, and also means that teachers/pupils are not tied to a particular subject for Fridays and Mondays throughout the term or year.

Timetabling devices for alternative pupil grouping

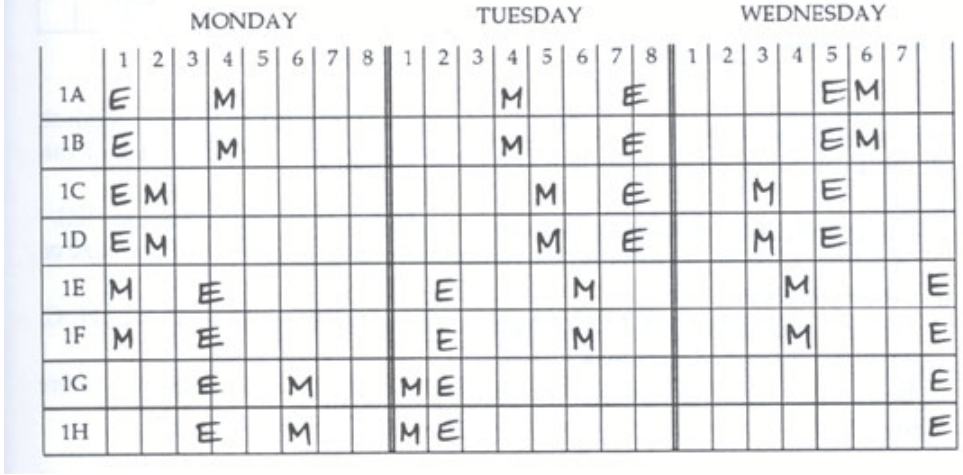
Blocking

This occurs where certain classes are timetabled together throughout the timetable for key subjects such as Mathematics or English. The number of groups created depends on the number of subject teachers available. Given this arrangement it is possible to :
• form ability groups or mixed ability groups of different sizes
• change teachers according to the topic being taught
• cover for absent teachers with the minimum disruption
• form smaller or larger groups according to teacher availability.

This device can only be used in larger schools where there are sufficient classes in the same year and sufficient subject teachers.

For an example, see Fig 4 (E = English; M = Mathematics).

Fig 4 Example of blocking



	MONDAY								TUESDAY								WEDNESDAY							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	
1A	E			M								M			E						E	M		
1B	E			M								M			E						E	M		
1C	E	M											M		E				M		E			
1D	E	M											M		E				M		E			
1E	M		E							E				M						M				E
1F	M		E							E				M						M				E
1G			E		M				M	E														E
1H			E		M				M	E														E

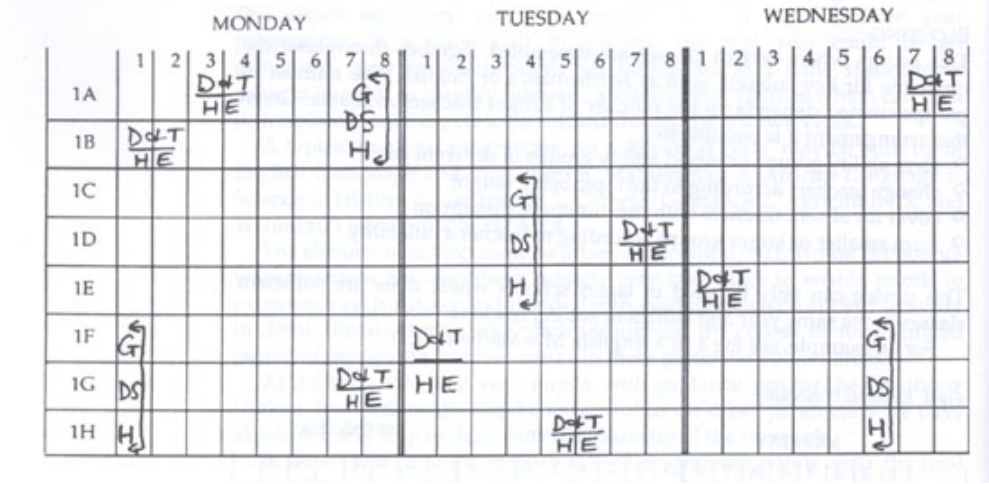
Mathematics and English have been blocked on the timetable for Monday, Tuesday and Wednesday.

Make out your timetable grid and complete the blocking for Thursday and Friday.

Setting

This device is used to provide alternatives for pupils within the slot on the timetable. It is essential where classes have to be half the normal size, for example, Design and Technology, Art, Home Economics. A number of classes within the same year can be timetabled together throughout the timetable and offered a number of options. A pupil chooses one from the selection of optional subjects on offer. There is no reason why the same option group cannot be offered twice on the timetable affording the pupils a second alternative. Option columns may contain more classes than the nominal number of classes having access to them, permitting the creation of small classes in certain practical subjects without overloading other subject classes. Adjustments can be made from year to year in the contents of these option columns. Thus if the demand for Geography falls and that for Development Studies rises, Geography can be replaced in part by Development Studies provided the school has teacher capability.

Fig 5 Example of setting



In the example given in Fig 5, Design and Technology (D & T) is set against Home Economics (HE); with half the class taking one subject and half the other.

Geography (G) is set against Development Studies (DS) and History (H).

In which of these subjects is the number of pupils likely to be class size or less than class size?

Draw a timetable grid and complete the timetable in D & T, HE, H, G, and DS for the rest of the week.

Both blocking and setting are infinitely better than streaming where whole classes are decided on the ability levels of pupils.

Step 1: Complete all preparation exercises outlined on pages 14 to 16 ('Timetable preparation in secondary schools').

Step 2: Decide on time allotments in compliance with Ministry of Education directives, including whether the timetable should cover five, six, seven or eight days. Give reasons for your choice of times and length of teaching day.

Step 3: Work out a first year programme which will meet pupil needs. Translate the programme into timetable form.

Step 4: Do you intend to block certain subjects in the upper two classes? If so, which subjects and why?

Step 5: List the option groups you intend to form, indicating subjects and size of classes in each subject. What freedom of choice do pupils have? What are the limiting factors?

Comments
It is imperative that each school head selects or devises a pupil-centred timetabled programme which is most appropriate to the school's circumstances.

Summary
A school timetable should give full information in three distinct areas, namely: teaching stations, teaching staff and class distribution, and subjects taught at certain times for each teaching day.

In order to compile a meaningful timetable the school head must be aware of the necessity to consult others so as to make full preparations and collect all the relevant data. He or she must command the expertise to direct the production of a timetable which will serve the needs of all categories, intellects and aptitudes among the school's pupils. Finally, the head must know and be able to apply such timetable devices as blocking, setting the extended day and week, and double sessions, in order to meet the special circumstances which may prevail in the school.

Next