HOW TO DEVELOP EDUCATIONAL PROGRAMMES FOR HEALTH PROFESSIONALS

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PREFACE

In the last 15 years, concern has grown world-wide about whether the education of health professionals trains workers who can meet the needs of the population and of health systems. Health professionals clearly need more appropriate training to tackle this task, and to cope with the challenges of health care reform, to reduce the costs of care and to ensure its quality.

Health care delivery in Europe has been changing in important ways to meet the challenges posed by health care reform. These challenges focus on effectiveness and efficiency to increase availability, accessibility and quality of care, and patients' satisfaction. Countries are trying various strategies, such as decentralization or centralization, substitution policies, redefinition of the functions of hospitals and primary care, new roles for professionals, improve management, cost-containment and a market orientation.

The World Health Assembly resolved in 1977 that the main social target of countries in the coming decades should be the attainment by all citizens of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life. [1] The resulting strategy for health for all does not mean the elimination of all diseases and disabilities, but that efforts should be made to improve health and promote equity for all people.

The concept of health care thus shifted from the traditional idea of medicine as confined to curative purposes, and embraced for the first time a full range of services covering health promotion and protection, disease prevention, diagnosis, treatment, care and rehabilitation. Accordingly, the patient encounters a wide variety of health care providers, and has a variety of roles - from sick and dependent person to client receiving advice to consumer or customer obtaining health products for self-administration. [2] This change requires new roles for professionals, replacing the paternalistic approach with partnership.

The participants in the International Conference on Primary Health Care in Alma-Ata in 1978 [3] concluded that achieving health for all required greater emphasis on primary health care. This does not mean that specialised care should not be an important part of the health care system, but that high priority should be given to allocating resources and developing adequate personnel in health and related sectors to work in primary health care, if a large section of the population is to be reached.

Primary health care should be the entry point to the health care system, supported by secondary and tertiary care. This was identified as the key to achieving greater equity, preventing disease,

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1 WHO. World Health Assembly resolution WHA30.43. Geneva, World Health Organization, 1977.

2 M. Garcia-Barbero. Declaration on the promotion of patients' rights in Europe. Proceedings of the Agora Meeting of the Standing Committee of European Hospitals. Brussels 1996. 44-50.

3 WHO. Report of the International Conference on Primary Health Care, Alma-Ata, USSR. Geneva, World Health Organization, 1978 (Health for All Series, No.1).

promoting health and providing adequate treatment and rehabilitation. The primary health care approach implies that: emphasis should be on the promotion of health as part of care; episodic care should be replaced by continuous and comprehensive care; there should be a move away from an individualistic approach to care, towards well co-ordinated teams that include general practitioners and other personnel; and there should be intersectoral collaboration, community participation, and personal responsibility.

In 1984 the WHO European Region acquired its own policy for health for all with 38 targets[4], the main goals being: to reduce inequities in health, to prevent illness, to promote healthy lifestyles and healthy environments, and to provide adequate care. Target 36: developing human resources for health, states that by the year 2000, the education and training of health and other personnel in Member States should actively contribute to the achievement of health for all.

Achieving these objectives clearly requires changes in the traditional curricula and educational systems for health professionals. The content of the programmes and the strategies applied to teaching-learning processes need to be reviewed because of their importance in the acquisition of attitudes and habits. Further, training must be in accordance with health priorities and the availability of resources. The rapid development of science and the changes in the health care systems that Europe is undergoing force health professionals to perform new tasks, such as: meeting community health needs; promoting health; considering sociocultural differences; considering the cost of the different interventions of drugs, advising the administration; working in teams; coping with the new information and computer systems and using managerial skills[5]. For this, they will need to acquire attitudes, knowledge and skills to:

- understand and apply the philosophy, principles, policies and strategies of health for all to improve the health of the population;
- identify and analyse the main factors influencing health and acquire skills, methods and techniques for health promotion;
- monitor the impact on health of social, cultural and economic changes;
- adequately use information systems and technology;
- provide leadership and acquire skills in managing people to support and nurture change in the community; and
- consider the patient as a partner and continue learning independently throughout life.

A widening gap lies between education and practice, resulting from the contrast between tradition and the academic values of educational institutions on the one hand and service requirements, consumers' expectations and rapid changes in sciences and health systems on the other. The new challenges that professionals have to meet include teamwork, the fast development of biomedical, technology and communication sciences, increased demands from the population,

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4 WHO. Targets for health for all. Copenhagen, WHO Regional Office for Europe, 1985 (European Health for All Series, No.1).

5 M. Garcia-Barbero. Medical education in the light of the WHO health for all strategy and the European Union. Medical education, 1995, 29, 3-12.

the patients' rights movement, changes in illness patterns and the ageing of the population. Another important challenge is the reorientation of the health care system, driven by a cost-containment policy, demands for increases in the quality of services and a focus on primary care. Together, these challenges make many of the traditional training programmes obsolete. Useful scientific knowledge has an average life span of ten years; training institutions must therefore be flexible and make maximum use of problem solving, self-learning and teamwork.

Educational programmes should address those issues and focus on the achievement of professional competence, not the retention and recall of information. The traditional of know-it-all should be substituted by know-how that will allow health professionals to cope with a rapidly changing world. A programme must be shaped to fit the goal to be achieved, must reflect health policies and be modified according to health needs. The planning of a programme should begin with a detailed analysis of the competencies required to meet the health needs and the population and the identification of the skills required and their application.

A curriculum is the result of the piecing together of a number of elements - content, strategies and methods - to assure quality in education and excellence in performance, but it must have the right mix of elements to ensure efficiency and to facilitate learning. A curriculum may have all the pieces needed; if they are poorly organized, they will complicate learning and will not produce the right results. The way in which objectives are incorporated in a curriculum will depend on the situation, programme, strategies and resources of a particular school or country. There is no unique universal solution. A strategy can be very effective but if it lacks the adequate resources to implement it, it will hinder more than help learning. The process of changing the education of health professionals is complex; a variety of determinants may influence the change, depending on the specific political and sociocultural context. Curriculum planners and teachers should consider, apart from health needs and priorities, the social and personal characteristics of the students and the community, the environment in which they move and the resources available.[6]

Learning activities should be as similar as possible to professional activities. The main purpose of education is to facilitate and promote learning. Strategies that focus on learning instead of teaching create an attitude that will facilitate the process of learning throughout life and help to close the gap between education and practice; these are considered more efficient ways to accomplish the purpose of education.

This manual is intended to be a guide for curriculum planners and teachers who want to plan programmes. It should provide them with information on the elements they must consider to make their programmes as effective and efficient as possible.

Milagros Garcia-Barbero, MD, Ph.D.

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6 M. Garcia-Barbero. Medical education in the light of the WHO health for all strategy and the European Union. Medical education, 1995, 29, 3-12.

INTRODUCTION: FACTORS TO BEAR IN MIND
WHEN PLANNING A PROGRAMME
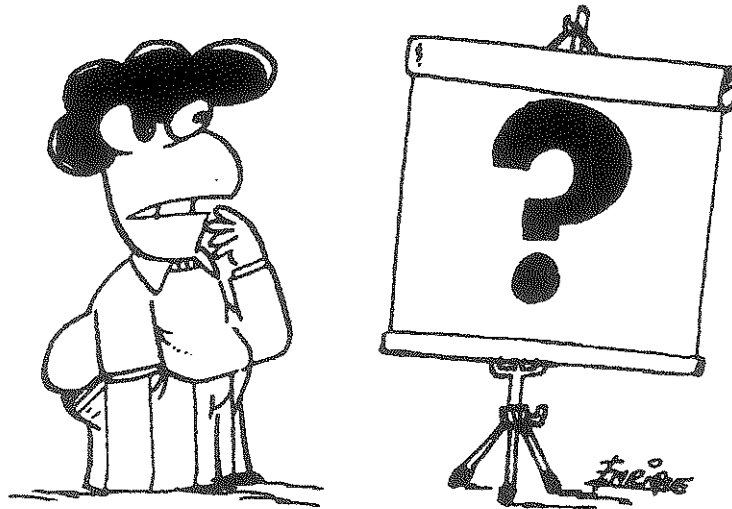
Planning a programme, course or curriculum means
structuring the teaching-learning process in a way
that will achieve the most effective results possible
in working towards its desired goal.

When trying to design any educational programme, one must bear in mind a series of factors, whose suitability to the situation will determine the programme's success or failure.

COMPONENTS OF AN EDUCATIVE PROGRAMME [a]

The factors that have to be analysed for the suitability planning of an educative programme can be divided into 10 main points.

1. What are the training needs?

Before starting a programme, one must define its requirements to ensure its adequacy and to avoid useless work.

> Because the needs change with time, a programme needs to be dynamic and adaptable to new situations.

There are many ways to identify the needs of professional training or the health needs of the population in order to develop health promotion campaigns. Each of these has its advantages and disadvantages, and the most suitable must be selected, according to the goals desired and the resources available.

2. What are the goals or aims of the programme:

The requirements identified must determine the series of aims to be achieved by the programme. The aims should match the final goal.

> The **aims** have to be directly related to the **needs** already identified

For the programme to be considered ideal, the aims, general objectives and the needs should be directly linked (Chapter 3).

3. What activities will the people at whom the programme is aimed have to undertake?

Traditionally, such activities are expressed as disciplines that the programme must cover. In modern pedagogy, the activities are expressed as objectives that the students must reach. The selection of objectives is based on the professional competencies that the students will need to have. The objectives indicate what the people at whom the programme is directed must be capable of doing at the end of the programme, not what the teacher has to teach.

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a Bandaranayake (1985), Davies (1981), Harden, R.H. (1986), Guilbert (1987).

4. How should the content be organized or what strategies should be used?

Next, the philosophy behind the organization of the programme should be defined. Modern strategies are based on the principle that the learning process is more effective when the students participate actively and when the learning situation resembles that in which the learned activity will be performed in practice.

5. What method should be chosen?

Etymologically, method means way towards. The pedagogical method is the path that must be followed to expose students to knowledge in the easiest and most advantageous way, putting into practice in an ordered manner as many principles and rules as necessary (Chapter 5).

6. How will the process be evaluated?

Although evaluation is understood to mean only the assessment of what the students have learned, the efficiency of the educational process as a whole should be assessed, including the suitability of the programme to its aims, the achievements of the programme, the methods used, and the teachers involved.

The aim of the evaluation is to discover whether the objectives have been achieved.

The evaluation technique to be used depends on the educational objectives to be assessed (Chapter 6).

These six factors constitute the fundamental points of any educational process. Tyler established this in 1949.[a]

If people want to achieve something, they must:

- decide what they want to achieve
- examine the information or systems available to achieve it
- look for the best method to achieve it
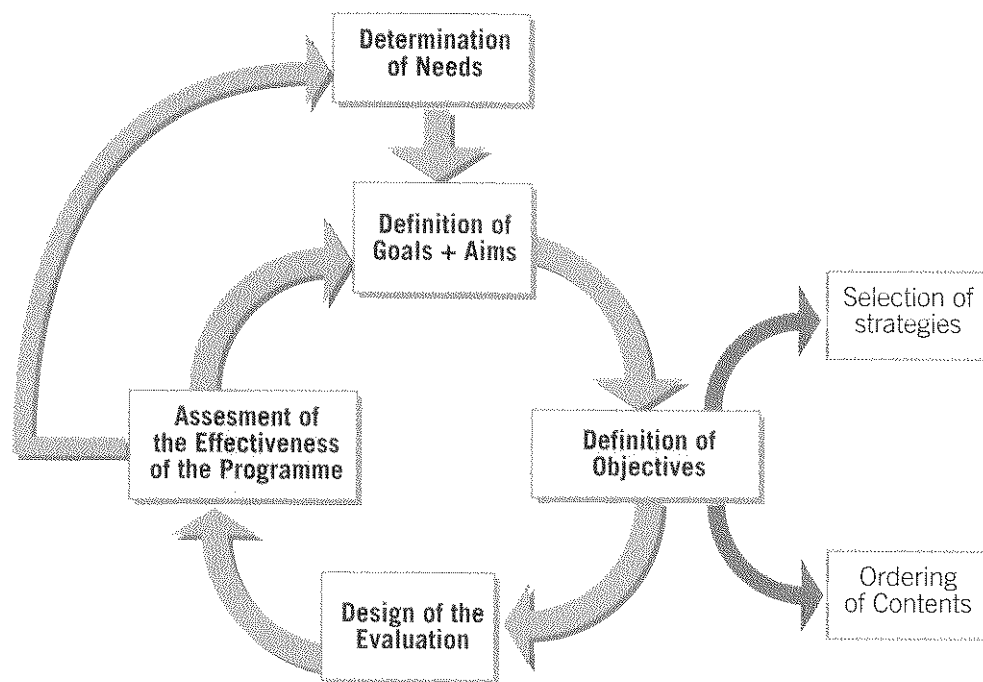- assess whether they have achieved it

If they have not succeeded, they must:

- analyse how to do better next time

All these steps are interrelated. They comprise a process indicated in Fig. 1, modified from Guilbert's "Educational Spiral".[b]

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a Tyler (1949).

b Guilbert (1987), Wheler (1967).

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                    ┌──────────────┐
                    │ Determination│
                    │   of Needs   │
                    └──────────────┘
                           ↓
                    ┌──────────────┐
                    │ Definition of│          ┌─────────────┐
                    │ Goals + Aims │          │ Selection of│
                    └──────────────┘          │  strategies │
                                              └─────────────┘
   ┌──────────────┐          ┌──────────────┐
   │  Assesment of│          │ Definition of│
   │the Effectiveness         │  Objectives  │
   │of the Programme│         └──────────────┘
   └──────────────┘                           ┌─────────────┐
                                              │  Ordering   │
               ┌──────────────┐               │ of Contents │
               │ Design of the│               └─────────────┘
               │  Evaluation  │
               └──────────────┘
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7. How can the information be transmitted about the organization of the programme?

All the people in the educational process (teaching staff, pupils, administrators, etc.) should know the details of the programme and feel part of it. In health campaigns the sector of the population for which the programme is intended must be identified so that the best methods of communicating with this sector can be chosen.

8. What should the learning environment be like?

Although this factor is normally overlooked in the planning of a programme, it deserves serious consideration. The setting for learning will be either help or hinder the process.

9. How should the process be managed?

The number of people who should be involved depends on the scope of the programme, although it is essential that **one person** be in charge of directing every process.

## 10. What characteristics should the teachers have?

The profile of the teaching staff is a source of conflict in education. It is more or less clear for primary schools, less clear for secondary schools and unclear for higher education or patient education. In undergraduate and postgraduate training, teachers are chosen for their research or professional abilities, with no consideration of pedagogic abilities. In patient education, physicians, nurses, social workers or psychologists are usually in charge, but they are selected more on the basis of availability and willingness than on appropriateness for the task.

To change an existing programme or curriculum, a new system can be developed or the existing one adapted piece by piece, applying certain general basic principles.[a] Motivated staff are indispensable. Even in a newly created institution, cooperation crumbles day by day, as new problems crop up.[b]

a Popper (1962).
b Smith & Keith (1971).

1. THE TEACHING-LEARNING PROCESS
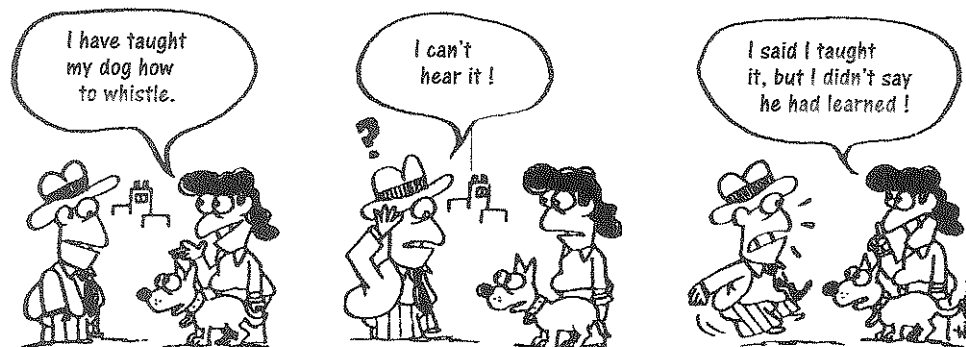
**It is important to remember that
the goal of any educational programme
is the students' learning.**

After working through this chapter, the student should be able to:

- define the concept of learning
- distinguish between learning and teaching
- define the concept of motivation
- indicate the factors that could influence motivation
- indicate the situations that favour learning
- explain the principle of transference

DEFINITIONS

Learning can be defined as [a]:

- an adaptive modification of the behaviour by means of repeated experiences;
- the selective modification of the answer after the repetition of an identical situation;
- a profound change of conduct that follows successive experiences of the same situation; and
- a relatively permanent change in conduct following practice.

All these definitions are variations of the fundamental principle of learning, which can be stated in the following way

> A change of conduct that is more or less permanent, owing to practice or experience, and proposing a change in action.

> Learning is a personal process that depends on the student and can be facilitated or hindered by external influences.
>
> In this pedagogical model, **teaching** is what must be done to facilitate changes in a student's actions.[b]

Therefore, unless the learning process becomes capable of producing satisfaction in the student, it can become a slow and ineffective process. In such a situation, **the teacher becomes a tutor or manager** whose mission will be to provide the directives and methods that will facilitate as much as possible the learning process and maintain the motivation of the student.

> The student's desire to learn is called **motivation**.

Along with the long term goals that students may set themselves, such as obtaining a degree , it is important to create short-term goals to maintain their motivation. The motivation of patients is normally high, given that their respective programmes are intended to improve their condition. In health promotion campaigns, however, motivation is difficult to obtain and the methods should suit the population at whom they are aimed. It is easy to reward schoolchildren with prizes. National campaigns, however, which offer no rewards, must employ suitable diffusion methods and slogans.

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a Guilbert (1987).

b Makenzie & Norman (1971).

The teacher must succeed in getting the student to do the following: [a]
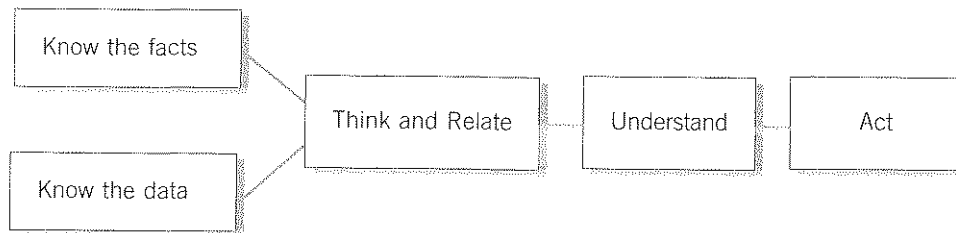
The most common form of maintaining or increasing motivation is the creation of incentives. Incentives can be extrinsic, intrinsic, positive or negative. [b]

Extrinsic	Intrinsic
Those that have no relationship to the learning process. The student works to achieve them, but not to learn. Examples: Diplomas, licenses, prizes	Those that are directly related to the learning process. Satisfaction lies in the learning itself, and the student works to learn. Examples: Giving students reachable goals linked to professional activities, creates a positive effect in learning
Positive	**Negative**
Those that reinforce the learning process by encouraging voluntary study. Examples: Praise, rewards, prizes, comprehension of what has been studied	Those that make learning obligatory through scare tactics. Examples: Punishment, failure

a Blight (1970).
b Collins (1962).

The learning process is more effective when:

• the teaching methods put students in a situation in which they learn actively;	**Active situation**
• the learning situations are as similar as possible to those in which tasks to be learned will be carried out in practice;	**Professional performance**
• the theory is directly related to the practical problems (practice gives function and reason to theory; [a]	**Practice**
• the students frequently receive information on their progress; and	**Feedback**
• the content of the programme suits its goals and students understand the importance of what they have to learn.	**Relevance**

Three elements deeply condition the focus that should be placed on the learning process in health sciences:

- the **huge amount of information** that exists, which makes it impossible to teach the pupils all that they might need to know during their professional lives;

- the **speed of development of biomedical information**, which makes a lot of information obsolete in a short period of time; and

- **social changes**, which modify the type of professional that society demands.

As a result, students must learn how:

- to **update** their knowledge and skills continuously;
- to **substitute** old ideas for new ones;
- to **transfer** the knowledge, attitudes and skills learnt in specific situations so as to solve problems in new situations **(transference principle)**. [b]

The emphasis on teaching or learning conditions the students' study habits and way of reasoning, and makes them able, in varying degrees, to adapt to new circumstances or problems.

Pursuing any type of course or career is nothing more than the first step towards the process of **continuous education** that all health workers must follow throughout their professional lives. Thus, it is important to instil in the student the habit of **independent learning**. [c]

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a   Bork (1981), Miller (1982), Socket (1982).

b   Miller (1962).

c   Fox & West (1983), Neame & Powis (1981).

2. IDENTIFICATION OF TRAINING NEEDS

The effectiveness of an educational programme in health sciences will depend on its suitability to the requirements of the population or the type of professional needed.

After working through this chapter, the student should be able to:

(a) classify the different techniques for identifying needs according to their suitability in:

- defining the type of professional needed to perform certain tasks
- identifying the activities to be undertaken by the professional
- identifying themes or content to be included in a programme
- determining the requirements of the public

(b) choose the identification technique most suitable to the goals.

INTRODUCTION

Before starting any programme, one must identify the requirements or needs that it will meet, and thus avoid designing a useless project. As Campbell wrote: [a]

If you don't know where you want to go
you may end up somewhere else
(and not even notice it)!

For example, the requirement identified may be the lack of health workers capable of practicing in a rural setting or in a specialist hospital, or the need to eradicate caries in the population, or malnutrition in poor children. [b]

The health requirements of the community normally determine the nature and content of health promotion campaigns or education programmes for patients. In contrast, training programmes for health professionals are normally determined by the structures of education centres, the teaching staff and a general reluctance to change. As a result, many such programmes are obsolete and inadequate to the real needs of the public and the health care system.

In fact, most of the **training programmes for health workers**, at undergraduate or postgraduate levels and in continuing education, **are put into effect without a prior definition of the requirements or the objectives**. The teachers normally determine the content of the programmes. This often changes the emphasis from the requirements of the student to the interests of the teacher.

In the 1970s and 1980s, many countries had large numbers of excellently trained workers in specific fields who were, in many cases, incapable of attending to their societies' needs because of the inadequacy of their training. Now there is a worldwide a movement to suit the teaching of health sciences to real needs as determined by the analysis of professional competence.

This change has resulted from:

- changes in the demands of the population
- the continuous rise in the cost of health care
- the large amount of biomedical information
- the speed of the constant development of knowledge
- the change in illness patterns
- the rise in life expectancy
- the modern consciousness of the need for better health

a   Campbell (1974).

b   All examples in this book are given in italics.

IDENTIFYING NEEDS

The first question to be raised is:

What type of programme or professional does society need?

Different types of health professional do not need the same training, and all sectors of the population do not have the same health requirements. Health workers and health requirements depend on the type of society concerned its development, the characteristics of the population and other factors.

The curriculum for a health professional who will work in a rural area remote from an urban centre in a less developed country cannot be the same as that for one who will work in a more developed country with an evenly distributed population. A unique curriculum would make health professionals adequately prepared for one environment and incompetent in another.

In the same way, starting a campaign drawing the public's attention to the donation of organs for transplants in a less developed country would be senseless, as would a campaign about the necessity of cleaning one's teeth to combat caries in a country such as Sweden, where caries has drastically reduced.

On the other hand, because **resources are limited**, priorities must be established to allow the more urgent or important requirements to be tackled.

For many years, the implicit aim of medical schools, was to train physicians with widespread knowledge in all branches of medicine. This gave rise to minispecialists who, after finishing their degree, were jacks of all trades but masters of none and completely incapable of meeting the needs of the community.

The awareness of the need for change has led many training schools for health workers drastically to change their educational programmes, adapting them to the professional competencies that the future graduates will need. This shows the need to identify these competencies.

The second question is derived directly from the first:

What sort of activities have to be carried out by the workers to be trained?

When a programme is adapted and limited to the professional activities that the students will have to carry out after their education, it is called **education and training based on competence**. [a] There are many ways of identifying these professional activities, [b] but the most frequently used are:

- an expert committee
- opinion surveys
- task analysis
- the critical incident technique
- epidemiological studies

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a   Rosinski (1975).

b   Dunn et al. (1985), Harden (1986).

Rosinski defined competence as: [a]

> The ability to carry out a certain professional function, which is made up of a repertoire of professional practices. Competence requires knowledge, appropriate attitudes and observable mechanical intellectual skills which together account for the ability to deliver a specified professional service.

Competencies can be broken down into three parts: Knowledge, attitudes and practical skills.

Expert Committee

Traditionally, the use of an expert committee has been the most popular technique.

> An expert committee is a group of people who are considered experts in the field concerned and will define what they believe to be the requirements for the programme.

This technique has its disadvantages, as the opinion of the group might not correlate with the real requirements, or be distorted by differences in circumstances or personal beliefs, or by the use of unsuitable experts.

A more elaborate form of this strategy diminishes these dangers to a certain extent. It is called Delphi technique [b] and was designed for the RAND Corporation. It has often been used in the planning of programmes or curricula. The Delphi technique can be said to have a number of stages.

1. **A committee of experts** is created and identifies the themes to be dealt with in the proposed programme.

2. **Collaborating staff** (about 20 people) are selected; these people are interested in the subject and are considered experts in one or more of the identified themes.

3. **Individual interviews**, either oral or written, are conducted with the collaborating staff to:

   - point out, within the identified themes, the general topics necessary for the satisfactory practice of the profession (general objectives);
   - identify the competencies required to cover these general areas or the content to be included (intermediate objectives);
   - break down the competencies into specific and practicable terms (specific objectives).

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a   Rosinkski (1975)

b   Helmer & Reschner (1959).

The group communicates its replies anonymously.

4. **A list of results** is compiled and sent to the panel of experts for modification.

5. **The modified list** is sent to the collaborating group, which then prepares a shortened version.

6. **The shortened version** is sent to the panel of experts, for their analysis and so on.

The process can be repeated as much as necessary to reach a consensus.

Each expert can be asked to rate the importance of each competence or theme from 1 to 5. The aptitudes or problems identified in this way provide a basis on which to elaborate the programmes.

The Delphi technique can be used to identify the type of health professional needed, the specific tasks to be completed or the optimal content of the programme.

1. *A committee of three experts is created to determine the needs of a group of general practitioners for continuing education.*

2. *Each expert lists the problems they consider to be the most common:*

Expert 1	Expert 2	Expert 3
Polytraumatism	Burns	Asthma
Fractures	Wounds	Heart attack
Shock	Heart attack	Shock
Heart attack	Polytraumatism	Serious burns
Abstinence syndrom	Shock	Abstinence syndrome
	Asthma	

3. *These lists are distributed to the collaborating group, which arranges and orders the themes according to their importance:*

- *Heart attacks*
- *Shock*
- *Polytraumatism*
- *Burns*
- *Asthma*
- *Abstinence syndrome.*

4. *The list is sent to the committee of experts whose members rate their importance on a scale of 1 to 5.*

Problems	Scores			Total
Heart attack	5	5	4	14
Shock	3	4	4	11
Polytraumatism	4	4	5	13
Burns	4	4	4	12
Asthma	2	5	4	11
Abstinence syndrome	1	3	3	7

5 *The committee uses the results to draw up a definitive in ranking order:*

1. Heart attack

2. Polytraumatism

3. Burns

4-5. Shock and asthma attack

6. Abstinence Syndrome

The number of themes to be covered will depend on the resources.

Opinion surveys [a]

The opinion survey is one of the most widely used techniques throughout the world, owing to its ease of execution and analysis.

> An opinion survey identifies people's opinion through an oral or written questionnaire.

The questionnaire can be structured so that the respondents give either closed or open replies. In **closed reply questionnaires**, the respondent has to choose between or rank the presented options as in the following example.

Indicate which of the following problems of the elderly that you consider should be included in a programme of continuing education for general practitioners. Rate the importance of the problems to be included on a scale of 1 to 3: 3 = very important, 2 = important, 1 = unimportant (Lickert-style scale).

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a   Best (1978).

	YES	NO		3	2	1
1. The incapacitated pensioner						
2. Senile Dementia						
3. Maltreated pensioner						
4. Respiratory problems						
5. Cardiovascular problems						

If no other problems can be included, respondents cannot add themes that might seem equally or more important to them.

In **open reply questionnaires**, no options are indicated, and the respondents express their opinions freely, as in the following example.

Indicate the problems of elderly people that you consider should be included in a programme of continuing education for general practitioners. If you wish, you may rate each according to their importance on a scale of 1 to 3; 3 = very important, 2 = important, 1 = unimportant.

Opinion surveys can be aimed at:

- the professionals for whom the programme is intended
- experts in different fields
- users of services

In each situation, the respondents will be chosen on the basis of the results being sought and the goals of the questionnaire. Always use a representative sample or your conclusions will have no value.

Task analysis[a]

> Task analysis is based on the systematic and attentive observation of the behaviour of a representative sample of the population in a specific field (skilled workers, general public, etc.).

The researcher monitors the behaviour of the studied sample and, by comparing the lists of tasks obtained, determines the basic functions and how to perform them. The better the selection of the studied sample, the more suitable the resulting list will be.

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a McClelland (1976).

If one observes the taking of the jugular pulse rate by 10 people in the hospital and we verify that 7 of them put the patient in a supine position at an angle of 45° and 1 of them in a completely supine position, one will determine that, in order to measure the jugular pulse rate, the patient should be placed at an angle of 45°.

If we observe the measurement of blood pressure by five people and we verify that four of them place the centre of the sleeve over the arm artery and one of them places it to one side of the arm artery, we will determine that the sleeve should be placed over the arm artery and not to one side. If all five of them inflate the sleeve to a pressure of 40 mmHg, we will conclude that the sleeve has to be inflated to a level of 40 mmHg and so on.

Task analysis serves only to describe the specific actions the professional has to carry out.

Critical incident technique [a]

> Critical incident technique is the collection of facts to characterize the efficiency or inefficiency of professional practice.

An incident is understood to be an activity that is sufficiently complete and observable to allow the deduction, *a priori*, of its effects.

To collect these facts, qualified people are asked about incidents, involving them or others that could reflect good or bad practice. This technique allows a series of guidelines to be obtained that can be used as a basis for the construction of a programme, emphasizing the activities that lead to good practice and correcting those that lead to bad practice.

The following question was part of a survey of general practitioners, conducted by the Division of Medical Educators of the University of Alicante. Could you explain any case in which your behaviour (positive or negative) as a health professional has decisively influenced the final result?

Two doctors replied:

> *Doctor A: A few days ago I was required to attend a sixty-year-old lady who had been suffering from abdominal pains and whose condition was progressively deteriorating. The first impression she gave me, through physical examination and anamnesis, was that of an acute abdomen, for which I transferred her to a hospital. The diagnosis was acute pancreatitis. I preferred not to prescribe analgesics or anything similar so as not to confuse the situation and lose precious hours.*

> *Doctor B: The other day I accompanied an elderly patient from my town to the local hospital so he could have a check-up and some X-rays of his thorax. The patient, who had never been outside his home town, was afraid to go alone. My accompanying him also meant that he was taken care of more quickly.*

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a   American Institute for Research (1960), Blum and Fitzpatrick (1965), Flanagan (1954).

Two varieties of critical incident technique are described here: the assessment of professional conduct and the study of errors of practice.

Assesment of professional conduct [a]

> The assessment of professional conduct consists of obtaining information from a number of professionals who are considered among *the best*, about the critical situations that they have encountered during their practice and how they dealt with them.

The information is used to build a list of situations and types of conduct.

The study of errors of practice

> The study of errors of practice consists of analysing errors in professional practice.

The distinguishing characteristics of this type of technique is that an outside party makes the assessment, although it could also be carried out by an anonymous questionnaire aimed at the professionals themselves or the users of services.

The identification of the errors allows the design of strategies to correct them, especially when the errors are due to deficiencies in training, not negligence. One way of identifying deficiencies in a programme or curriculum is to ask the people who have completed the programme to evaluate its usefulness. They can indicate from six months to one year after graduation, the areas of the curriculum that were deficient or useless for professional practice. This information can be used to modify existing curricula or construct programmes to make good the deficiencies of previous training.

Epidemiological studies [b]

Epidemiological studies are one of the most suitable ways to define needs for a health care plan or health promotion campaign and, thus to make an educative activities plan.

The analysis of **mortality and morbidity** of a determined area will permit the design of adequate programmes and the establishment of priorities according to the incidence of illness.
An infectious diseases programme designed for countries such as Brazil or India would differ from a programme developed for Sweden or Spain.

Information mortality describes only deaths. It does not address ill people or diseases that do not necessarily lead to death [c]. Information on morbidity describes the presence of illnesses in an

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a McClelland (1976).
b Ahlbom & Morell (1988).
a Pineault & Daveluy (1989).

individual or in a population. Morbidity can be expressed in two different ways: **Incidence**, reflects new cases of an illness and **prevalence** indicates the presence of an illness, and therefore includes all cases.

These two aspects are measured in the following ways.

$$\frac{\text{No. of new cases during a set period}}{\text{Exposed population}} = \text{Incidence}$$

$$\frac{\text{No. of cases during period}}{\text{Population being studied}} = \text{Prevalence}$$

Planning, Incidence and prevalence are useful for different reasons. Incidence is used for short term illnesses or for etiological studies, while prevalence is considered as the weight of the morbidity which has to be tackled. Elevated prevalence can be due to one or both of two factors: elevated incidence and a long evolution. This difference is important because the approaches to the problems will differ from one case to another.

It is important to determine not only needs but also their priority.

ESTABLISHING PRIORITIES

There are many ways of establishing priorities. This book covers the three that are most often used: the analysis grid, the Hanlon method and the paired variables system. The process of setting priorities on a system that comprises different problems according to certain parameters or criteria. The most common of these are:

- the importance of the problem
- the capacity of intervention
- the possibilities of action

Priorities are conditioned by social, environmental, economic, and organizational values. They vary from place to place, as subjectivity intervenes to a certain extent.

Analysis grid [a]

The analysis grid has four elements, which can be phrased as questions.

A. Is the problem important?
B. Is there a relationship between risk factors and the problem?
C. Is there technical capacity for resolving the problem?
D. Is intervention or the programme feasible?

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b Pineault & Develuy (1989).

Problems are prioritized by the application of each of the elements to them, For each element, one makes a positive (+) or negative (-) response. The position of each problem, on completion of the grid, determines its priority.

If one constructs a grid for lung cancer, cervical cancer and dental caries, each problem must pass through the four elements.

		Element		
Problem	A	B	C	D
Lung cancer	+	+	+ at primary level	-
Cervical cancer	-	+	- at primary level	-
Dental caries	-	+	+ at primary level	±

When these results are entered on the grid, the priority of each problem is revealed.
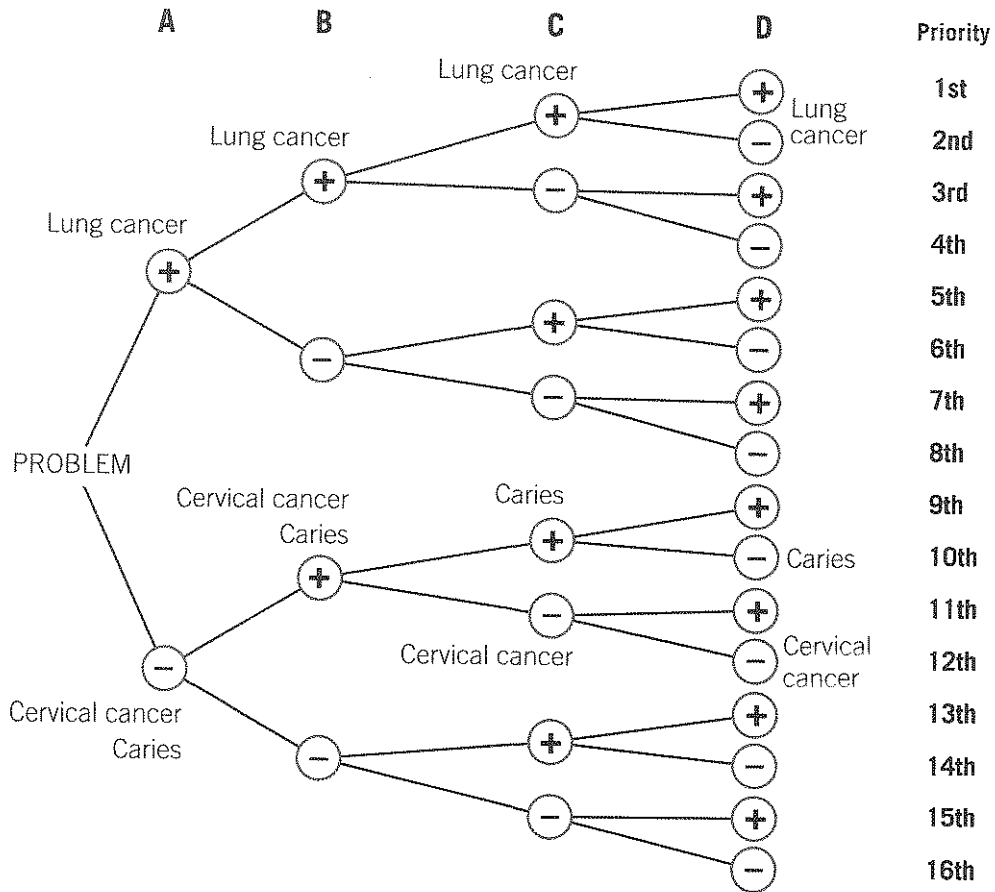
Hanlon method [a]

The four components of the Hanlon method are:

A. The magnitude of the problem
B. The severity of the problem
C. Effectiveness of the solution
D. The feasibility of the intervention

The four are combined through the formula: (A+B)(C x D).

The **magnitude** of the problem is defined as the number of affected people in relation to the total population. The estimation of the magnitude can be made by using the following table.

People affected per 100 000 population	Score
	10
5 000 – 49 999	8
500 – 4 999	6
50 – 499	4
5 to 49	2
<5	0

The **severity** of the problem is one of the most difficult factors to define owing to the variety of existing possibilities. It depends on health, social and administrative considerations, such as: mortality, permanent or temporary invalidity, loss of working days, discomfort for the individual in society, associated costs and evolution of the problem.

Planners have to decide the severity by using the facts at their disposal and give a value from 0–10 for each of the evaluated situations, afterwards calculating the average of the scores obtained.

The **effectiveness** of the solution depends on whether resources and technology are available to tackle the problem. Some authors suggest giving a score of 0.5 points to problems that will be difficult to solve, 1 to those of doubtful solution, and 1.5 points to the solvable ones, increasing, maintaining or diminishing the A+B component in this way.

The **feasibility** of intervention is determined by the acronym PEARL. The planners ask whether intervention is:

P = Pertinent?
E = Economically feasible?
A = Acceptable?
R = Resources available?
L = Legal?

Each of the elements is evaluated in absolute terms. Yes = 1 point; No = 0 points; A total of 0 automatically eliminates the possibility of solving the problem.

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a Hanlon & Pickett (1984).

This method is applied to the same problems prioritized in the analysis grid. The data we are going to use have no objective foundation; they are given to provide a description of the method.

A. As to the magnitude of the problem, according to the scoring system on page 39, the scores of the problems are:

Lung cancer   4
Cervical cancer   2
Dental caries   8

B. The severity of the problem

Factor	Score		
	Lung cancer	Cervical cancer	Dental caries
Mortality	8	6	0
Incapacity	2	0	1
Labor cost	4	2	1
Health cost	6	4	2
Propagation	0	0	0
Family affect	8	6	1
Total	28	18	5
Average	4.6	3	0.8

C. The effectiveness of the solution:

Lung cancer   0.5
Cervical cancer   1.5
Dental caries   1

D. The feasibility of the intervention

Factor	Score		
	Lung cancer	Cervical cancer	Dental caries
Pertinence	1	1	1
Economic feasibility	1	1	1
Resources available	1	1	1
Legality	1	1	1
Acceptability	1	1	1

If there are no economic or resource problems and intervention is possible in any of the three cases, the results are the following.

Problems	A	B	C	D	(A+B)(C x D)
Lung cancer	4	4.6	0.5	1	4.3
Cervical cancer	2	3.0	1.5	1	7.5
Dental caries	8	0.8	1.0	1	8.8

In this case, the efficiency of the solution determines the final result, independently from the magnitude or severity of the problem.

Paired variables

A simple method for determining the importance of a problem or selecting between various options is that of paired variables. Each problem on a list is paired with all the others, and the planner selects the more important of each pair.

The problems are: burns, heart attack, polytraumatism, shock, cerebral embolism.

Burns	*Heart attack* [x]	*Polytraumatism* [x]
Heart attack [x]	*Polytraumatism*	*Shock*
Burns	*Heart attack* [x]	*Polytraumatism* [x]
Polytraumatism [x]	*Shock*	*Embolism*
Burns	*Heart attack* [x]	*Shock*
Shock [x]	*Embolism*	*Embolism* [x]
Burns		
Embolism [x]		

The number of times that each problem is selected as the more important determines its importance in relation to the others. Therefore, according to the preceding table, the "importance scores" of the problems are:

Burns	*0*
Heart attack	*4*
Polytraumatism	*3*
Shock	*1*
Cerebral embolism	*2*

The total score should correspond to the number of possibilities. In descending order of importance, the sample problems are:

- *heart attack*
- *polytraumatism*
- *cerebral embolism*
- *shock*
- *burns.*

Exercises

THE DELPHI TECHNIQUE

With your group, apply the Delphi technique to an educational programme, a continuing education programme for health personnel or a curriculum for a medical or nursing school. Consider yourselves a group of experts.

1. As a group, name an area in which you would be interested to work (such as cardiovascular diseases on the problems of the elderly) and the people whom you would like to direct the programme (such as nurses, physicians or medical students).

   a) Problem_____

   b) Type of people:_____

2. Individually, list 10 themes or needs that you think the programme should include.

   1._____
   2._____
   3._____
   4._____
   5._____
   6._____
   7._____
   8._____
   9._____
   10._____

3. Compare your list with those of your colleagues and list the themes that were chosen by more than one person. Then rank these according to the importance that you give them in the programme, on a scale of 1 to 5.

Themes

Importance

	5	4	3	2	1
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

4. Note the score that each member of the group awarded to each theme and add them up.

Themes

Importance

Members					Total

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

5. Use the total scores to list the themes in order of priority.

1st

2nd

3rd

4th

5th

**Congratulations! You now have the subjects
on which to concentrate your efforts.**

OPINION SURVEY

As a group member, design a survey to identify needs. Start by answering the following questions. Use the subject that you wrote down on page 25.

1. What is the objective of the survey?

2. For whom would you design the educational programme?

3. To whom would you address the survey?

4. Will it be an open-ended or closed type answer? Why?

5. Will it include evaluation scales? Why?

6. If you use evaluation scales, which one would you use? What components will it have?

7. Write three of the statements to be included in the survey.

(a)

(b)

(c)

CRITICAL INCIDENT TECHNIQUE

Describe three critical incidents in your professional practice. Discuss these with other members of your group.

1.

2.

3.

ERRORS IN PRACTICE

Describe three or four situations during your career in which you felt unsure due to insufficient training. You may remember so many that they don't fit on the page. Don't worry, this is only a theoretical exercise and you probably resolved them sufficiently.

1.

2.

3.

4.

PAIRED VARIABLES

1. List the five priority themes that you determined by using the Delphi technique (see page 25).

    1.

    2.

    3.

    4.

    5.

2. Pair them and put an X in the box next to the one that indicates which one of the pair you consider more important.

    1 ☐   2 ☐   3 ☐
    2 ☐   3 ☐   4 ☐

    1 ☐   2 ☐   3 ☐
    3 ☐   4 ☐   5 ☐

    1 ☐   2 ☐   4 ☐
    4 ☐   5 ☐   5 ☐

    1 ☐
    5 ☐

3. Add up the number of times that each theme appears as "important"

    1:_____   2:_____   3:_____   4:_____   5:_____

Are the results the same as with the Delphi technique ? If they are, **well done!**
If they're not, **don't worry**, this is only an exercise and different techniques have different results.

Usefulness of different techniques

For each of the following numbered techniques, rate its usefulness in identifying: the types of worker to teach a programme, the tasks that he/she must complete; the contents that should be included in a programme; the possible errors and the importance of problems.

(4 = very useful, 3 = useful, 2 = of little use, 1 = useless)

Techniques	Usefulness				
	Type of worker	Tasks	Content	Errors	Importance of problems
Expert committee					
Delphi technique					
Opinion surveys					
Interviews with people who have recently finished a programme					
Task analysis					
Assessment of critical incidents					
Assessment of conduct of experts					
Study of errors of practice					
Analysis grid					
Paired variables					

Now compare your answers with the following ones.

Techniques	Usefulness				
	Type of worker	Tasks	Content	Rectifying Errors	Determining Importance
Expert committee	3	4	4	-	3
Delphi technique	4	4	4	-	4
Opinion surveys	4	4	4	-	2
Interviews with people who have recently finished a programme	1	2	2	4	2
Task analysis	2	4	1	-	-
Assessment of critical incidents	2	3	1	3	-
Assessment of conduct of experts	3	4	2	-	-
Study of errors of practice	1	1	1	4	1
Analysis grid	4	2	3	-	4
Paired variables	4	2	3	-	4

This exercise is not easy! These answers are approximate. You may feel proud if your answers correspond with these. If they do not, try again.

Each of the techniques to identify needs and set priorities has advantages and disadvantages, and the most suitable one should be chosen for each situation, taking account of the aims of the programme and the available resources. Needs change with time, and programmes must be dynamic to allow adaptation.
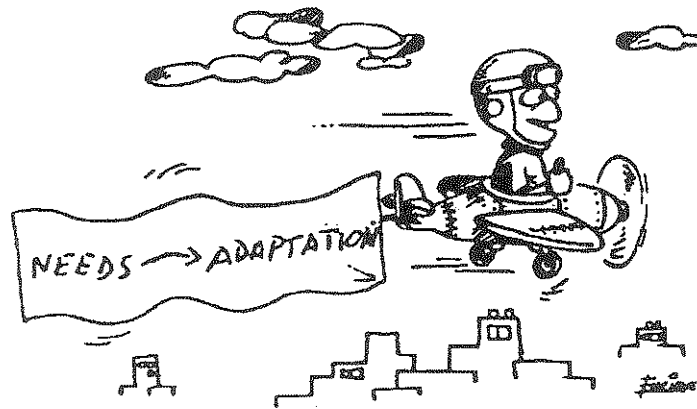
3. OBJECTIVES

**The lack of definitions for educational objectives
makes discussions about programmes and
teaching methods difficult and often useless.**

After working through this chapter, the student should be able to:

- describe the general objective of the educational programme

- describe three competencies to be performed by the trainee

- break down each of these competencies into the three learning domains (knowledge, attitudes and skills), and

- list five measurable and five imprecise active verbs.

TYPES OF OBJECTIVES

> Some authors call the choice of aims, based on the functions that the trained professional has to perform, general objectives.

In more traditional programmes, activities are expressed as disciplines to be covered in the programme. In modern pedagogy, they are expressed as objectives that students must reach. Some authors distinguish two levels of professional tasks. One is defined by **activities**, called **intermediate objectives**. The other is defined by tasks, called **specific objectives**.

> Specific objectives indicate what the students should be able to do on completion of the programme, not what the teacher has to teach.

GENERAL OBJECTIVES
↓
INTERMEDIATE OBJECTIVES
↓
SPECIFIC OBJECTIVES
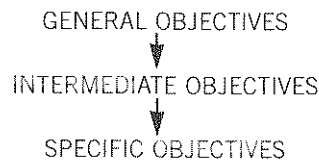
Intermediate objectives must be derived from the general objectives, and specific objectives from the intermediate ones.[a]

Identification of needs should lead to the establishment of the goals to be achieved by the programme. These should correspond to the final product desired.

The **aims** of the programme have to be closely related to the identified **needs**. In an ideal programme, the general aims or objectives should correlate completely with the requirements. In practice, however, the two only overlap as shown in the diagram. The bigger this overlap, the more suitable or relevant the programmes will be.

If the assessment of requirements lead to the conclusion that more health personnel able to work in a rural environment are necessary, the aim would be to train workers to meet these needs. If the requirement is the reduction of caries in the population, the objective would be both to educate people to clean their teeth adequately, and to add fluoride to the water supply. If the aim is the reduction of child malnutrition, the objective will be to educate parents to provide an adequate diet.


NEEDS   OBJECTIVES

UNION IN THE
PROGRAMME

---
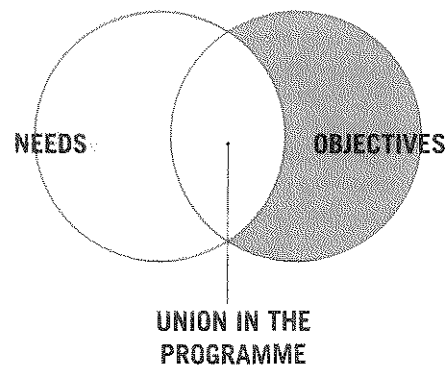
a Guilbert (1981).

Say that the intermediate objective is the capability of trained health personnel, working in the community, to diagnose infectious hepatitis in an acutely ill person. The break down of these objectives into specific tasks is known as **specific objectives**. The specific objectives, in this case, could include: observing the sclerotic of the patient, finding out if there had been any similar cases in the family or community, explaining clearly to the patient's family the therapeutic measures that they should adopt, etc. In another case, an **intermediate objective** could be that mothers keep balanced diets; and **specific objectives** may be that they distinguish carbohydrates from fatty foods, monitor infant growth or learn to correctly weigh their children.

Separating intermediate and specific objectives, although technically clear, poses difficulties because an objective can be intermediate or specific, according to the context. If the general objective is to train health staff capable of practising in a rural environment, the identification of infectious diseases can be an intermediate objective, which can be broken down into specific tasks or specific objectives, or it can be considered as a task in itself, which converts it into a specific objective.

"A scientific age demands exactitude and specificity in teaching." This is how Franklin Bobbit[a] expressed, in 1918, the need for teachers to write their objectives in clear and non-technical language, so that the pupils and their parents could understand them.

In 1924, Warret Charters[b] spoke of "job assessment". This meant identifying the "job's ideal", assessing the activities that it implied and breaking both down to a level of "work units assumable by human ability".

"Ideal"	Functions	General Objectives
↓	↓	↓
Activities	Activities	Intermediate Objectives
↓	↓	↓
Work Units	Tasks	Specific Objectives
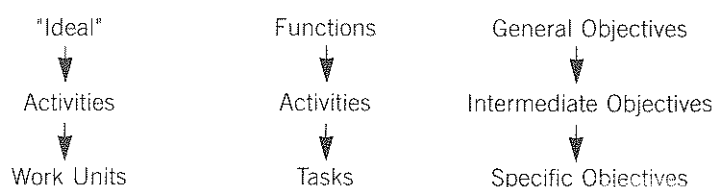
Definitions

The following are definitions of the three levels of objectives, with examples of each.[c]

> **General objectives** describe the functions that the trained personnel will have to perform.

Training should supply general practitioners, with suitable practical and scientific knowledge and skills to make them useful to the community in which they will practice, and with the capacity and motivation to continue their learning individually throughout their professional life.

---

a Bobbit (1918).
b Charters (1924).
c Examples taken from Academic Handbook of the Medical Faculty of the University of Alicante.

> **Intermediate objectives** describe the activities needed to achieve the general objectives.

In the second cycle, the student should reach a sufficient standard of knowledge and skills to be able to solve individual and collective health problems in his or her environment, developing attitudes suitable to relate to patients and their social and family surroundings and influencing their lifestyles.

> **Specific objectives** describe the tasks that must be completed to achieve the intermediate objectives.

- *defining the clinical history*
- *receiving the patient politely*
- *taking the regular pulse*
- *measuring blood pressure*

General objectives are also known as institutional objectives as they express the end product of the institution.

> The term **Educational objective** has been used to define the professional tasks that the student should be capable of carrying out at the end of the educational process.

This term can give rise to confusion, given that any objective of an educational institution or programme can be considered an educational objective, without necessarily indicating a task. Better names for educational objectives may include:

- operative objectives (indicating a job to be done)
- specific objectives (referring to a particular task)
- learning objectives (indicating a change of conduct)

When the word "objective" is mentioned in literature without a qualifier, it usually means an operative objective.

USEFULNESS OF OBJECTIVES

The usefulness of defining objectives remains controversial amongst educators. Most complaints come from the humanities teachers whose arguments are based on points such as:

- Education is a sophisticated process that cannot be reduced to a simplistic model based on objectives. [a]

---

a Sockett (1976).

- It is impossible to separate knowledge, attitude or even skills as some include others.[a]
- It is a system that limits the freedom of teachers and pupils alike. [b]
- Education is a continuous process that constantly changes and that has to be adapted, therefore it is difficult to set any objectives. [c]

Other educators take the view that:

- It is more important to learn to think than acquire a skill in carrying out a certain job. [d]
- Education is the art of using knowledge and not the acquisition of inert ideas. [e]

Experts in health sciences education agree that the objectives that ensure adequate training should be defined.

Objectives define the basic tasks that have to be completed. This does not mean that students cannot deepen their knowledge in the subjects that particularly interest them, or acquire a special dexterity in the skills that they like most. The difficulty arises when specific objectives or tasks are so rigid that they limit the achievement of the final objectives of the education process.

Kelly makes five arguments in favour of the use of objectives. [f]

The **logical argument** is that, if education is planned as a rational activity, goals and aims must be established, and action directed towards reaching the objectives.

The **scientific argument** tries to apply scientific methodology to education, along with the efficiency that is applied to other sciences as a norm.

The **socio-economic argument** is that training is an expensive process, and the people who pay for it have the right to know what the final product will be.

The purely **educational argument** is that evaluation of the learning process requires the definition of what has to be learnt. Objectives therefore constitute the starting point for a coherent evaluation.

The **appropriateness argument** is that, in health sciences, defining objectives allows a programme to be tailored to society's needs and therefore ensures a service suited to the users.

In conclusion, the use of objectives offers advantages for the teacher, student, institution and society alike.

For the **teacher**, objectives permit a rationalisation of educational planning, adjusting it to the needs. They also facilitate the evaluation of students.

---

a Ashton (1975).
b James (1968).
c Dewey (1968).
d Hirst (1938).
e Witehead (1932).
f Kelly (1982).

Tests can determine the extent to which the desired results have been achieved only when the objectives have been previously defined.

For the **student**, objectives constitute a guide to learning and a method of self-evaluation. Objectives provide continuous information on the state of their learning and indicate the need for adjustments through comparison.

For the **institution**, objectives ease the evaluation of students and permit an assessment of the programmes. Further, they provide information on the suitability of the teaching staff, and allow the allocation of adequate resources.

For **society**, objectives ensure the suitability of learning to social needs.

Objectives can also indicate to the student tasks of high priority, in contrast to those that could be considered complementary or even accessory.

The training objectives of a haematology laboratory technician include the following:

1. *Describe the basic norms to be followed in the process of blood donation.*

2. *Number the different systems and types of anticoagulants used.*

3. *Write the biochemical formula of the anticoagulants most often used.*

4. *Briefly describe the biochemical processes that occur during coagulation.*

Objectives 1 and 2 can be considered priorities, 3 accessory, and 4 complementary.

Objectives can be essential or accessory according to the type of professional to whom they are directed. One profession's accessory could be another's priority.

For a haematology laboratory investigator, objectives 2–4 could be priorities, while objective 1 would be accessory.

SELECTION OF OBJECTIVES

Objectives should be selected on the basis of:

- their relevance or direct contribution to the aims of the programme;

- the probability of their serving as a basis for other courses or sections of the programme; and

- the previous knowledge and the socio-cultural situation of the students.

Of these, **relevance** is the fundamental quality that should control any process of selecting objectives.

BREAKDOWN OF SPECIFIC OBJECTIVES

Specific objectives have been split into three groups. The first comprises objectives that are cognitive, or related to **knowledge**; These define the purely intellectual processes or knowledge needed.

The second group is affective, or related to **attitudes**. These indicate the affective states needed.

The third group can be called psycho-motor, or related to **skills** and **abilities**. This type of objective expresses the manual tasks to be carried out.

> *Cognitive objective:*   numbering the possible causes of duodenal ulcers.
>
> *Attitudes objective:*   informing the parents of mental deficiency in their child, without giving a value judgement.
>
> *Skills objective:*   exploring the patellar reflex.

These classifications have one purpose: permitting an analysis of the learning process and helping the teaching staff to take pedagogical decisions. In fact, human behaviour can rarely be divided into activities, skills and knowledge. This division of objectives is somewhat artificial. Neither teachers nor those responsible for the programmes can separate them completely. [a]

Further, different levels can be defined in each of the three fields. [b] Bloom defined those of the cognitive field, which were widened to include preparation for evaluation by McGuire; Krathwohl and his collaborators defined those for attitudes, and Harrow for skills. [b]

Although up to eight different levels have been specified in some fields, this book covers only three. They express the succession from one level to the next in the clearest way possible.

Knowledge

> Knowledge objectives correspond to purely intellectual activities.

The first level in this field is **recall**, which implies the ability to remember facts, processes, principles, methods, etc. It is an activity in which the memory is the fundamental tool. The second level constitutes the **interpretation of data**. This requires more complex intellectual activity, including the process of applying ideas, principles, and methods to tackle a new situation or phenomenon. The third level is the **solution of problems**. It consists of the application of the principle of transference to find the best possible solution to a problem that has arisen from new situations.

> *Recall:* the student must state the normal values of a blood formula.
>
> *Interpretation:* when presented with a leucocytary formula the student will remember the information of a normal leucocytary formula and will deduce if the one he has been presented with is normal or not.
>
> *Solution:* the student, faced with an abnormal leucocytary formula, will be capable of determining the type of leukaemia and indicate suitable treatment.

---

a Guilbert (1987).
b Bloom (1956), Harrow (1972), Krathwol et al. (1964), McGuire (1963).

Attitudes

> An attitude is a relatively constant state of feeling towards someone or something.

This manifests itself in one's behaviour towards other people, events or opinions. As far as health professionals are concerned, this field refers mainly to relationships with other people. The first level in this field is **receptivity**, which implies a certain amount of sensitivity to the existence of certain phenomena in others and the attitude to adopt. The second level constitutes response – this means being sufficiently interested in the phenomenon taking place to decide to deal with it personally. The third level is **interiorization**. This means that the perception of phenomena must form part of the student's values, which allows the automatic adoption of a response.

Receptivity: appreciating the parents' worry when faced with the possibility that their child might have an oligophrenia.

Response: talking with and comforting the parents while they wait for the results.

Interiorization: reflecting the parents' concern, showing a willingness to help them.

Practical skills

> Practical skills relate to the set of movements that lead to the precise execution of an action (skill). This always implies manual action.

The first level consists of **imitation**. Students faced with an action that can be observed, repeat it element by element until they are capable of carrying it out themselves. The second level is **control**. Students become capable of carrying out an action by following instructions, not only by observation. They begin to differentiate between a series of actions in order to choose the most appropriate one. The third level comprises **automatism**. The students' skill in execution reaches a high level of efficiency and they practice a skill automatically, without thinking about the steps to follow.

Imitation: the nursing student sees an intramuscular injection being carried out, and practises by following the monitor's instructions.

Control: the nurse starts administering injections thinking about the steps to follow.

Automatism: the experienced nurse automatically gives injections without deciding the different steps to follow.

These levels and their relationships are summarised in the following diagram.

```
                        ┌─────────────────┐
                        │    LEARNING     │
                        └─────────────────┘
          ┌───────────────┐  ┌───────────────┐  ┌───────────────┐
          │   KNOWLEDGE   │  │   ATTITUDES   │  │    SKILLS     │
          │               │  │               │  │               │
          │    Memory     │  │ Receptiveness │  │   Imitation   │
          │ Interpretation│  │   Response    │  │    Control    │
          │  Transference │  │Interiorization│  │  Automatism   │
          └───────────────┘  └───────────────┘  └───────────────┘
```
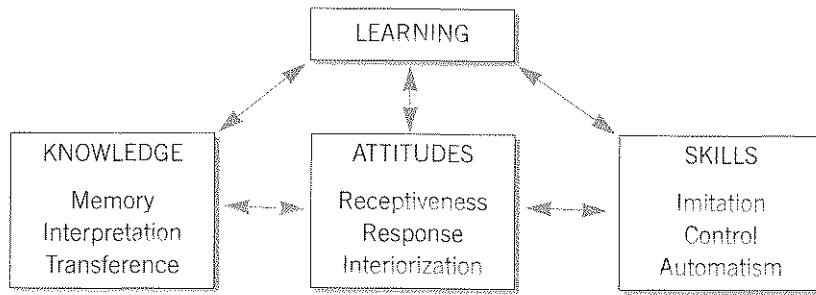
All objectives in this field must have a series of **qualities**[a] that can be synthesised in the following way.

They must:

• correlate with the aims	**relevant**
• indicate clearly and exactly what is to be done	**precise**
• be easily understood	**comprehensible**
• be achieved by students with the resources available and in the current situations	**possible**
• be amenable to determine whether the student is capable of carrying out the set task, and therefore be measurable	**measurable**

STATEMENT OF OBJECTIVES

A statement of objectives must contain the following elements:

• the action to be taken, defined by an appropriate verb	**action**
• the subject to be mastered or skill to be carried out	**object or content**
• the situation in which the student must be able to carry out the action	**situation or conditions**
• the minimum required level of performance of the task, which will allow evaluation of the learning process and thus of the student	**criteria**

Indicate (action) the histological components of the venules (object) in a circular section of the wall (conditions) within 10 minutes, with a maximum error of one element (criteria).

A statement of objectives that include all four elements can be cumbersome and difficult to read. Tyler[b] dealt with this problem by limiting statements to the first two elements (**action and object or content**).

Describe the histological components of the venules.

---

a Miller (1962).
b Tyler (1949).

Objectives must be formulated in specific and measurable terms. Abstract terms, such as understand, learn, believe, appreciate, are not measurable and therefore they neither show whether the teaching/learning process has occurred nor tell the student the task to be carried out.

Students asked if they know the histological characteristics of the veins can answer yes or no. If they do not have to describe, number and draw them, etc., their knowledge cannot be evaluated. The students can use the well known excuse "I know it but I don't know how to explain it."

Therefore, statements of objectives should use verbs that clearly indicate measurable action. The following list suggests some of the **measurable, active verbs** that could be used; it can be modified and improved.

The lists of specific objectives should maintain a balance between the definition of the task to be carried out and the quality and efficiency of the group. The excessive division of the objectives can give rise to endless lists that scare both teacher and student alike, turning a useful tool into a nightmare.

MEASURABLE ACTIVE VERBS FOR THE FORMULATION OF SPECIFIC OBJECTIVES [a]

Abstain	Contrast	Differentiate	Note	Reunite
Act	Contribute	Direct	Obtain	Safeguard
Adhere	Control	Discuss	Oppose	Select
Administer	Co-operate	Distinguish	Organise	Send
Analyse	Copy	Inscribe	Participate	Share
Apply	Correct	Insert	Place	Show
Assist	Create	Interpret	Plan	Specify
Assume (respon-	Criticise	Intervene	Practise	Spread
sibility)	Decide	Introduce	Predict	Square
Avoid	Decipher	Justify	Prepare	State
Calculate	Deduce	Know	Preserve	Supply
Care	Defend	List	Prognosticate	Synthesize
Carry out	Define	Maintain	Promote	Take
Change	Delimit	Make	Protect	Take account
Choose	Demonstrate	Measure	Read	Take off
Classify	Describe	Mobilise	Recollect	Take part
Collaborate	Design	Modify	Refer	Teach
Compare	Determine	Motivate	Register	Use
Complete	Develop	Name	Resolve	Work
Consult	Diagnose	Narrate	Resume	

The following, in contrast, is a list of verbs describing activities that are difficult to measure.

IMPRECISE ACTIVE VERBS

Appreciate	Forget	Know	Observe	Understand
Believe	Guess	Learn	Perceive	Warn
Discern	Ignore	Look	Think	

Exercises

DESIGNATING OBJECTIVES

Group work:

With the area previously chosen on page 25, fill in the following sections.

1. State the aims and goals of your training programme.

2. At what people is your educational programme aimed?

3. State your programme in the form of a general educational objective.

4. Formulate an intermediate educational objective.

Individually:

State 6 objectives that you consider priorities within the chosen area. Design two dealing with knowledge, two with attitudes and two with skills. Remember that there are themes in which the attitude or skill objectives are very difficult to formulate and most require some knowledge.

KNOWLEDGE
1.

2.

ATTITUDES

1.

2.

SKILLS

1.

2.

Group work:

Choose the six most important objectives from all those listed by group members. Choose two for each of the three fields.

KNOWLEDGE

1.

2.

ATTITUDES

1.

2.

SKILLS

1.

2.

Individually:

Label each objective as a priority (p), complementary (c), or accessory (a). Compare your results with those of the rest of the group.

Group work:

Complete the 4 elements (action, content, condition and criterion) that each of the selected objectives must have. Make sure that the verb used is a measurable one.

Operational
Objective 1
| Action
| Content
| Condition
| Criterion

Operational
Objective 2
| Action
| Content
| Condition
| Criterion

Operational
Objective 3
| Action
| Content
| Condition
| Criterion

Operational
Objective 4
| Action
| Content
| Condition
| Criterion

Operational
Objective 5
| Action
| Content
| Condition
| Criterion

Operational
Objective 6
| Action
| Content
| Condition
| Criterion

DISTINGUISHING FIELDS AND OBJECTIVES

Indicate in which of the fields, knowledge, attitude and skills, the following can be placed?

a   knowledge   d   knowledge and attitudes
b   attitudes   e   knowledge and skills
c   skills   f   knowledge, attitudes and skills

1.   Describe the clinical signs of Hodgkin's disease.
2.   Personally inform the relatives of a patient of the seriousness of the illness.
3.   Change a patient's dressing.
4.   Describe the normal guidelines to be followed to take a blood pressure measurement.
5.   Place adequately the sleeve of the blood-pressure apparatus.
6.   Offer the patient a seat when he enters the consulting room.
7.   Carry out an electrocardiogram and calm a patient suffering from a heart attack.
8.   Inform a patient of her situation, taking her knowledge into account.
9.   Draw the sections of the cranium from memory.
10. Number seven bones of the cranium.
11. Copy a histogram.
12. Construct a histogram from the data supplied.
13. Give an intramuscular injection following the supervisor's instructions.
14. Give information on the problems of abortion without moral judgements.
15. Considerately interview a patient about his illness.
16. Co-ordinate a health team.
17. View the other members of the health team positively.
18. Inform the authorities of a case of noticeable illness.
19. Fill in a death certificate.
20. Calm a five year-old child and suture a wound she presents.

Compare your results with those of your fellow group members and with those that follows.

Results

1. a	6. b	11. c	16. d
2. d	7. f	12. e	17. b
3. e	8. d	13. c	18. d
4. e	9. e	14. d	19. a
5. e	10. a	15. d	20. f

You probably did much better than you thought.
If not, don't worry; you'll do it better next time.

4. EDUCATIVE STRATEGIES
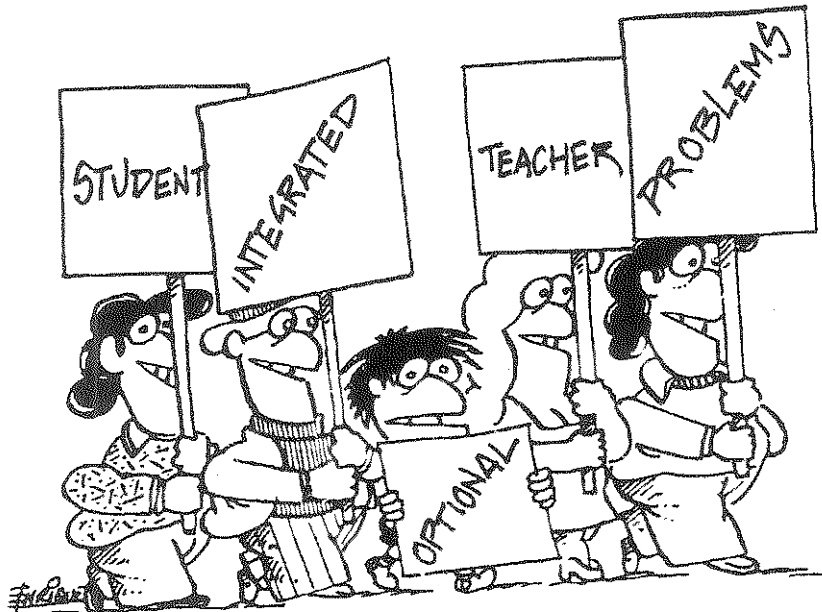
**Strategies constitute the philosophy
of the teaching and learning process
in a programme.**

After working through this chapter, the student should be able to:

- evaluate educational strategies according to the desired aims
- select the strategies most suited to the programme

The selection of educational strategies in health sciences constitutes one of the most important decisions in the planning or modification of a programme or a new curriculum. The adoption of a strategy conditions the teaching system in general: the educational methods, the evaluation and the infrastructure needed.

Harden et al.[a] identified 12 possible strategies that are most often used in the training of health professionals. In reality they comprise the extremes of six continua:

Centred on the student ◄————————► Centred on the teacher

Based on problems ◄————————► Based on information transmission

Integrated ◄————————► Based on disciplines

Directed at the community ◄————————► Directed at the hospitals

Based on optional courses ◄————————► Based on standard programmes

Systematic ◄————————► Opportunist

Another has been added.[b]

Multiprofessional ◄————————► Uniprofessional
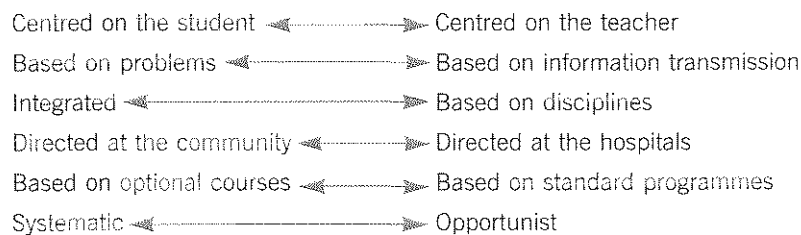
The more modern strategies on the left have often been considered opposites of the traditional ones on the right. It has been assumed that one would have to choose between them, when in reality a **whole range of intermediate possibilities exists**.

To train doctors or nurses capable of working in a rural environment, one must provide the chance to learn an environment similar to that in which they will work; that is, the teaching process should be based in the community, rather than in a hospital environment. If the trainees need to learn to solve problems, they should have opportunities to do so, and a teaching method based on problems should be constructed.

This does not mean that all the learning has to be carried out in the community and that hospitals cannot be used for learning, nor that all teaching must be based on problems. It means that teaching should be adapted as much as possible to the **functions and professional tasks** that have previously been defined, given that some strategies are more suitable than others to reach the desired aims.

Before starting any programme the **strategies** that are to be used should be clearly defined. This definition should take account of the aims of the programme and the possibilities and resources available. The strategies condition the teaching and learning methods.

---

a Harden et al. (1984), Heathcote et al. (1975).
b WHO (1988)

Each strategy has specific characteristics. As mentioned, however, the 14 that are discussed can be considered as the ends seven continua, different points along which can be chosen.

STUDENT-BASED AND TEACHER-BASED EDUCATION

> Student-based or teacher-based education raises the question of the focus of the instruction. The first is centred on what the student learns and the second on what the teacher teaches.

In student-based learning, students are responsible for their own learning and for choosing the path to follow to achieve it, and teachers become tutors. In an extreme case, students also establish their own objectives, and the system and timing of evaluation.

One may suppose that education always revolves around the student, but students usually have very little to say about the education they receive. It is the teacher who selects the content, the themes, the teaching methods, the books, the timetables. The opposite is true of a student-based strategy.

Probably, neither extreme is ideal. It is difficult to believe that medical students could establish their own objectives and seek the suitable methods to achieve them, without being distracted from the final objective. It is unreasonable, however, to think that the teacher must decide everything. In postgraduate or continuing education programmes, it is easy to understand that the students decide what learning or updating they need and the time necessary to carry it out.

One should strive for balance, working to take advantage of the experience of the teachers without limiting, where possible, the student's initiative.

Teacher-centred education is the one commonly used in faculties and schools. The teacher lectures every day on a subject decided by him or her or the department, often unknown to the students. The teacher decides when and how exams will take place and indicates the material to be used for study.

In student-centred education, students receive a list of objectives that determine the minimum to be learnt and a list of materials for study among which they can choose. When a student considers that he or she is capable of carrying out the objectives, he or she asks to be examined.

Student-centred education requires the teacher to become a tutor with a new role. In addition to transmitting information, the teacher must guide students and advise them on how to get the most from their time to reach the objectives. Good resource material should be provided to allow the students to find the information needed.

Student-centred education

ADVANTAGES	DISADVANTAGES
• It puts the emphasis on what the student learns.	• The students can divert themselves from the forecasted results.
• It increases motivation.	• As they do not feel pressured they can neglect their studies.
• It facilitates the learning process on adapting the study methods.	• The need for a wide range of resources.
• Studying becomes a completely personal task.	• Managerial structures have to be flexible.
• It puts the responsibility of learning on the student.	
• It facilitates the organisation of self-learning habits.	

Teacher-centred education

ADVANTAGES	DISADVANTAGES
• Experienced teachers.	• The initiative of the student is limited.
• The teacher guides the student down the path he/she believes to be the most convenient.	• Conditions the study habits of the students.
• The ease of evaluation.	• Forces the student to follow a specific methodology.
• The students are better controlled.	• Students do not feel responsible for their education.

PROBLEM-BASED LEARNING AND INFORMATION TRANSMISSION [a]

> **Problem-based learning** is a way of contracting and teaching courses by using problems as the stimulus and focus for students' activities. It is not the addition of problem-solving activities to otherwise discipline-centred curricula. [b]
>
> **Information transmission** is an educational strategy in which the teacher transmits, in an ordered manner and usually orally, knowledge to the students. The focus is on the acquisition of facts, concepts and principles.

a Barrows & Tamblyn (1980), Schmidt (1983).
b Boud & Feletti (1991).

While information transmission is the most widely used in universities, problem-based learning is closer to the reality of professional practice.

The patient goes to the doctor with a complaint such as pain, sickness or fatigue, and the doctor must use the information he/she possesses to deduce the causes, the physiopathology and come up with a diagnosis and a treatment. The patient does **not** provide the doctor with an explanation of the aetiology, the possible diagnosis or the tests necessary for the differential diagnosis. Nevertheless, this is how medicine is normally taught nowadays.

Problem-based learning focuses on developing learning for capability. Its goals go much further than just the acquisition of abilities to solve problems.

Professional Exercise   **Traditional education**

Solution 1   Solution 2   Solution 1   Solution 2

PROBLEM   PROBLEM

Solution 3   Solution 4   Solution 3   Solution 4
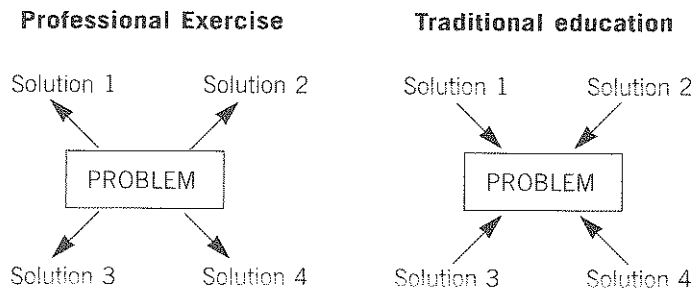
In problem-based education, a student is given, for example, the case of a patient with angina, in the form of a clinical history, from the information given by the patient. The student will have to determine the possible aetiologies of angina, the mechanisms of pain transference, the characteristics of cardiac circulation, the chambers of the heart, the relationship of the heart with other organs, etc.

Problem-based learning

ADVANTAGES	DISADVANTAGES
• The way of learning is similar to the professional practice. • It develops the problem-solving ability. • It facilitates the principle of transference. • It gives meaning to basic sciences. • It increases motivation. • It lays the foundation for a lifetime of continuing education.	• The complexity of planning. • The complexity of the structure. • The need for teacher-training. • The need for a high number of human and material resources.

Information transmission

ADVANTAGES	DISADVANTAGES
• Information is presented in an ordered manner. • The teacher can easily select what is important. • A "logical" structure of information exists. • It facilitates the presentation of new or conceptually difficult material.	• The way of learning differs from professional practice. • Students have to restructure their knowledge "a posteriori" in order to apply it.

INTEGRATED AND DISCIPLINE-BASED EDUCATION

> Integrated education is a system that implies the sacrifice of the peculiarities of the classical disciplines to incorporate all that is necessary for understanding a problem as a whole.
>
> Discipline-based education is a strategy in which disciplines are covered separately and individually

In integrated education, the disciplines lose their identity and are replaced by a new type of information organisation, based on specific themes or problems. The concept of integrated teaching is somewhat ambiguous, because it is applied to different forms of education.

There are as many types of curricula as institutions that practise integrated education. [a]

An integrated curriculum can be organised to link various subjects as they exist, or to define a global concept or general idea, that will give the teachers the basis on which to organise the relevant content. [b] Many possibilities exist.

Two types of integrated teaching have been differentiated: **Horizontal integration** coordinates the disciplines traditionally covered in the same course or year and **vertical integration** coordinates disciplines usually covered in different courses or years.

The combination of anatomy, histology and physiology in the second year of Medical School could be considered as horizontal integration. Likewise, the coordination of anatomy, histology, internal medicine, surgery, radiology, etc. to focus on the digestive system would be an example of vertical integration (see diagram).

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a Heathcote et al. (1975), Ingham (1979).
b Benor (1982), Kelly (1982).

| ANATOMY |
| stomach position |

PHYSIOPATHOLOGY

pain causes

MEDICAL PATHOLOGY

other symptoms

STOMACH PAIN

production mechanism

PHYSIOLOGY

pain transmission

PHYSIOLOGY
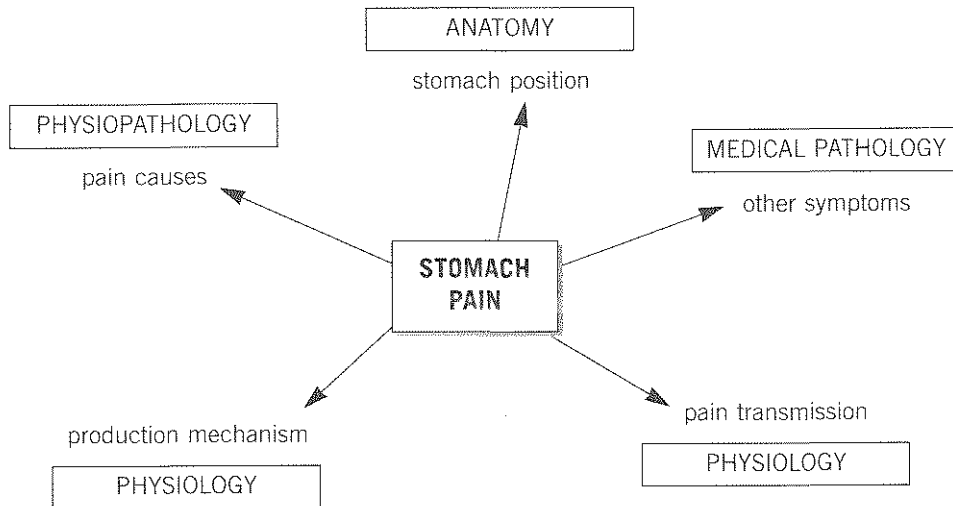
Nowadays, teaching staff specialise in specific professional areas of research or clinical work. This makes it easier for many teachers to practice integrated teaching, using a system-based approach, than traditional discipline-based education.

The term **integrated teaching** is often used to describe what is really coordinated teaching. The two are very different, however. In integrated teaching, traditional disciplines lose their identities to change into a new discipline. In coordinated teaching, disciplines maintain their identity, but are applied in a logical and ordered way to a common problem. [a]

Integrated teaching
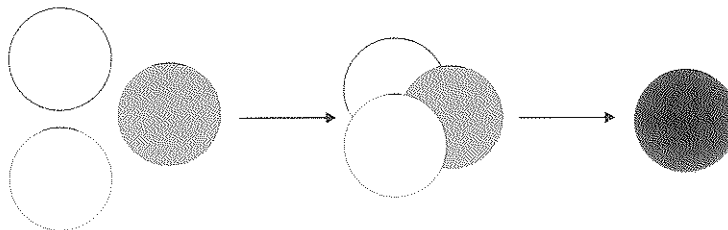
Co-ordinated teaching
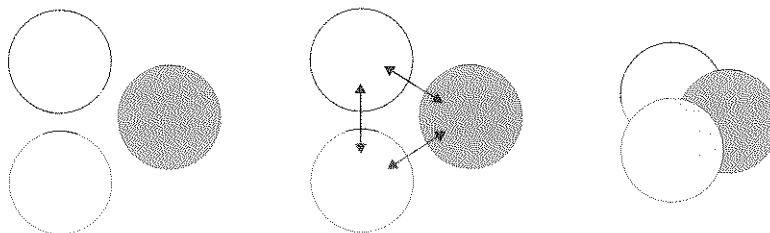
a Heathcote et al. (1975).

Discipline-based teaching
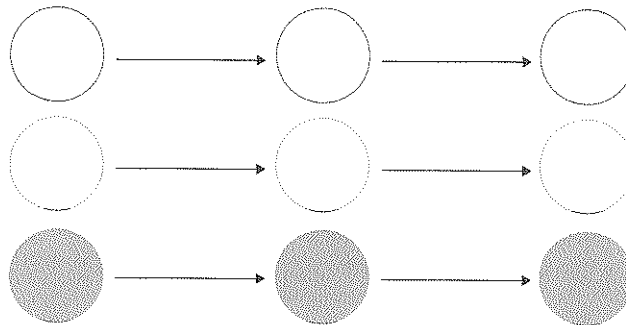
In discipline-based education, disciplines retain their separate identities and all those related to a problem are studied separately.

In the case of angina, the student will study, by means of books or information from the teacher, the anatomy of the heart first, physiology second, and then pathology and therapeutics.

Integrated education

ADVANTAGES	DISADVANTAGES
• It reduces the fragmentation of teaching. • It covers content in a coherent way. • It facilitates learning. • It increases both memory and transference capacity. • It avoids unnecessary repetition. • It saves time.	• It needs a lot of planning time. • There is no fixed timetable for the teaching staff. • The programmes' autonomy. • The loss of autonomy in dealing with the students. • The evaluation system is complex. • Existing texts are inadequate to the strategy. • Teaching staff lack training in the strategy.

Discipline-based education

ADVANTAGES	DISADVANTAGES
• It is scientifically coherent. • Teachers are trained in the strategy. • Educational material for the strategy exists. • It gives security to both teacher and student. • The teacher can put his/her personal experience into practice.	• It breaks up the teaching process. • Discussing the disciplines separately creates unnecessary repetition.

COMMUNITY BASED/HOSPITAL BASED EDUCATION

> Community-based education focuses on individuals and population groups and takes account of the health needs of the community concerned.[a]
>
> Hospital-based education focuses on the main teaching hospitals and problems encountered in them.

The philosophy of community-based learning requires that some or all learning take place in settings such as health centres, homes and community associations.

If **learning is more effective when it is closest to professional practice**, the type of worker being trained determines the strategy to use.

The exposure of students, (in nursing as much as in medicine or other professions related to health sciences), only to tertiary-level hospitals has led to the training of minispecialists all over the world. Tertiary-level hospitals deal with only 15% of diseases, which limits the exposure of the students to the most common pathologies. In some countries, owing fundamentally to the malfunctioning of the health care structures at lower levels, this distortion has been slightly relieved because the tertiary-level hospitals have taken on tasks that were not assigned to them at the start. This has allowed students to observe primary care.

There is a global movement to shift the emphasis of undergraduate teaching from hospitals to the health centres or primary health care centres. The idea is that the graduate from medical school should be closer to a general practitioner than one of a compendium of specialists. Tertiary hospitals are an excellent setting for postgraduate training.

Community based education

ADVANTAGES	DISADVANTAGES
• It allows a more varied group of patients.	• Performing diagnostic tests.
• It places patients in their environment.	• The activities carried out by the students are difficult to control.
• It allows patients to be followed up.	• Staff trained to teach in this way are lacking.
• It helps the learning of a teamwork.	• Facilities to accommodate students are lacking.
• It exposes the student to the most common diseases and those that need only ambulatory care.	• There are administrative difficulties for cooperating centres, which are usually outside the education system.

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a WHO (1987).

Hospital-based education

ADVANTAGES	DISADVANTAGES
• It allows in-depth study of patients. • It allows the learning of complex gnostic and therapeutic techniques. • It facilitates communication with a variety of specialists. • It puts the student in touch with specialised medicine. • It puts the student in touch with clinical sessions.	• Conflict between the hospital's needs and educational needs. • Differences between the needs of the patients and the students. • Highly specialised or surgical pathologies. • Teaching of highly technical medicine.

ELECTIVE-BASED OR STANDARD-BASED EDUCATION

> Teaching based on electives is that in which students make up their own curriculum by selecting courses within the range offered to them.
>
> In standard-based education, the curriculum is fixed in advance and all the students pass through a set of prescribed courses, with no opportunities for choice.

Everybody recognises the need for the acquisition of a series of obligatory minimum skills and knowledge for professional practice in health sciences, but the establishment of **elective courses** permits both teacher and student to **deepen their knowledge in the areas that most interest them**, without having to include them in the main body of the curriculum. Electives can also relieve the curriculum of less important, although interesting, areas. Some American universities follow a curriculum with standard programmes in the first two or three years and allow specialities to be included as electives in the last one or two years.

In a system using electives, teachers do not feel the need to include highly specialised areas in the basic curriculum. They also have the opportunity to demonstrate and share their knowledge in the areas in which they are specialists.

Elective-based Education

ADVANTAGES	DISADVANTAGES
• It increases motivation. • It allows early specialisation. • It allows the teachers and students to pursue the subjects that interest them. • They provide students with some responsibility for the direction of their studies.	• It can derail the educational process. • It can overload the curriculum. • It can be difficult to fit into the programmes. • Comparative assessment is difficult to carry out.

Standard-based Education

ADVANTAGES	DISADVANTAGES
• The programme is uniform. • All the students receive the same training, so comparative assessment is very easy.	• It does not encourage the initiative of the students.

SYSTEMATIC AND OPPORTUNIST EDUCATION

A systematic programme requires the students to reach a set of clearly defined objectives and is methodically organised in accordance with them.

An opportunist programme is the one that is conducted on the basis of the opportunities that arise, with no definite plan.

Some opportunism is unavoidable. One cannot, for example, study non-existent patients. On the other hand, practical activities should be regulated to an extent that allows the students to cover the minimum established.

An opportunist continuing education programme is based on courses or lectures that are selected according to the availability of lecturers or the patients that come to the Teaching Centres during the tuition period, without taking account of the educational needs. A systematic programme tackles the themes considered necessary.

To avoid a lack or shortage of patients with a specific pathology, some universities use models or simulated patients to cover the needs. Simulated patients are people trained to fake one or several illnesses They learn to answer questions, simulate signs and symptoms and even responses in physical examination.

Systematic education

ADVANTAGES	DISADVANTAGES
• It allows the teachers and students to cover the objectives. • Needed resources are allocated. • Programmes are adjusted to needs.	• Careful planning is needed. • Materials are expensive. • The resources are difficult to secure.

Opportunist-based education

ADVANTAGES	DISADVANTAGES
• No previous planning is needed.	• What is learned may be irrelevant. • What is learned may not correspond to the objectives.

MULTIPROFESSIONAL AND UNIPROFESSIONAL EDUCATION [a]

> In multiprofessional education, students who do or will follow different careers learn together during certain periods of their training.
>
> Uniprofessional education is the traditional way of teaching, in which education is oriented to only one profession.

Multiprofessional education is not an aim in itself, but a means of easing the work of different professionals in a team, in order to meet society's demands.

The introduction of multiprofessional training in undergraduate teaching is difficult, owing to the differences in technical content and the administrative structure. It is an excellent method, however, for postgraduate training or continuing education of already established groups. Thus, a course on drug addiction could include the different types of personnel on a primary health care team.

In a university, students aiming for different careers can learn together the things they have in common, and divide to learn the technical details of their future professions.

As mentioned, the strategies paired in this chapter are seen as antagonists. In reality, they represent the extremes of a common philosophy. Considering only the extremes can cause more problems than it solves.

The most reasonable and feasible solutions seem to meet at points somewhere between the extremes.

While planning a programme, one must seek the most suitable parts of each strategy to carry it out, depending on the desired aims, the nature of the programme and the available resources. Modern pedagogy tends to lean towards the strategies situated on the left-hand side but, a programme can fail by being too ambitious in its proposals. The teacher must identify the strategies that will achieve the objectives most effectively while considering the resources available.

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a WHO (1988).

Exercises

PAST STRATEGIES

1. Think of the curriculum you followed when you did your university degree, or some of the subjects, and place them in the lines that unite the different strategies. The closer the learning was to one strategy, the closer you must place the X to that option.

   Student-based_____Teacher-based
   Problem-solving_____Information transmission
   Integrated_____Discipline-based
   Community-based_____Hospital-based
   Elective_____Standard
   Systematic_____Opportunist
   Multiprofessional_____Uniprofessional

2. Now place an X on the spots where you think they should have been.

   Student-based_____Teacher-based
   Problem-solving_____Information transmission
   Integrated_____Discipline-based
   Community-based_____Hospital-based
   Elective_____Standard
   Systematic_____Opportunist
   Multiprofessional_____Uniprofessional

3. Observe the difference and take it into account when designing your programme.

FUTURE STRATEGIES

1. Place an X where you consider that the programme you are working with through this book should appear on each line that unites the different strategies.

   Student-based_____Teacher-based
   Problem-solving_____Information transmission
   Integrated_____Discipline-based
   Community-based_____Hospital-based
   Elective_____Standard
   Systematic_____Opportunist
   Multiprofessional_____Uniprofessional

2. Compare your results with those of the rest of your group and draw up a new list.

Student-based_____Teacher-based
Problem-solving_____Information transmission
Integrated_____Discipline-based
Community-based_____Hospital-based
Elective_____Standard
Systematic_____Opportunist
Multiprofessional_____Uniprofessional

5. METHODOLOGY
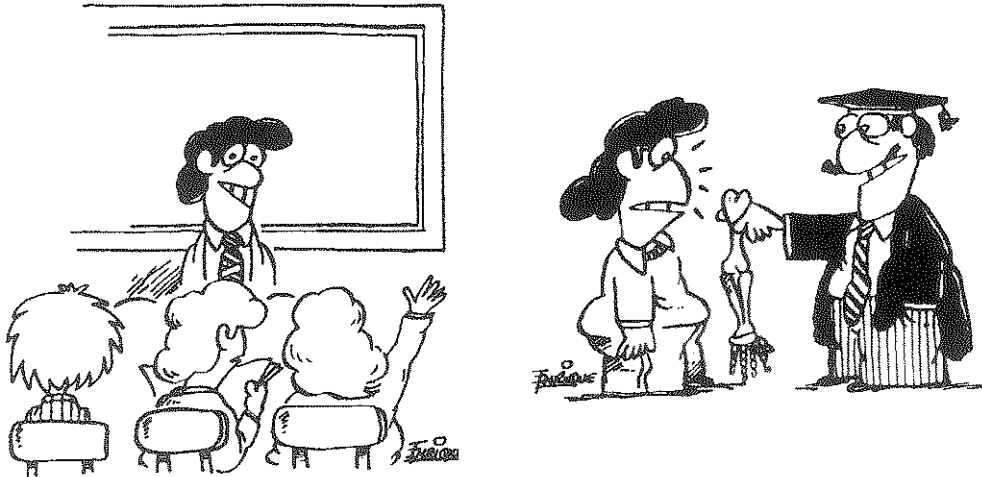
**The methods to be employed will depend
on the objectives to be achieved.**

After working through this chapter, the student should be able to:

- select the most suitable method to achieve the objectives
- evaluate the different methods according to their usefulness for learning.

INTRODUCTION

Etymologically, method means **way towards**.

> The pedagogical method is the path that must be followed in order to offer knowledge in the easiest and most advantageous way possible, putting into practice, in an ordered and rational way, as many principles and rules as necessary.

Taking account of the characteristics of learning and the conditions in which learning is more effective (see p. 10), one must look for the most suitable methods within the range of possibilities to facilitate learning as much as possible.

There are no universal rules for the selection of methods to be employed. Some students learn better with a given method, and some teachers teach better with a given method. [a]

> A method that **teaches** students to observe the sclerotic is to give them a demonstration followed by a practical session. If the teacher **demonstrates** with a patient, he or she will have to do it **individually** or in small **groups of students**. If the teacher uses a video, however, he or she could work with a larger group. The teacher could use slides, patients, text with photographs, etc. to show the difference between a normal sclerotic and a bloodshot one.

The selection of a method depends on the goals, the available materials, and the number of students. The suitability of methods to be used depends on what students should learn, that is, on the Educational objectives. [b]

> If the objective is to **enable** the students to measure blood pressure, they will have to learn to do it through a practical session. It will not be enough simply to tell them how it is done. If the students are to learn the basics of electrocardiography, different systems can be used: a lecture given by an expert, a seminar, a self-study module, a textbook or a manual.

In principle there are four types of instruction systems. [c]

In **information gathering**, the teacher transmits information to the students through:

- Lectures
- Demonstration sessions

In **discussion sessions**, learning is based on the discussion of subjects or problems by the students or with the teacher through:

- a seminar
- problem-solving sessions
- a workshop

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a Bork (1981), Davies (1981).
b Cox (1978).
c Collins (1962), Davies (1981), Miller & Fulop (1974), Newble & Cannon (1983).

In **practical sessions**, the student learns to carry out the tasks that he or she will have to perform later. The sessions can be:

- real
- simulated (role-playing games, simulations)

In self-learning, students learn by themselves, without the intervention of the teacher.

Two or more of these systems can be mixed.

Lecture

In a lecture, the teacher transmits his or her knowledge to the students.

ADVANTAGES	DISADVANTAGES
• It is a good method to transmit information that is outside the grasp of the students or may be complex. • It allows the teaching of a large number of students at once. • A wide range of knowledge can be covered. • It allows the teacher to pass on his or her personal experience. • It allows the reiteration of important points and gives a suitable overview of the subject. • It allows the teacher to stimulate the students' interest and motivate them to learn.	• It is a passive process without student participation. • Learning has to be carried out *a posteriori*. • The student' attention soon wanders. • Few teachers know how to maintain the students' interest and give the relevant information at the same time. • There is no way to know whether the students are actually learning. • There is no feedback.

Although the advantages seem to outnumber the disadvantages, the negative factors are very important. They show that lecturing lacks the factors that facilitate learning. Several authors have studied the efficiency of different pedagogical methods for transmitting information, without coming to definite conclusions. [a]

A well structured lecture constitutes a useful teaching method that should not be rejected *a priori*. It provides a good method for passing on information, that is not available elsewhere.

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[a] Blight (1970), Womersley et al. (1974).

Lectures have been harshly criticised and even totally eliminated from the most modern health sciences teaching centres. Along with other methods, they have their place in education centres.

One must remember, however, that the **lecture** is a method for transmitting information and not for learning. Learning must take place afterwards.

A lecture could be used to introduce a subject or discussion (seminar, workshop) or to present guidelines for practical work.

A variation of a traditional lecture that allows student participation is called a participatory lecture.

Participatory lecture

In a participatory lecture, the teacher transmits his or her knowledge orally to the students while the students actively participate.

The most frequent form of participation is the instigation of student participation through dialogue or questions.

ADVANTAGES	DISADVANTAGES
• It is a flexible method.	• It immediately rules out the possibility of a large class (more than 40)..
• IIt can be used jointly with other methods.	
• It requires the active participation of the student.	• It limits the possibility of covering a wide area of knowledge.
• It stimulates the student's interest.	• It is difficult to maintain the structure and to cover the preset objectives of the lecture.
• It allows the passing on of complex information.	• It takes up more time than the straight programmed lecture.
• It allows emphasis of the most important points.	• There is no way to know whether the students are actually learning.
• It enables the teacher to pass on his/her professional experience.	• There is no feedback.

The participatory lecture can be considered as an intermediate point between the lecture and discussion sessions. In the literature, it is sometimes called a programmed lecture.

Demonstration sessions [a]

> Demonstration sessions show the students how to carry out a practical activity, or reiterate the need for the acquisition of knowledge or attitudes.

The teacher can run demonstration sessions or videos and films can be used, with or without the teacher being present. This method is useful if it is followed up by the repetition of the practical activity or the study of the subject by the students. If not, its efficiency is doubtful.

ADVANTAGES	DISADVANTAGES
• It is a flexible method that can be adapted to the student's pace. • It can serve a large number of students if they can observe closely. • It shows the student how a task should be done before he/she carries it out.	• Learning has to be carried out *a posteriori.* • The student does not take part, it is a passive method.

The main thing to remember is that learning is very limited if **information transmission** is not followed up by study or practice.

Nevertheless, information transmission sessions are excellent for:

- communicating ideas to the students;

- passing on professional experience that would otherwise be difficult for students to acquire;

- motivating students and getting them to be enthusiastic about a subject;

- teaching students the correct attitudes;

- providing students with information for carrying out practical tasks; and

- showing students how to behave correctly.

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a Davies (1981), Newble & Cannon (1983), Tiberius & Sackin (1988).

Seminars [a]

Seminars are discussion sessions on theoretical subjects, generally led by a teacher.

In general, seminars are considered a way of clearing up any queries or doubts. They are very useful for this purpose, but their primary function is, during discussion, to teach the students to learn to reason and think in a scientific way.

ADVANTAGES	DISADVANTAGES
• They are an excellent method of learning.	• They take up a lot of time.
• They consolidate the theory already learnt.	• Only a limited number of themes may be tackled.
• They are highly stimulating and motivating.	• The number of pupils has to be low (maximum 15).
• They allow deeper exploration of important points.	
• They help the student learn to reason.	• The discussions can address irrelevant subjects.
• They facilitate the teacher-student relationship.	• It is difficult to make all students participate.
• They assist teachers to get to know students individually.	• There is no feedback.
• They provide feedback about learning.	

To be effective, seminars must:

• be structured
• have clear objectives
• have a small number of students

Therefore, students must come to a seminar with prior knowledge of the subject to be discussed, so that they can take part in the discussion. Otherwise the seminar becomes a waste of time and changes into a lecture.

a Blight (1970), Miller (1962), Miller & Fulop (1974).

Problem-solving sessions [a]

> The aim of problem-solving is to make students learn how to solve problems in practice.

The problems used in sessions can be based on real or simulated cases. In real cases, it is convenient to eliminate the irrelevant information, particularly when one is dealing with students unfamiliar with the subject, to ensure that the student does not waste time. On the other hand, oversimplification can distance the case from a real-life situation.

The problems have to be related to the objectives and to what the student has to learn, taking account of what the students already know. Students with little knowledge who are asked to solve complex and difficult problems will only become confused.

ADVANTAGES	DISADVANTAGES
• Learning is active.	• The groups must have a small number of students (approx. 7).
• Learning is usually related to professional practice.	• The preparation of the problems takes a lot of time.
• The learning situation simulates professional needs better than those of the methods previously discussed.	• It is difficult to construct a programme based on problems.
• It teaches students to reason.	
• They help the student learn to reason.	
• It is motivating.	
• It helps to apply the transference principle.	

Teaching based on solving or discussing problems can have two different aims:

(a) Through problem-solving the students learn things not directly related to the problem; as in the study of morphology (relations and histology of the stomach) in the case of a patient with a stomachache; or the study of nervous anatomy and physiology and the mechanisms of hypertension, in a case of cranial hypertension.

(b) Pupils learn to solve specific problems that occur and transfer their knowledge from one situation to a similar one. As would be the case in the correct diagnosis of the cause of the stomach pain and the correct application of the suitable treatment; or diagnosing arterial hypertension and its causes.

Teaching based on problems, therefore, can be a general strategy or a method, depending on the desired goal, and the structure of the problems and course.

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a Anderson & Reder (1979), Normen (1988), Romiszowski (1981), Schmidt (1982).

Practical sessions

In practical sessions, students acquire skills through practice.

The students must repeat the task as many times as is necessary, until they master it.

It is the most active and motivating form of learning. It can be used in **two learning situations** depending on the resources available and the specific task to be carried out. In a real-life situation, the students learn in the environment in which they will have to carry out the task.

A nursing student will learn to change the bed sheets in hospital wards, with patients, or schoolchildren will be taught to clean their teeth in the bathroom with real toothpaste and toothbrushes.

In a simulated situation, which is as close as possible to the real-life situation, dummies, simulators, simulated patients, etc., can be used.

A nursing student can learn how to change bed sheets in a demonstration room with a dummy or with a fellow student, and can perfect the technique at home. Children can be taught to clean their teeth in a classroom with a brush, but without toothpaste or water.

One of the techniques used to teach attitudes is role playing. Students and/or teachers play the role of patients, relatives, or professionals in different situations, just as in a play. It makes the students consider their attitudes and how they will react in specific situations, or their ethical attitudes to subjects with moral implications.

Practical teaching is the most difficult facet to carry out successfully, owing to the high cost of staff, material and time. It is also the one that most closely relates to the aims to be achieved (if these are not purely intellectual knowledge objectives), and the most motivating to students, and **it makes sense of theory.** Students can learn practical skills only by practising the task to be carried out.

The **simulated** patient has become a good instrument in certain universities. Actors or other people are trained to simulate some illness, faking signs and symptoms and responses during physical examination. Students can practise without the ethical concern of using real patients. Simulated patients can also be used for evaluation purposes, providing a stable situation with different students. Training simulated patients is costly, and affordable by few schools. When using simulated patients, it is important to select the most useful illness to simulate.

Self-directed learning

> In self-directed learning, the student works without the presence of information given by the teacher.

Self-directed learning is a misleading term because **all learning is a self-learning process**. The student is the one that has to learn and no one else can do this. The teacher or the material used can only facilitate this work.

In self-directed learning, the student uses self-instructional materials without the assistance of the teacher. These materials include problems, practical work with guidelines or any other educational material for the purpose.

This does not mean that the student must work alone, although he or she does so most of the time. It means that the student works when he or she considers it appropriate.

The terms **self-directed learning, individual learning**, and **programmed education** are usually used indiscriminately in the literature.

ADVANTAGES [a]	DISADVANTAGES [a]
• The student can study at his/her own pace and within his/her own time-frame.	• It presents difficulties in preparation of materials.
• The student can take as much time as he/she likes on different subjects.	• The materials are difficult to adapt.
• It allows adaptation to the preference of the student.	• Assessment of the student is difficult to make.
• It permits continuous self-evaluation.	• A wide range of resources is necessary.
	• Tutors are needed.
	• If not well planned, it can become an inflexible learning system.

> In individual teaching, the teacher works with students individually, and uses different resources, according to the preferences of the students.

Individual teaching is closely related to the personal preferences of the students, their motivation, personal capacities and learning skills.

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a Manwaring (1979)

> Programmed education is based on the principles of self-directed learning. It is carefully designed so that the students may reach the desired objective without the help of a teacher, by means of progress through a set of sequential approaches.

The real educational innovation of programmed education [a] is the emphasis that it puts on the answers given by the students and the consequences for the continuation of the problem. A programmed text should arouse the students' curiosity, incite them to make decisions and provide them with feedback on their decisions.

Learning may be unsuitable if the acquired conduct presents itself in inappropriate situations or in an inadequate way. The learnt conduct must become apparent in a precise way in the presence of suitable stimuli.[b] In health sciences, the stimuli can be the signs and symptoms, indications and contraindications, etc. The failure of the response to the correct stimuli can give rise to mistaken diagnoses with possible serious consequences for patients.

Problem structures

Programmed teaching employs problem structures with four elements: [c]

- lineal or branched structure
- open or closed answer

With a closed lineal structure, the student is obliged to make decisions about a series of questions posed, and can only proceed through correct answers. No possible answers are offered.

You are called to an emergency: a 45-year-old man with pericardial pain.

1. *On your way to the scene, you think about the possible diagnosis. Which do you think is the most probable?*

2. *What information should you receive on your arrival?*

3. *What sort of physical examination must you carry out?*

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a Skinner (1954).

b Ferster & Skinner (1957), Guild (1977), Honing (1966).

c Harden (1983).

CLOSED LINEAL STRUCTURE
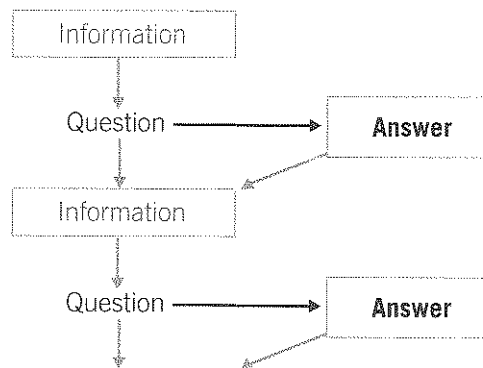
With a closed lineal structure, each question has various possibilities, although the student can progress through the problem only/through the correct answer.

David's parents take him to the surgery because he has spent the whole night coughing. He is 14 years old and has a history of dry coughs.

1. *What action would you take?*

   a. Prescribe antibiotics   *No, try another option.*
   b. Prescribe cough medicine   *Yes, go on to Question 2.*
   c. Send him to hospital   *No, try another option.*
   *d. Calm the patient*   *Yes, and what else?*

2. *You decide to prescribe a cough medicine and tell him to come back in two weeks. When he comes back his situation has not improved. Which is the most probable diagnosis?*

   a. Allergy   *Yes, go to Question 3.*
   b. Sinusitis   *No, try another option.*
   c. Infectious Bronchitis   *No, try another option.*

3. *Which investigations will help you to carry out the diagnosis?*

   a. Exercise test   *No, try another option*
   b. Tests with allergens   *Yes, go to Question 4.*
   c. Chest X-rays   *Yes, and what else?*
   d. Blood test   *No, try another option.*

CLOSED LINEAL STRUCTURE
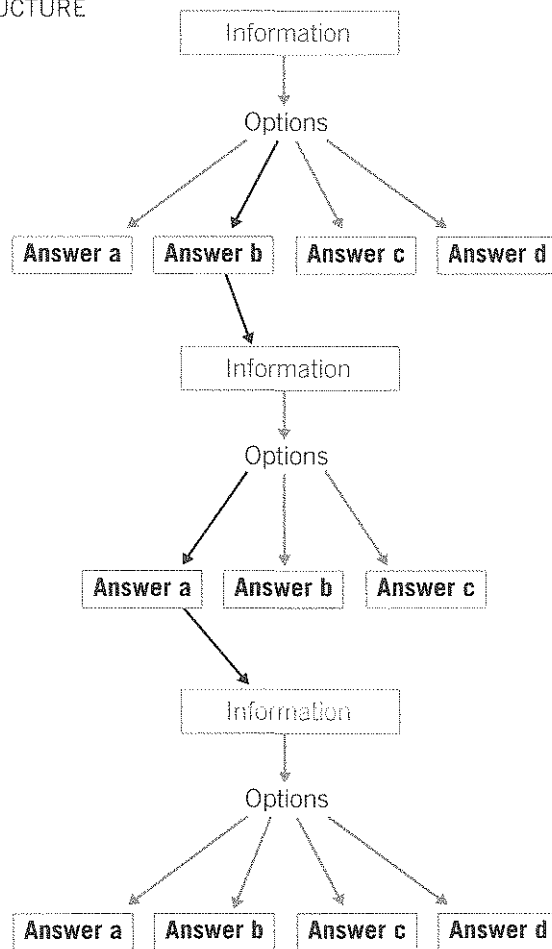
With a **branched structure**, the answers depend on the chosen route. Each question has various possibilities, and the problem progresses through each of the answers.

In the following example with a range of 1–16 questions-answers, only three possibilities are presented.

David's parents take him to the surgery because he has spent the whole night coughing. He is 14 and has a history of dry coughs.

    1. What action would you take?

          a. Prescribe antibiotics   *Go to Question 6.*
          b. Prescribe cough medicine   *Go to Question 7.*
          c. Send him to hospital   *Go to Question 8.*
          d. Calm the patient   *Go to Question 9.*

2. You decide to prescribe cough medicine and tell him to come back in two weeks. When he comes back his situation has not improved. Which is the most probable diagnosis?

     a. Allergy   Go to Question 10.
     b. Sinusitis   Go to Question 11.
     c. Infectious Bronchitis   Go to Question 12.

3. Which investigations will help you to carry out the diagnosis?

     a. Exercise test   Go to Question 13.
     b. Tests with allergens   Go to Question 14.
     c. Chest X-rays   Go to Question 15.
     d. Blood test   Go to Question 16.

CLOSED BRANCH STRUCTURE
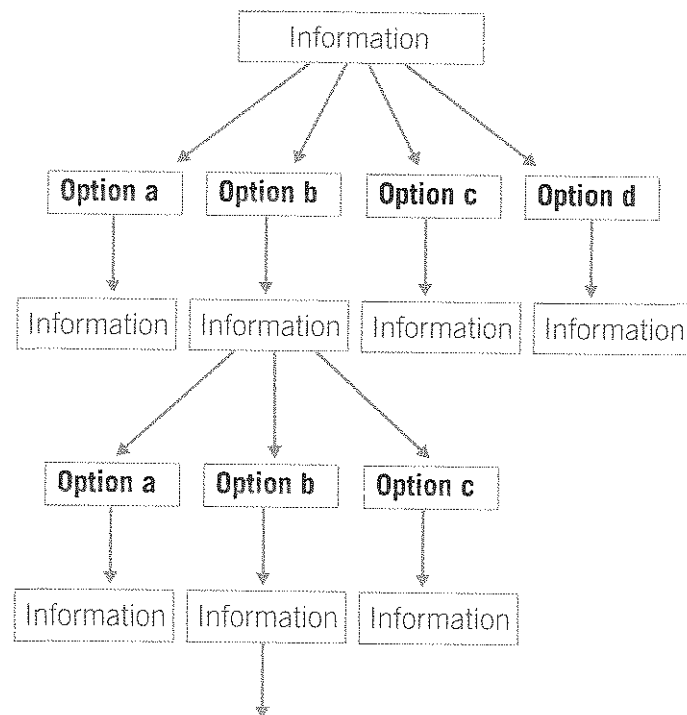
With an **open branch structure**, the student determines his or her own route and can choose what to do after making the choice.

A patient comes to the surgery with stomach pains. What measures will you take?

    a.   *Widen the clinical history.*

    b.   *Carry out a physical examination.*

    c. *Arrange a radiography.*

If you decide to widen the clinical history, what information would you ask for?

If you decide to carry out a physical examination, how would you direct it?

If you want a radiography, what information can you get?

These problems are very difficult to work out, even with a computer, owing to the large quantity of variables that they cover and the possibilities of using different terms that can be identified by the computer.

OPEN BRANCHED STRUCTURE
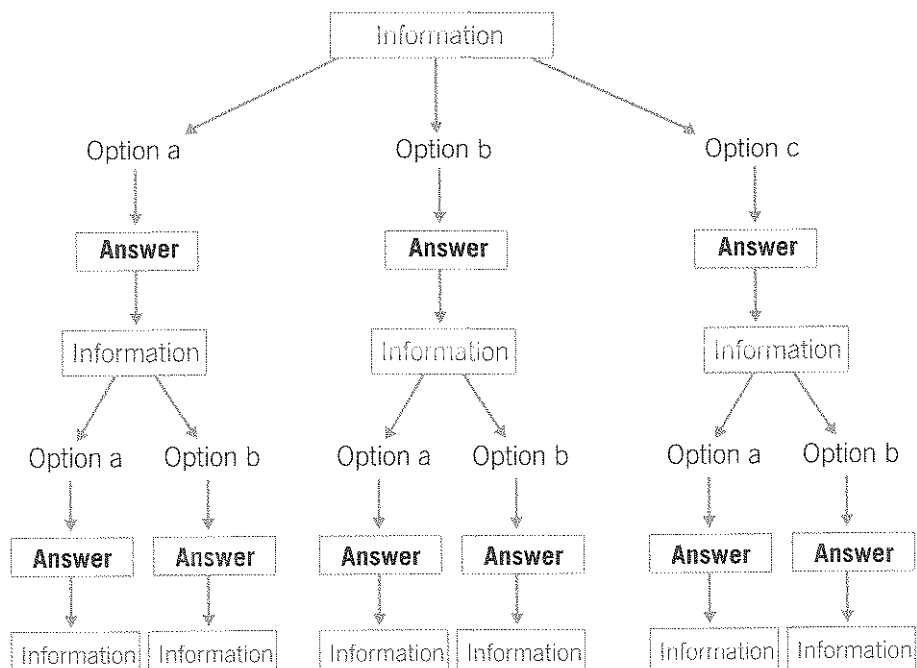
Exercises

MATCHING METHODS TO OBJECTIVES

For each of the previously chosen objectives (see page 25) work individually to assess which method you would use to facilitate learning.

OBJECTIVE	METHOD
1.	
2.	
3.	
4.	
5.	
6.	

Now compare your option with those of your fellow group members and make a definitive list.

OBJECTIVE	METHOD
1.	
2.	
3.	
4.	
5.	
6.	

If only one method could be selected for the entire programme, which would you select and why?

EVALUATING METHODS

Evaluate each of the following instruction methods on a scale from 1 to 3:

A **active** or **passive** student involvement
   (3 = active, 2 = depending on how it is carried out, 1 = passive)

B provides **feedback** or notes to the student about his or her learning situation
   (3 = yes, 2 = relative feedback, 1 = no).

C Based on **learning** or **teaching**
   (3 = learning. 2 = in between. 1 = teaching).

Method	Active/passive	Feedback	Learning/Teaching
Lecture			
Participatory lecture			
Demonstration sessions			
Seminars			
Problem-solving sessions			
Practical sessions			
Self-directed learning			

Compare your results with those of the rest of your group and with those below

Method	Active/passive	Feedback	Learning/Teaching
Lecture	1	1	1
Participatory lecture	2	1	2
Demonstration sessions	1	1	1
Seminars	2	2	3
Problem-solving sessions	3	3	3
Practical sessions	3	2	3
Self-directed learning	3	2	3

The points given to the different methods are only approximate values.
If this correspond with your answers, well done!

Now, on a scale from 1 to 3, evaluate the efficiency of the different learning methods in each of the different domains of objectives: knowledge, attitude, practical skills, and as an information gathering or learning process.

3 = very efficient, 2 = depending on the situation, 1 = inefficient

Method	Domain			Process	
	Knowledge	Attitude	Skills	Transmission	Learning
Lecture					
Participatory Lecture					
Demonstration sessions					
Seminars					
Problem-solving sessions					
Practical sessions					
Programmed education					

Compare your results with those of the rest of your group and with those below:

Method	Domain			Process	
	Knowledge	Attitude	Skills	Transmission	Learning
Lecture	2	2	1	3	1
Participatory Lecture	3	3	1	3	1
Demonstration sessions	2	2	2	3	1
Seminars	3	3	1	3	3
Problem-solving sessions	3	3	1	1	3
Practical sessions	3	2	3	1	3
Programmed education	3	1	2	2	3

The values are approximate, but your answers should not differ from them very much.

6. RESOURCES
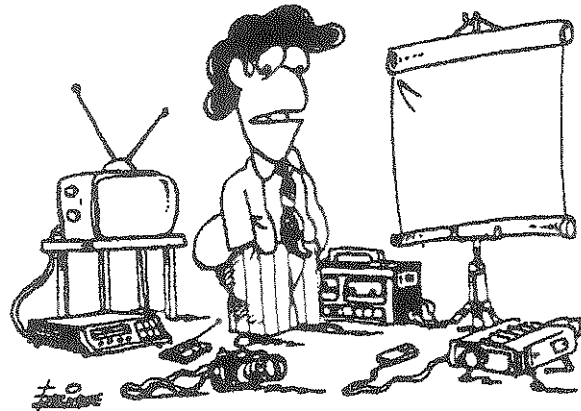
The resources available condition the teaching methods.

After working through this chapter, the student should be able to:

* indicate the resources that condition the teaching methods

* state the different types of complementary material

* select the complementary material most suited to the aims

* state the characteristics that illustrations should have

* describe the aim of using pictures.

If the objectives determine the methods selected, the resources available condition the choice of methods or strategies to apply.

If there is no video library, it will be difficult to base the teaching on videos. If there is only one teacher, it would be difficult to have small groups; if the number of pupils is high and no self-study modules have been designed, the effectiveness of self-learning will be doubtful.

TEACHING STAFF

Teaching staff are rarely selected on the basis of their teaching capabilities. For example, health sciences teachers in Spain are selected according to their investigative and clinical capabilities, on the assumption that a good scientist or professional is automatically a good teacher.

Different teaching methods require **different skills** from teaching staff. In a programme based on expert lectures, the teachers should be good orators. If there are a lot of seminars, the teachers should be capable of listening to and chairing the discussions. If teaching is based on problem solution or on self-study, they should assume the role of tutors, etc.

The Teacher/Pupil Ratio

Although it is normal to talk about the number of students, what really conditions the teaching methods is the teacher/student ratio. It determines the size of the groups that can be made and, consequently, the type of teaching to be used.

If there is only one teacher for one subject and a group of 500 students, he or she cannot teach all of them how correctly to take an accurate blood pressure reading; this calls for individual teaching. Similarly, the teacher cannot discuss students' individual problems as they emerge while they study the basics of electrocardiography.

GROUP SIZE

The ideal size of a group of students depends on the situation, but teaching is in general more effective in small groups. In deciding on the size of a group, one should consider:

- the nature of the task to be achieved, the field to which the objectives belong;
- the number of students;
- the chosen method or strategy;
- the time available;
- the number of classrooms available.

Practical sessions require smaller groups than do discussion sessions, and these in turn need smaller groups than the expert lectures. The objectives in the field of practical skills require smaller groups than the cognitive field.

CLASSROOMS

Classrooms are an important factor in the planning of a programme, but are rarely taken into account. The classroom determines whether the atmosphere that is created is productive.

One must consider the following characteristics of classrooms, which determine the kinds of teaching methods that can be used:

- size
- seating arrangements (fixed, mobile, etc.)
- presence of individual or communal tables
- presence of adequate lighting arrangements (for slides, etc.)
- acoustics

Individual teaching requires individual seating; a discussion session requires that all participants can see each other's faces. A slide show must take place in a dark room.

COMPLEMENTARY MATERIAL

Complementary material is used to facilitate teaching and learning. Four main types can be distinguished: printed material, projected material, real patients and simulations.

Printed material includes:

- books
- magazines
- information sheets
- posters

Printed material is essential as a complement to other techniques. Students can use it at their own pace and according to their needs. Journals are the principal means of disseminating information on new scientific advances. Information sheets or posters constitute a support and reference element in health campaigns.

Projected Material includes:

- slides
- transparencies for overhead projectors
- videos
- programmes
- films

Despite the boom in the field of audio-visual resources in the last decade, they have been used indiscriminately without evaluation of their effectiveness in achieving the aims desired.

Students can watch videos of expert lectures without the need for the presence of the lecturer. As a teaching method, however, this has been a failure because the students get bored and lose interest quickly, and no interaction occurs.

Each method has a specific place in teaching and must be used according to its possibilities.

Slides:

- are very useful in large auditoriums
- can be easily adapted to self-study modules
- cannot be modified once they have been made
- must be shown in a dark room
- must be prepared in a laboratory before use.

Videos and films [a] **are ideal for demonstrating movement** or as a feedback system for the learning of skills and even attitudes. Videos and films:

- can be used in large or small groups
- cannot be modified after completion
- are not easily adapted to the learning situation.

In some centres, they are used to record students carrying out a specific exercise. Afterwards, the students, with or without a teacher, can check their performance and correct their mistakes. Teachers often have trouble with telling students exactly what they are doing wrong, and videos can help solve this problem. If one records how students carry out an exploration or interview a patient, and then analyses their work with them, significant changes result.

For many years, in health sciences, teaching has employed **real patients.** [b] This method places the student in a situation identical to that of professional practice, which leads to high motivation. The method also has certain limitations:

- Only a small number of patients can be seen.
- Only a few types of pathology can be seen.
- Ethical problems arise.
- The task cannot be repeated as many times as necessary until it is learned.

Simulations are complementary material that permits the creation of artificial situations that resemble, to a certain extent or in some of its facets, real-life situations. [c] This type of material includes:

- Computer programmes
- Simulators, models and dummies.

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a Afzal Mir et al. (1986), Beswick et al. (1982), Dunn & Fisher (1985), Kaufman & Kaufman (1983).

b Brownell & McDougall (1984), Carmel & Bernstein (1986), Dwyer et al. (1988), Linfords (1983), McLeod & Harden (1985), Morgan et al. (1972).

c McAvoy, B.R. (1988), Murray et al. (1977), Raj et al. (1982), Siegel & Parino (1988), Verbeek (1987).

Computers are very useful for teaching problem solution, and the most suitable for programmed teaching. They have several disadvantages, however:

- they are expensive;
- elaborating the programmes is complex; the closer the problem is to the real-life situation, the more complex its elaboration will be; and
- highly specialised staff are needed to design problems.

Simulators or dummies are very useful for practical teaching. They allow the student to acquire the necessary skills in a way that offers no risks, and to practice as many times as desired or necessary. They also give the student confidence. Although they have a high initial cost, they remain useful for a long time.

Nowadays, there are all sorts of simulators: plastic heads for the study of the back of the eye by placing slides in both eyes; for exploring the ear, for the study of anatomical structures. Dummies for birth simulation or for resuscitation including a computer that gives the student information on how he or she is doing. There are arms for the taking of arterial pressure and dolls that simulate babies for exploration, etc.

Simulated patients are specially trained people who learn to simulate symptoms. They are very useful, above all for the teaching of interview techniques. In general, they receive a salary, and therefore they consider patient simulation a job. No ethical problems exist as in the use of real patients.

The students and teachers themselves can act as patients for the simple examinations and to practise interviewing techniques. Role-playing games such as those often used in nursing schools allow students repeatedly to practise communication techniques.

Just because one type of material is more expensive or newer does not mean that it is better than another. As in the other elements of the Educational process one has to select the material most suitable to the achievements of the aims.

In the selection of complementary material, the following must be taken into account:

- simplicity
- cost
- manageability
- flexibility
- the goals one is aiming for.

It is absurd to use a video or a film (due to its high cost and lack of manageability and flexibility) to show static images when a slide-projector, photographs or transparencies could be used.

Exercise

CHOOSING RESOURCES

Individually, show which resources you would need in order to achieve adequately the objectives already proposed. Indicate the method that you chose, the size of group, type of classroom and complementary material.

	Specific objective	Method chosen	Group size	Type of classroom	Complementary material
1.					
2.					
3.					
4.					
5.					
6.					

Compare your results with those of the rest of your group and draw up a definitive list.

	Specific objective	Method chosen	Group size	Type of classroom	Complementary material
1.					
2.					
3.					
4.					
5.					
6.					

THE USE OF PICTURES IN EDUCATION

Pictures strongly reinforce learning; as the old saying goes:

A picture is worth a thousand words.

The use of pictures can have several aims. The first is increasing the ability to remember. Visual memory is a lot stronger than auditory memory, and pictures reinforce it, as does learning through reading.

Illustrated books are not only more pleasant, but also more effective for learning.

The second aim is attracting attention. Pictures can be used to encourage the student to concentrate on a particular thing.

This is one of the aims of the posters designed for use in health campaigns. This is the aim of advertisements.

The third aim is developing an affective role; to induce changes of attitude in both the student and the general public.

The slogan "no ensucie la ciudad, es tan bonita" (Keep your city tidy, it's so beautiful) was intended to have an Educational role, and to create a positive attitude towards the city.

Fourth, pictures can help in **supporting education** by easing the understanding of a specific subject.

An anatomical diagram will ease the comprehension of the relationships of the different organs or of the anatomical unevenness of a bone. A diagram will allow the student to follow the biochemical steps of the metabolism of a drug. A sheet explaining how new-born babies should be placed to be bathed or have their nappies changed will help mothers, especially if they have little education.

Finally, pictures can be used in **developing a didactic role**. As in the previous case, it helps understanding. The difference in this case is that the pictures are used as complementary material to an explanation, a lesson, etc. and the picture carries the emphasis of the teaching.

The posters used in antismoking campaigns, or the information sheets, develop a didactic role.

Illustrations should be used with a specific aim.

The following are general norms of use:

- Do not use them for the sake of it.
- Always use the same format.
- If you use a colour code, stick to it.
- Put them in the same order as the text that they illustrate.
- Make them as simple as possible.
- Take account of the sort of people in the intended audience.
- Make the lettering legible.
- Highlight the message or the most important words.
- Never write on a picture. It may look pretty but has little effect.
- Place the text in a suitable location.

Exercise

USING PICTURES

State the goals of the following pictures and indicate the errors in their use. Most of them are taken from educational material for patients.

A. Neck exercises

Neck movements–these can be done while sitting in a chair with a straight back.

A. Move your chin up and back.

B. Move your head from side to side as far as possible.

C. Turn your head to look around without moving your shoulders.

D. Bend your neck back and look at the ceiling.

E. Bend your neck forward until your chin touches your chest.

What is the aim?

_____
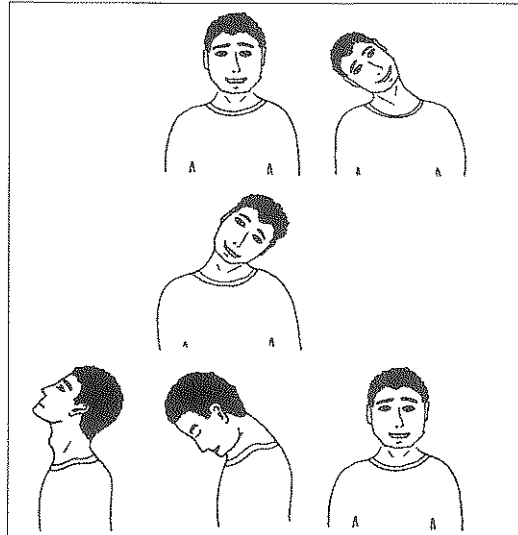
What are the defects?

_____

B. Care in cutting toenails

(a) Cut your nails after a bath, when they are softened.
(b) Cut your nails following the shape of the toe.
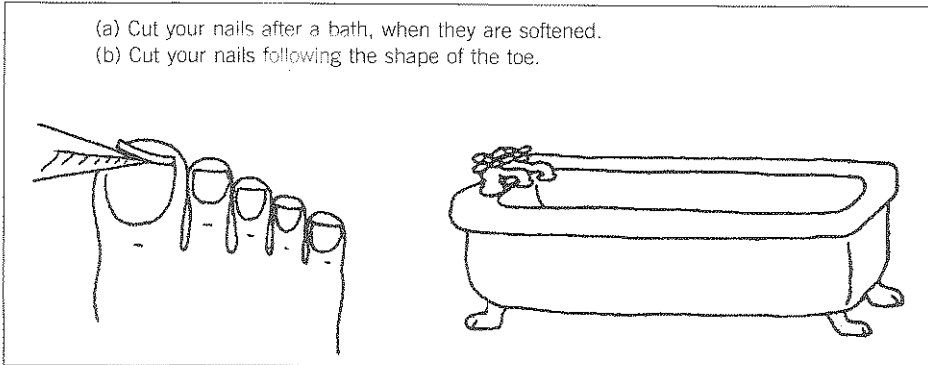
What defects does it have?   What could its aim be?

_____   _____

_____   _____

C. Modifications to the home

Small modifications to the house can make your life easier.

A firm, but not rock hard, mattress can ease back pain.

The installation of a banister rail will ease going up and down stairs. It should be placed at the correct height.

Showers can be easier than baths. From a safety point of view showers are safer. A mat on the floor can prevent slipping.
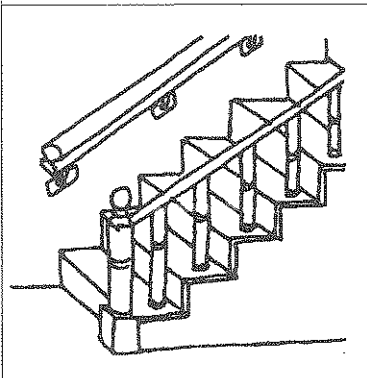
The installation of a good light is also necessary, as is the adequate laying of carpets.
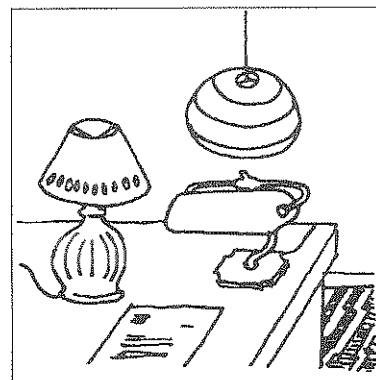
What is the aim?

What are the defects?

**Check your results with those of your fellow group members
and with those on the following pages.**

A. Neck exercises

Defects:

1. The options given in the text do not correspond to the number of pictures.
2. The pictures do not have numbers that allow them to be related to the text.

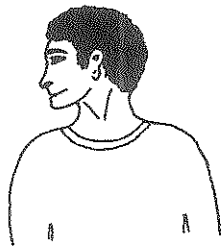**Aim:** supporting education.

Neck Exercises

They can be done standing or while sitting in a chair, with a straight back.

1. Move your chin back.

2. Move your head from side to side alternate as much as possible.
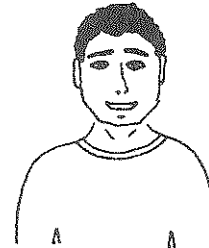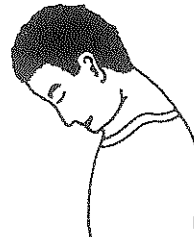
3. Turn your head to look back but keep your shoulders in the same position.

4. Bend your neck back and look at the ceiling.

5. Move your head forward until your chin touches your chest.

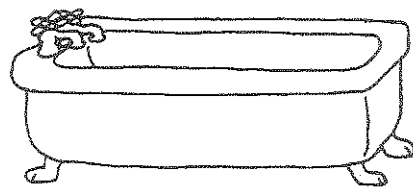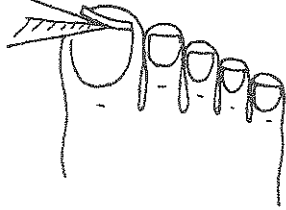6. Return to the original position.

Repeat the exercise 10 times.

B. Care in cutting toenails

Aim: Supporting education.

Defects: 1. The pictures are in the wrong order.

Care while cutting your nails

(a) Cut your nails after a bath, when they are softened.
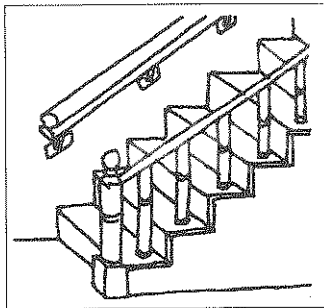
(b) Cut your nails following the shape of the toe.

C. Modifications to the home
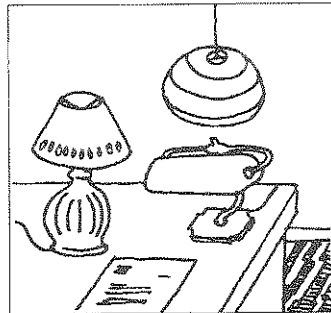
Aim: supporting education

Defects 1. The text does not correspond to the pictures.
2. There are more options in the text than in the pictures.
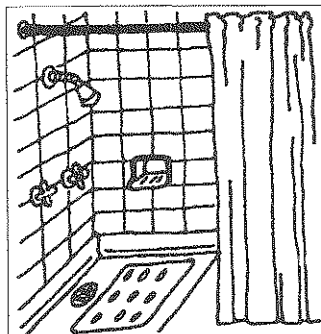3. The pictures are not placed as they should be.

Small modifications to the house
can make your life easier.

The installation of a banister rail will ease going up and down stairs. It should be placed at the correct height.
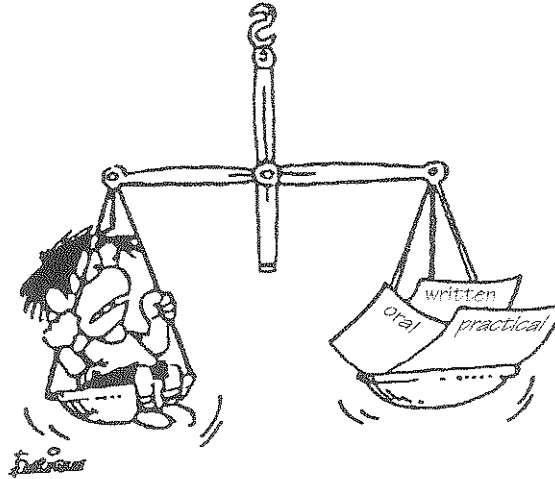
The installation of a good light is also necessary, as is the adequate laying of carpets.

Showers can be easier than baths. From a safety point of view showers are safer. A mat on the floor can prevent slipping

7. EVALUATION METHODS

The function of evaluation is to verify that objectives for students and programmes have been reached.

After working through this chapter, the student should be able to:

- give a series of objectives
- select the most suitable type of examination
- write a modified essay
- write three questions for each type of multiple choice test
- formulate an essay
- formulate an evaluation following the closed linear programme structure
- select the stations to set up an OSCE to cover his or her objectives

EVALUATION [a]

> Evaluation is the process that assesses the achievement of objectives and the effi-
> ciency of programmes and teachers. It is a value judgement on a test of perfor-
> mance.

Although evaluation is usually understood to mean only the assessment of the students' learning,
it should assess the education process as a whole, including the suitability of the programmes to
the aims, the efficiency of the programme, the methods used and the teachers. The aim of eva-
luation is to verify that the objectives have been reached:

- **For society**, it constitutes a way of ensuring the quality of professional competence.
- **For the institution**, it checks whether the institution's objectives have been reached.
- **For the teacher**, it determines the extent to which the operative objectives have been
  reached and the efficiency of his or her performance.
- **For the student**, it measures the extent of his or her learning.

Students are normally distributed throughout a wide range of capabilities. When most of them fail,
the reason could be that the course is badly structured, the level may not be suited to their pre-
vious knowledge or the objectives have not been clearly stated. If an entire class fails, one must find
out what has gone wrong. Teachers who feel proud of the high number of failures in their classes
should question the efficiency of their teaching, instead of condemning the stupidity of the students.

Meherens and Lehmann [b] identified various purposes for student evaluation that can be summa-
rised as:

- judging the acquisition of essential skills and knowledge
- measuring the use of knowledge
- classifying students
- identifying students' difficulties
- measuring the efficiency of teaching methods
- measuring the efficiency of programmes
- forcing students to study.

The evaluation technique
to be used will depend on
the educational objectives
to be assessed.

OBJECTIVES

↕

EVALUATION

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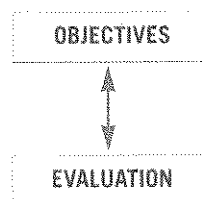
a This chapter is based on Green & Lewis (1986), Hubbard (1978), Meherens & Lehmann (1982), Miller & Fulop (1974),
  Newble & Cannon (1981) Rippey (1981).

b Meherens & Lehmann (1982).

No evaluation technique is suitable to assess the achievement of all types of objectives.

To determine whether the student knows how to distinguish a jaundiced sclerotic from a normal one, the student must not only explain the difference, but also identify each in photographs of real patients.

Although the same evaluation system can serve several purposes, one should define what one wants to measure, and **look for the most suitable methods**.

The effectiveness of a health campaign cannot be measured in the same way as self-injection by a diabetic patient, taking blood pressure by a group of nurses, or diagnosing a stomach ulcer by the doctor.

Most teachers agree on the importance of helping students to acquire the necessary capability to identify, analyse and solve problems. Examinations, however, test mainly only the capacity to remember isolated fragments of information. [a]

For students, passing exams constitutes the most important part of their academic career. In fact, the type of examination that they will face conditions their study habits and their learning. [b]

All evaluation systems must have the same **quality**. They must:

Measure what they are supposed to measure [c] ————————**VALIDITY**

Produce consistent results ———————————————————— **TRUSTWORTHINESS**

Give practical results within a reasonable time and costs – **EFFICIENCY**

Apply same standards to all students [d] ————————————— **OBJECTIVITY**

Indicate clearly to students what is expected of them ——— **CLARITY**
in relation to the objectives that they must reach

Evaluation can have two aims. The first is to identify the failures in learning in order to correct them. There is no coercive component in formative evaluation.

A professional assesses how a diabetic patient injects himself with insulin.

The second aim is to classify the students, decide who passes or fails or select somebody for a post, etc. Certification or sanctioning evaluation is used to determine the learning level.

Students who do not know how to do a clinical history or do not pass the internal medicine test cannot move to the next academic year.

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a Miller & Fulop (1974).

b Entwistle (1981), Märton & Säljo 1976), Newble & Jaeger (1983).

c Newble & Cannon (1981).

d Herweg (1976).

TYPES OF EXAMINATIONS [a]

There are different types of examinations, each with advantages and disadvantages. In addition to the objectives, these factors must be taken into account in the selection of the most suitable type of examination. Examinations can be classified according to:

- the way they are set out
- the type of answer required
- their structure
- the domain of learning to be assessed.

Each category includes different types.

The efforts of teachers to improve evaluation systems result in continuous appearance of new methods and systems, which are often difficult to classify. **Not all evaluation methods are useful for assessing all types of objectives.**

To determine whether the student has acquired certain knowledge, all sorts of oral, written or computer examinations can be used. But how can one certify that a student knows how to examine a liver by means of a written test? A written test can show that the student knows the theory of the examination, but a patient, dummy, or simulator must be used to discover whether the student can carry out the examination.

Category 1. The way they are set

Written examinations are those in which students must present their answers in writing. This is the most popular form of evaluation. It is used to assess the knowledge field from the recall of information to problem-solving abilities.

ADVANTAGES	DISADVANTAGES
• The responses are recorded. • They can be revised as many times as possible. • Qualification check-lists can be made up.	• The long answer type need a lot of time for correction, particularly when the number of students is high. • The presentation and handwriting of the pupils influence the marks they receive. • When testing problem-solving, it is difficult not to give clues to the students.

The most usual forms of written examination require **open answers or closed answers:**

An open answer examination gives the students only the questions (essay, short-answer, modified essay, solution of cases) and no possible solutions. In a closed answer test, the student does not have to formulate an answer but choose one or more of the options presented.

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a Garcia Barbero (1986).

Oral examinations require students to answer orally.

ADVANTAGES	DISADVANTAGES
• They allow the clarification of points when necessary. • They allow the teacher to follow or inquire about the reasoning of the student. • They provide direct teacher-student contact. • They can provide feedback to the student and guidance on the answers.	• They are not objectives, but highly influenced by external factors, such as the physical appearance of the students, which has nothing to do with their level of learning. • They are difficult to standardise. • They are very time consuming, especially if the number of students is high.

The most usual form is the discussion of a given theme by long or short answers.

Observation examinations require students to perform a certain task or demonstrate some skills. They are used mainly to evaluate attitudes or competence. They present the same advantages and disadvantages as oral examinations, and are discussed in more depth on page 106.

In **computerised examinations**, a computer is used. Initially they were used for multiple choice questions, but now it is key to programmed problem-solving evaluations.

ADVANTAGES	DISADVANTAGES
• They do not require the presence of the teacher. • They can simulate the complexities of reasoning in real cases. • Many variables and pathways can be introduced. • They are objective. • They allow the assessment of the reasoning process by measuring the time, number of responses, etc. needed to reach the correct answer.	• Good programmes are difficult and costly to produce. • Students learn the answers by repetition.

Category 2. The type of answer required

When **closed answers** are required, students choose among a series of options presented to them. The options are generally written or in computer form. Multiple-choice questions, some problem-solving exams and some programmed tests demand closed answers.

ADVANTAGES	DISADVANTAGES
● They can be used to explore a large number of areas. ● They are easy and quick to mark, particularly if computer and an optical reader are available. ● They are objective. ● They allow precise grading. ● They can be administered on a large scale.	● They require preparation time. ● It is difficult to use them to evaluate complex intellectual processes. ● Mistakes can easily be made in the phrasing of questions.

In **open answers**, students formulate their own replies to the questions. In an essay question, students must expound on a subject to a more or less extensive degree. Short-answer questions require a brief response in concrete terms. The examination can be made up of a series of unrelated questions, or by linked questions. They can be oral or written. The essay, short-answer questions, modified essay and some problem-solving examinations require open answers.

ADVANTAGES	DISADVANTAGES
● The questions are easier to prepare. ● They do not give clues to the students.	● Open answers are difficult and time-consuming to grade. ● They are less objective than the closed answers.

Category 3. The structure of examinations

With a **linear structure**, the student has to make decisions on a series of questions put forward. The student follows a process of answering single set questions.

With a **branched structure**, the answers depend on the path chosen by the student. Each one offers various options and the student determines his/her own path. Branched examinations can be written or oral, but the most common are programmed for computers. Further explanations are given on page 109.

Category 4. The domain of learning to be assessed

As mentioned, there are three domains of learning for which objectives can be set

Knowledge includes everything from simple memory to problem solution capacity, through analysis, synthesis, interpretation, etc. Any combination of the previously discussed types of examination can be used to measure knowledge.

In a strict sense, only practical examinations are suitable to assess **attitudes**. For indirect evaluation, however, any other form can be used: oral or written, open or closed essays.

Measuring **skills** is the closest thing to assessing professional competence. The only direct form of evaluation is the practical examination.

Conclusion

As shown, each type of examination [a] has its pros and cons. These must be considered, along with the objectives set, when one or another type of examination is selected. Among the most frequently used types of examinations are:

- essays

- short-answer questions

- problem-solving:
  - cases
  - modified essays
  - programmed examinations

- tests:
  - multiple choice
  - true or false
  - pairing

- practical examinations:
  - real
  - simulated

- objective structured clinical evaluation.

Each involves characteristics of those already explained, and its own pros and cons.

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a Garcia Barbero (1986), Green & Lewis (1986), Harden et al. (1975), Hubbard (1978), Meherens & Lehmann (1982), Newble & Cannon (1983), Rippey (1981).

ESSAY [a]

> An essay requires students to develop a theme in an extensive manner; it can be oral or written, but the term is used for the written format.

Essays are useful for measuring knowledge and (indirectly) attitudes. They are not appropriate for measuring practical skills.

ADVANTAGES	DISADVANTAGES
• Little preparation time is needed. • It explores the organisation of ideas. • It can indirectly measure attitudes and opinions.	• Much time is needed for correction. • It explores a very limited range of knowledge. • It is only useful for measuring knowledge. • It does not provide feedback unless the essays are returned after correction. • The person marking the essay may lack objectivity.

To measure knowledge: Number the possible causes of arterial hypertension and describe its physiopathology.

Indirectly to assess attitude: How would you react when confronted with an AIDS patient.

Indirectly to measure skills: Which steps would you follow in order to correctly place a cast on a fractured tibia.

The major problem attributed to essay type examinations is the lack of objectivity of the marker. This can be avoided if: [b]

• The question is clearly expressed;

• Before starting to mark the essays a grading system is drawn up, with well defined criteria;

• One question is marked at a time for every student before moving on to the next;

• The marker cannot identify the student;

• Each question is marked by different teachers;

• A grading body is set up in which points are allotted to the possible answers or even taken away for wrong answers; or

• the answers are categorised after a first reading as good, satisfactory or bad, and graded after a second reading.

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a Bandaranayake (1978), Cox (1978), McGuire (1963), Newble & Cannon (1981).

b Bandaranayake (1978), Newble & Cannon (1981).

MODIFIED ESSAY [a]

> It is an examination in which students are required to answer a series of linked questions in order to solve a case or problem.

The modified essay is a type of problem-solving open question. The term gives rise to confusion, because the modified essay is a mixture of programmed teaching and short-answer questions. It has little to do with an essay type examination.

There are two forms of modified essay. One is made up of questions in which the student has to answer various options (A). In the other, the student must fill in blank spaces (B).

For example,

A. *A patient comes to your surgery complaining of chest pain. The pain began two days before.*

   1. What are the four most probable diagnoses?

       a = ...

       b = ...

       c = ...

       d = ...

   2. Which questions would you ask initially to focus the diagnosis?

       a = ...

       b = ...

       c = ...

   3. What tests would you carry out to confirm the diagnosis?

       a = ...

       b = ...

       c = ...

a Felleti & Smith (1986).

B. Fill in the blank spaces with words or letters and cross out those which do not correspond.

A 57-year-old man has been complaining of migraines, vomiting and blurred vision for the last ten days.

1. *The general practitioner finds that he has _____ at the back of the eye.*

2. *With the diagnostic impression of Intracranial Hypertension Syndrome, he prescribes _____ mg _____ I.V., while he arranges transfer to the hospital.*

3. *On admittance, the man's medical records are checked and with the examination a right-hand hemiparesis without dysphagy is added. He starts to lose consciousness. Soon after, his right pupil is seen to be dilated, which does not seem to fit in with the rest of the neurological examination, unless the _____ is interpreted as a _____.*

4. *With the complementary tests, _____ and _____, carried out as an emergency procedure, the diagnosis of _____ of the _____-handside is reached and anatomopathology of the _____, which is confirmed following a neurosurgical operation, the postoperative prognosis is _____ and a life expectancy of _____ months.*

SHORT-ANSWER QUESTION

> Short-answer questions require students to give brief answers to questions asked in concrete terms.

Short-answer questions represent an intermediate stage between essay questions and "tests".

What does the Romberg sign test consist of?

What are the three fundamental signs of diabetes?:

a = ...

b = ...

c = ...

ADVANTAGES	DISADVANTAGES
• They allow the exploration of a high number of areas. • They are easy to draw up. • They are objective. • They do not give clues to the students. • They allow the evaluation of higher intellectual levels than the test questions.	• They need preparation time if they are done in a programmed examination style. • They need a pre-established grading system. • They need more time for correction than tests.

TEST

> A test comprises the form of examination in which students have to choose between a series of options presented to them.

In general, there are three types of tests: those with true-false items, multiple-choice questions, and pairing items.

With true-false items, the student has to indicate in each of the options if it is true or false.

Which organs are affected by the XX syndrome?

Brain T F   Heart T F   Kidney T F   Lung T F

In multiple-choice questions, the student must choose the correct answer from four or five options.

Which organ is affected by the XX syndrome?

a. Brain   b. Heart   c.Kidney   d. Lung

(correct answer: c)

Pairing requires the students to fit together two series of options

Indicate which of the organs in the right hand column would be affected by the syndromes named on the left.

a) XX syndrome   Brain
b) KL syndrome   Heart
c) CVB syndrome   Kidney
d) TRF syndrome   Lung

Tests are often used to assess large groups of students. They were very popular in the 1970s and early 1980s, but they are giving way to other more complex examinations, such as problem-solving or programmed examinations.

The problem-solving test

Some problem-solving examinations present linked questions with diverse options from which the students have to select correct answers. In reality, these are tests that follow a structure instead of being made up of unconnected questions.

David's parents take him to the surgery because he has spent the whole night coughing. He is 14 years old and has a history of dry coughs.

> *1. Which diagnosis seems the most probable?*
>
> > *a. Allergy*
> > *b. Sinusitis*
> > *c. Infectious bronchitis*
>
> *2. Which attitude would you adopt?*
>
> > *a. Prescribe antibiotics*
> > *b. Prescribe cough mixture*
> > *c. Send him to hospital*
> > *d. Calm him*
>
> *3. Which tests would help you to confirm a diagnosis?*
>
> > *a. Exercise test*
> > *b. Tests with allergens*
> > *c. Chest X-ray*
> > *d. Blood test*
>
> *This examination can be structured in different ways. Students can be asked:*
>
> > *1. to select the right option*
> > *2. to evaluate each option from 1-5*
> > *3. to indicate whether each option is true or false*

PRACTICAL EVALUATIONS

> In practical evaluations, students must show capabilities or attitudes. The objective is to assess whether the objectives for practical skills have been reached.

Practical evaluations show what students can do instead of what they say they can do. Such evaluations allow the assessment of students' organisational capabilities, use of information and reactions in a given situation.[a]

a Charvat et al. (1969), Harden & Cairncross (1980), Neufeld & Norman (1985).

Practical evaluation in health sciences is one of the fields in which medical teachers have spent most of their research time, owing to the difficulties in organising good and reliable evaluation systems. The methodology is already available but the infrastructure, and real or simulated situations are difficult to establish, particularly when the number of students is high. **Nevertheless, this is the only way of evaluating the acquisition of skills and attitudes.**

When people talk of practical examinations, they are not trying to evaluate students' competences to carry out a specific task (which includes knowledge, attitudes and abilities), but their knowledge or identification capabilities. This means testing their knowledge of histology, anatomy or surgical or internal medicine, for example, through written examinations in a classroom.

ADVANTAGES	DISADVANTAGES
• They determine whether the student is capable of professional practice basing the assessment on practice instead of theory.	• They are difficult and costly to plan. • They are time consuming. • Patients or simulators may not be available. • Many external factors may influence the results.

Practical evaluations can be carried out in real or simulated situations. The real situation is the best way to assess clinical competence, because it puts the student in a professional environment. Nevertheless, it is the most difficult to organise in undergraduate schools.

The right patients may not be available, or the time to spend with the students or the infrastructure may be lacking.

A simulated situation can be almost as good as the real one. The closer to the real one, the more accurate the assessment will be. Simulated patients trained for the purpose, have proved to be very useful. Some medical schools have even trained them to evaluate students' performance, thus saving a lot of the teachers' time.

This a complicated and expensive system. Training requires a lot of time, effort and money. To cover a wide range of illness a large number of simulated patients is needed. In addition, this system may not be acceptable to the students, owing mainly to the culture of the country.

For undergraduate medical schools that are more interested in teaching students a way of thinking, how to solve problems, how to make decisions and the general competencies in medicine, the evaluation of competence is more easily achieved.

No more than 10% of what the students are expected to be able to do is evaluated. It is assumed that they know a subject if they can answer some questions correctly, or that they can solve all types of problems, if they can solve one type.

Who has never thought or said: "How lucky I was, they asked me one of the few questions I knew!" or, "How unlucky I was, they chose the only subject I did not study!"?

The impossibility of evaluating every competence needed is what makes objectives important. They allow the discrimination of important from less important competencies.

In postgraduate education or specialist training, the evaluation of competencies is more easily achieved because training takes place in real situations as part of the daily work of the trainee.

OBJECTIVE STRUCTURED CLINICAL EVALUATION (OSCE) [a]

> An objective structured clinical examination (OSCE) is a combination of all the previously explained examinations. Students are examined for three hours, rotating through a series of specially designed "stations", in which they carry out different tests with different levels of knowledge, attitudes and skills, in periods of 4 to 5 minutes.

In each of the stations or settings there can be either a real or simulated patient, a problem to be solved, etc. Each student may rotate through each unit. The number of units may vary according to the objectives.

Some of the stations are marked at the time by the teacher who is present. In others, the students carry out the test by themselves and hand in the results on leaving. The results of all the tests are gathered for marking. For each one of the tests, to be as objective as possible, a sheet with instructions for marking is drawn up beforehand. The sum of each of the marks attained in each of the stations will give the total mark for the OSCE.

Although the OSCE is called objective, the presence of an observer to mark the practical stations introduces an element of subjectivity. Check-lists improve objectivity, but cannot eliminate subjectivity.
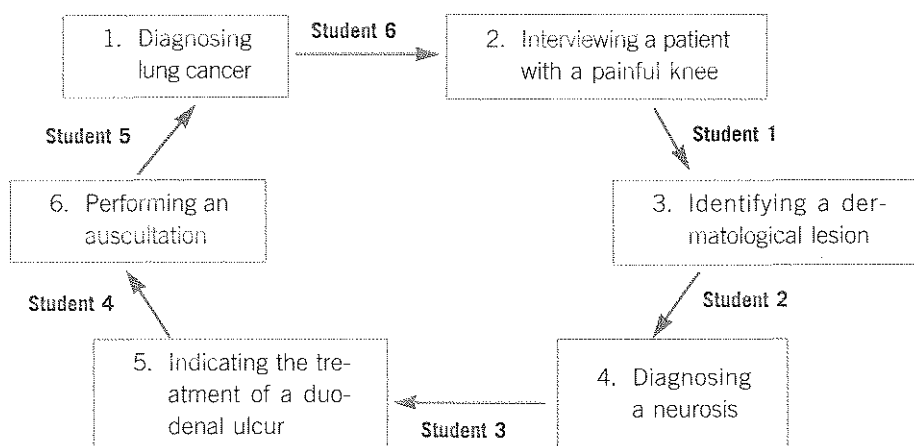
a Harden & Cairncross (1980), Harden et al. (1975).

OSCE stations

STATION	MATERIAL	LEARNING DOMAIN	EXAMINATION TYPE
Diagnosing lung cancer	Radiography and sputum analysis	Knowledge	Problem-solving
Interviewing a patient with painful knee	Patient	Attitudes knowledge	Practical
Identifying a dermatological lesion	Photographs	Knowledge analysis	Short-answer question
Diagnosing neurosis	A video with a real patient	Knowledge	Problem-solving
Indicating the treatment of a duodenal ulcer	Pen and paper	Knowledge recall	Essay
Performing an auscultation	Simulated patient	Knowledge skills	Practical

PROGRAMMED EVALUATIONS [a]

> Programmed evaluations of an instructional sequence. They use programmed texts and, in many cases, a computer.

Programmed evaluations were very popular throughout the 1970s and the early 1980s, but the cost of preparation and materials restricted their use. They were often used for formative evaluations.

Programmed evaluations simulate real problems and assess, within the field of knowledge and decision-making, the line of action taken by the student. Whether these actions would be similar to those in a real-life situation remains unclear, but the evaluation seems adequately to measure students' problem-solving capabilities.

The most usual format is the presentation of a clinical case. It starts with information about the patient, followed by a series of closed options between which the pupils must choose, or open questions they have to answer. The process may be repeated as many times as considered necessary. The **structure** of the programmed evaluation can be lineal or branched and open or closed.

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a Daly et al. (1982), Evans (1984), Farguhar et al. (1978), Tosteson (1986).

Open Lineal Structure

With an open lineal structure, no options are presented; the student has to write the answer. The problem always advances in the same way, independently from the answer.

CASE PRESENTATION

While you are working in the emergency ward of the hospital, a 45-year-old male is admitted in an unconscious state, sweating heavily after a period of intense precordial pain.

1. *On your way you are considering the possible diagnoses. Which do you think is the most probable?*

2. *What examination will you carry out on arriving?*

3. *Which resuscitation technique would you immediately carry out?*

Open lineal structure
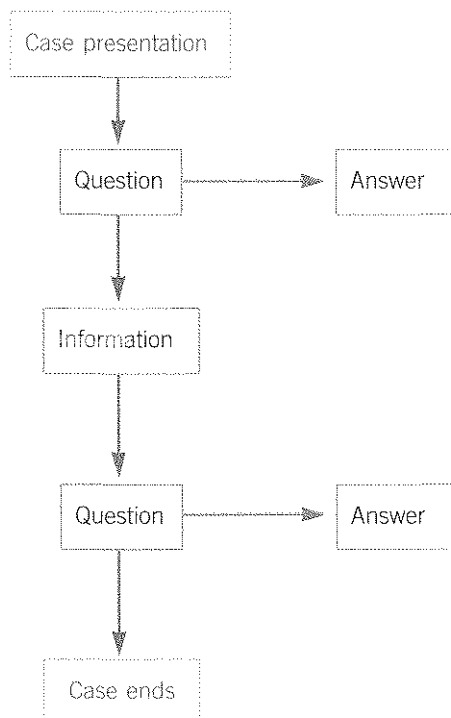
Closed Lineal Structure

With a closed lineal structure, the student must choose between the options encountered. The problem advances only through a single answer.

Closed lineal structure
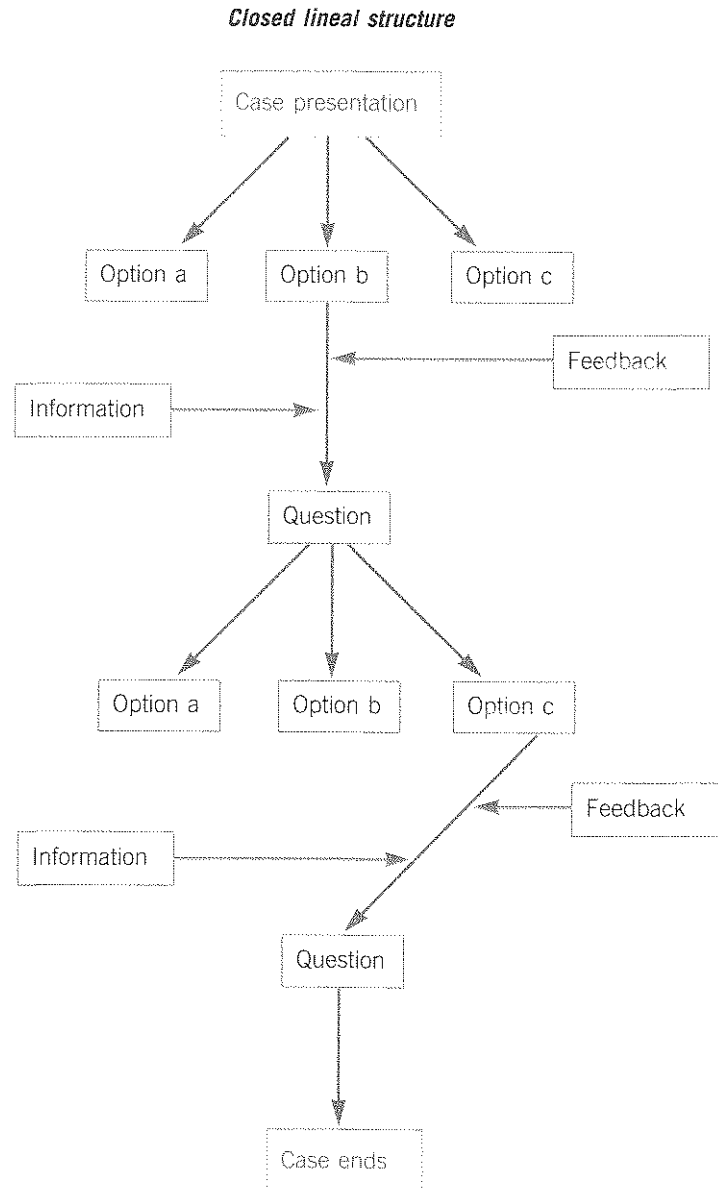
Example 1

CASE PRESENTATION

A 12-year-old patient is brought to your surgery complaining of abdominal pain from which he has been suffering for the last two days.

1. What possible diagnoses would you consider?
    1A. Peptic ulcer
    1B. Appendicitis
    1C. Hiatus hernia
    1D. Gallstones
2. What questions would you ask the patient in order to aid your diagnosis?
    2A. If there is fever
    2B. When the pain started
    2C. Where the pain is
    2D. If there is flatulence
    2E. If movement aggravates the pain

3. What areas of the patient would you examine, and how?
    3A. Feeling the abdominal wall
    3B. Carrying out the Blumberg's Sign test
    3C. Feeling the peripheral pulses
    3D. Abdominal auscultation

INFORMATION

In the examination the patient presents a hard abdomen and a positive Blumberg's sign.

4. Which complementary tests would you ask for?:
    4A. GSS
    4B. A straightforward radiograph of the abdomen
    4C. A leucocytary formula and count
    4D. An echogram
    4E. An endoscope examination
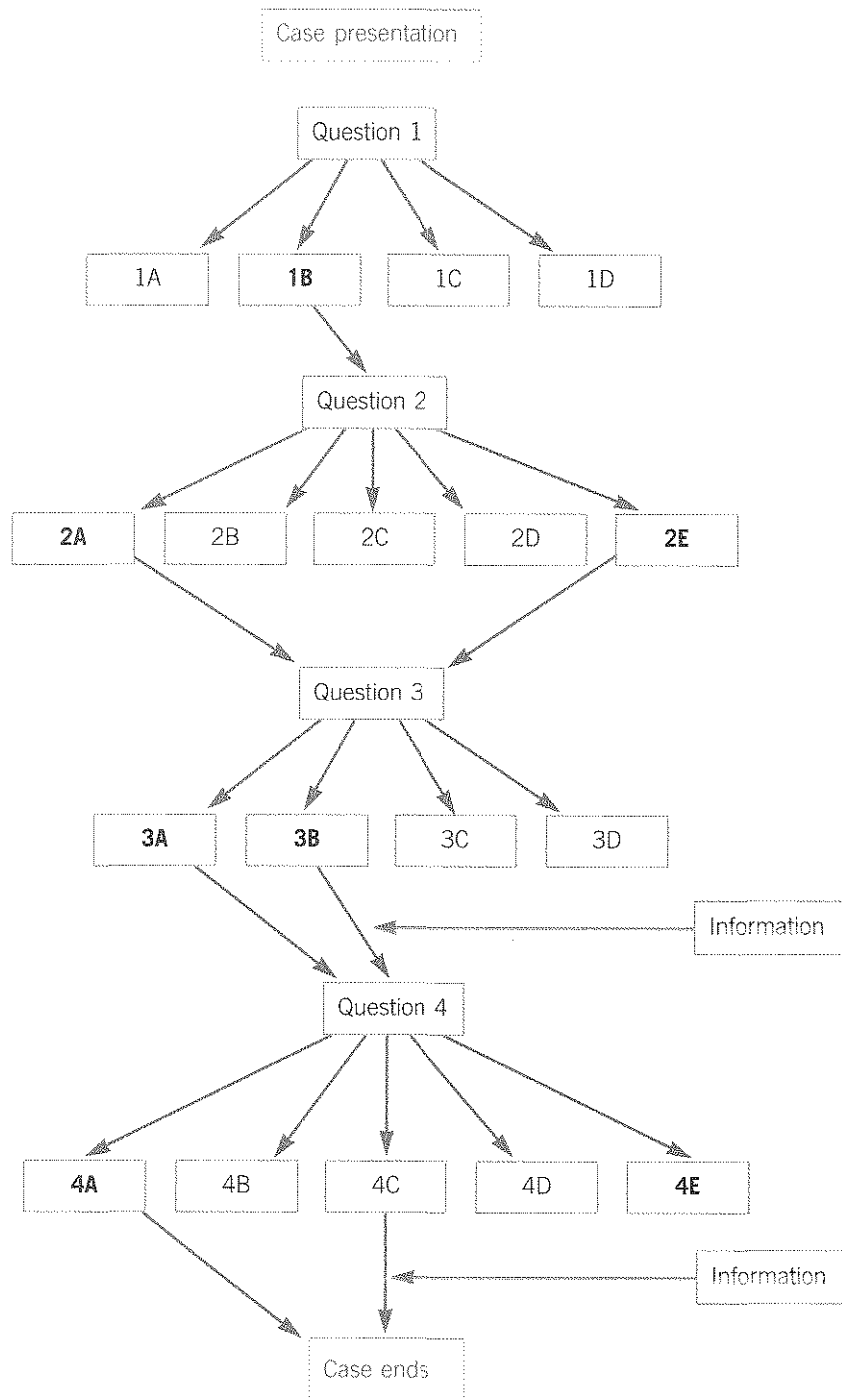
INFORMATION

The GSS presents a reading of 31 in the first hour and leukocytes of 11 000/mm³; nothing of interest is noted in the radiography and the echogram, and the endscopy is of no use (information).

CASE ENDS

With the preceding information you can confirm the diagnosis of _____.

Closed lineal structure (example 1)

Example 2

CASE PRESENTATION

A patient comes to your surgery with a right knee that has been painfully swollen for the last three days. In the past, the patient has had three similar self-limited episodes.

1. Which of the following complementary tests would you ask for in order to point the diagnosis?

    1A. Knee x-ray
    1B. Uraemia
    1C. Synovial analysis

FEEDBACK
1A. This information will turn out to be useless.
1B. This is not very specific; there can be pathology with low values and vice-versa.
1C. A good choice; 25 000 cells and intercellular monosodium urate crystals are observed.

2. Which of the following diagnoses seems the more plausible to you?

    2A. Chondrocalcinosis
    2B. Gout

FEEDBACK
2A. There is no reason for this choice.
2B. Very probable. Carry on.

INFORMATION
There is a family history of gout.

3. What treatment would you suggest at this time?

    3A. Rest and diet
    3B. Indometacin
    3C. Allopurinol

FEEDBACK
3A. The knee will continue to be inflamed; the patient will find walking increasingly difficult and will be hungry.
3B. The patient's condition will improve.
3C. The patient will have the same inflammation and less uric acid, which may be consoling.

INFORMATION
*The patient refers to previous episodes of renal lithiasis.*

4. How would you treat the patient?

    4A. Send him to an urology ward
    4B. Administer benzobromarone
    4C. Administer allopurinol

FEEDBACK

4A. When he has another lithiasis attack, perhaps he will have an operation.
    You have not solved his problem.

4B. Following the increase of uricosuria, he will have more lithiasis.
    his condition will worsen.

4C. This is a good choice; the renal excretion of uric acid will drop
    and the lithiasis will improve.


CASE ENDS

If you chose the right actions, the patient will improve. You have effectively treated the inflamma-
tion with indometacin and, given the history of renal lithiasis, have reduced the renal excretion of
uric acid with allopurinol, the probable cause of the lithiasis.

Closed lineal structure (example 2)
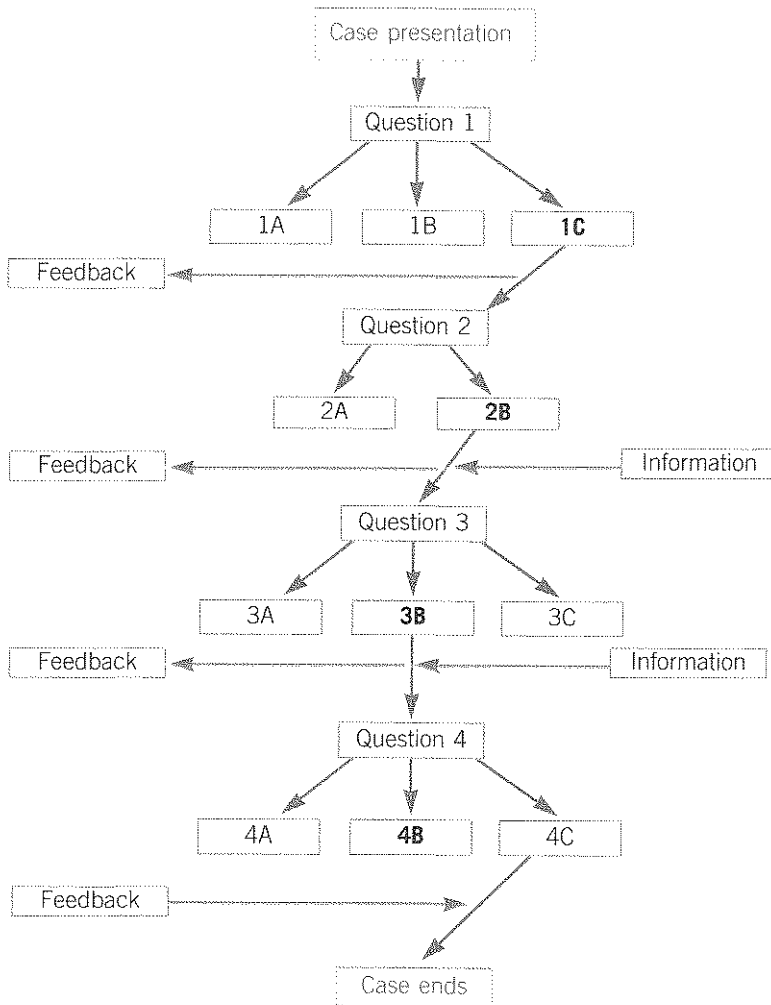
Branched structure

With a branched structure, the answers depend on the path chosen by the student. Each question has various possible answers and the student determines his or her own path. Answers can be closed, so that the student chooses between the options presented, or open, with no established answers.

Branched structure
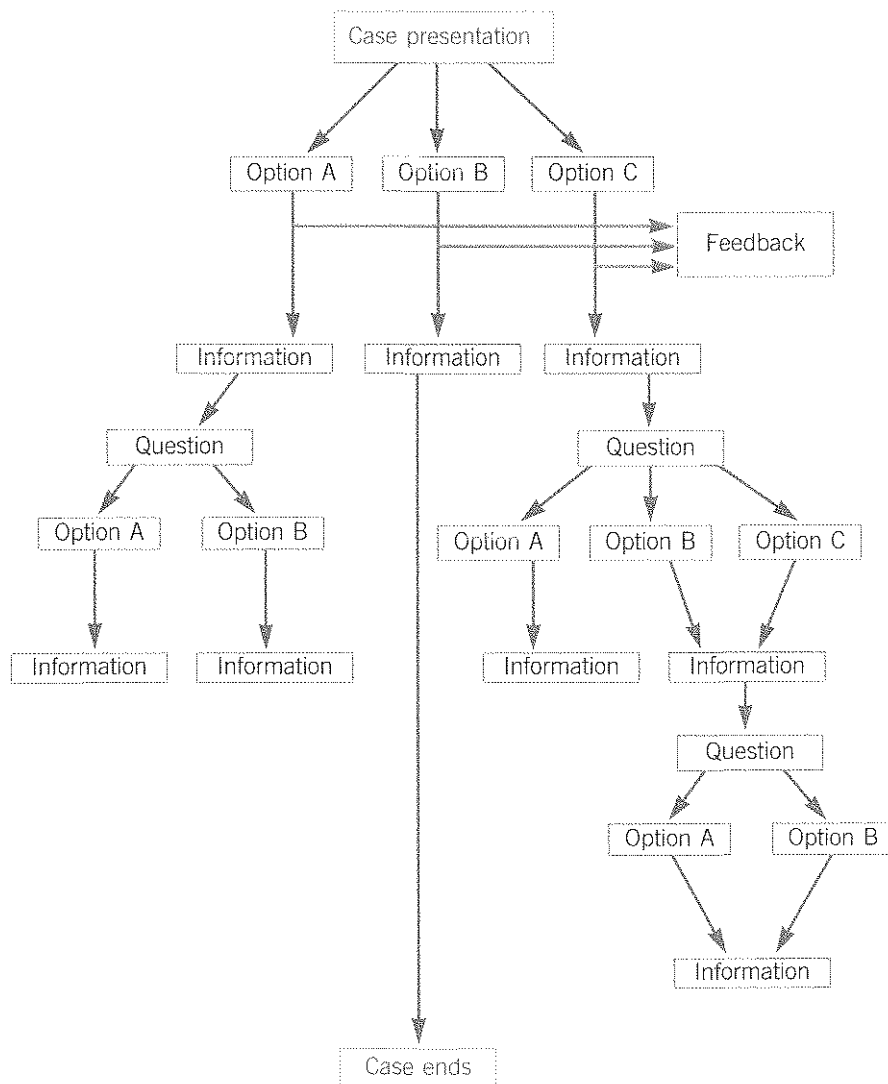
Example - closed branched structure

A patient comes to your surgery complaining of anxiety and chest pain from the last two days.

1. *Which possible diagnoses would you think of?*

1A. Angina	*Go to question 2.*
1B. Hiatus hernia	*Go to question 3.*
1C. Gastric ulcer	*Go to question 4.*

2. *You consider that he has an angina, which examination should you carry out on the patient?*

2A. ECG	*Go to question 5.*
2B. Anterior-posterior radiography	*Go to question 6.*
2C. Echogram	*Go to question 7.*

5. *You decide to carry out an ECG, and the findings are:*

   What should you do now?

5A.	*Go to question 8.*
5B.	*Go to question 9.*
5C.	*Go to question 10.*

On the other hand, if the student chooses option 1B, the problem will evolve along another line.

3. *You have decided that the patient has a hiatus hernia, what questions would you ask in order to confirm the diagnosis?*

3A.	*Go to question 11.*
3B.	*Go to question 12.*
3C.	*Go to question 13.*

With an open branched structure, the examination evolves in the same way, except that no information is given to the student. The computer selects the following step according to each answer given. These programmes are the most difficult to develop because they need a wide glossary of terms. The computer will identify correct answers, even when they are expressed in different ways.

A patient comes to your surgery complaining of anxiety and a chest pain which he has been suffering from for the last two days.

1. Which possible diagnoses would you think of?

If the student indicates an angina, the computer will automatically move on to question 2.

If the student decides that it is a hiatus hernia, the computer will move on to question 3, and in this way will move on through the problem.

EVALUATION OF ATTITUDES, SKILLS AND KNOWLEDGE

As mentioned, all types of examinations are not valid for evaluating any type of Educational objectives. Nearly all types suitably assess the acquisition of knowledge, but not all of them assess attitudes and skills. The first thing to ask, therefore, is what to measure, and adapt the type of examination. [a]

OBJECTIVE	METHOD	EXAMINATION TYPE	MATERIAL
Knowledge			
Memory	Written	Multiple-choice question	Facts
Identification	Oral	Short-answer question	Graphs
Relation	Observation	Essay	Illustrations
Interpretation	Computer-based	Modified essay	Problems and clinical cases
Analysis		Programmed texts	
Synthesis			
Problem-solving			
Skills	Observation	Practical	Real (patients, apparatus, etc.) Simulated (Dummies, role playing, etc.)
Attitudes	Observation	Practical	Real patients Simulated (Simulated patients, role playing)

a Adapted from Garcia Barbero (1986).

Exercises

OSCE STATIONS

With your group, define an OSCE station for each of your chosen objectives. Indicate what material you will need and which is the most suitable examination type.

Objective	Method	Examination type	Material

TEST QUESTIONS

With your group, develop test questions related to your objectives.

1. Write a multiple-choice test question that assesses only recall.

2. Write a multiple-choice test question that assesses analysis capability.

3. Write two true-false questions. Indicate the knowledge level that they will measure.

4. Draw up a pairing test question.

5. Write a modified essay to evaluate one or more of the objectives. Develop at least four possible questions.

6. Make up an examination model with a closed branched structure that is suitable for the evaluation of your objectives Develop at least four questions.

7. Construct a similar model with a closed lineal structure.

8. Construct a model with an open lineal structure.

9. Identify the errors in the following multiple-choice questions.

A. Sometime before some of the below cited cancer becomes apparent, granuloma-tosis appears in one organ. Could you indicate which one?

a. Vulvular cancer   d. Endometrial cancer
b. Vaginal cancer   e. Ovarian cancer
c. Cervical cancer

B. The fundamental cation in the intercellular compartment is:

a. Sodium   d. Protein
b. Nitrogen   e. Magnesium
c. Potassium

C. The cessation of menstruation between the ages of 45-55 is called:

a. Menopause   d. None of the above
b. Menarche   e. All of the above
c. Climactery

D. The congenital anomaly "blind rectum" represents the total of the anorectal ano-malies by:

a. 67.5%   d. 35%
b. 20%   e. 50%
c. 3%

E. Among the following micro-organisms, which one causes subacute endocarditis bacteriana?

a. The Streptococcus Viridans bacteria
b. Staphylicoccus Aureus
c. Haemophilus Influenzae
d. Haemophilus Influenzae
e. Streptococcus - haemolyticus

Answers

A. The correct answer is **a**. There are 2 mistakes:

- the statement is badly formulated with many unnecessary words;
- it is unnecessary to repeat the word cancer in each of the answers, as it is included in the question.

The question should be formulated as follows:

What sort of cancer is occasionally preceded by granulomatosis?

a. Vulvular   *d. Endometrial*
b. Vaginal   *e. Ovarian*
c. Cervical

B. The correct answer is **c**. There are 3 mistakes:

- he question implies a value judgement;
- neither nitrogen nor proteins are cations; so two of the answers are invalid, as they do not correspond to the question;
- the question does not indicate what is *fundamental.*

The question should be formulated as follows:

Of the following cited cations, which is the most important for the maintenance of the membrane potential of the muscular fibres?

           a. Sodium   *d. Calcium*
           b. Manganese   *e. Magnesium*
           c. Potassium

C. The correct answer is **a**. There is 1 mistake:

The answer *None of the above* should be placed in the **e**. position, and the answer *All of the above* in the **d**. position. In the way they are written, *all of the above* includes also *none of the above.*

The question should be formulated as follows:

The cessation of menstruation between the ages of 45-55 is called:

           a. Menopause   *d. All of the above*
           b. Menarche   *e. None of the above*
           c. Climactery

D. The correct answer is **a**. There are 3 mistakes:

- the figures are not in order;
- the correct answer is more specific than the rest;
- answers a and c do not follow the same numeric pattern as answers b, d and e.

The question should be formulated as follows:

The proportion of the total of anorectal anomalies represented by the congenital anomaly "blind rectum" is:

           a. 13%   *d. 51%*
           b. 22%   *e. 67%*
           c. 35%

E. The correct answer is **a**. There is 1 mistake:

Because answer **a**. reads better as a continuation of the statement, it must be correct.

All of the options should be given in the same form.

Pros and cons

Evaluate, as an individual, the advantages and disadvantages of the different types of examination. Use the following scale:

5 = Very suitable, very advantageous
4 = Suitable, advantageous
3 = It depends

2 = Of little use, of little advantage
1 = Inadequate, of no advantage

| Examination type	Preparation time	Correction time	Number of areas to cover	Objectivity	Feedback
Essay					
Short-answer question					
Modified essay					
Programmed text					
Multiple-choice question					
Oral					
Practical					
OSCE					

Compare your results with those of the other members of your group and with those below

Examination type	Preparation time	Correction time	Number of areas to cover	Objectivity	Feedback
Essay	5	1	2	3	1
Short-answer question	4	4	3	4	3
Modified essay	4	4	3	5	3
Programmed text	1	4	3	5	4
Multiple-choice question	1	5	5	5	4
Oral	5	1	2	1	3
Practical	3	2	2	4	3
OSCE	1	3	4	4	3

The values shown in this table constitute a mere indication and should not be taken as exact.

Congratulations! You have done a good job!

8. QUALIFICATIONS
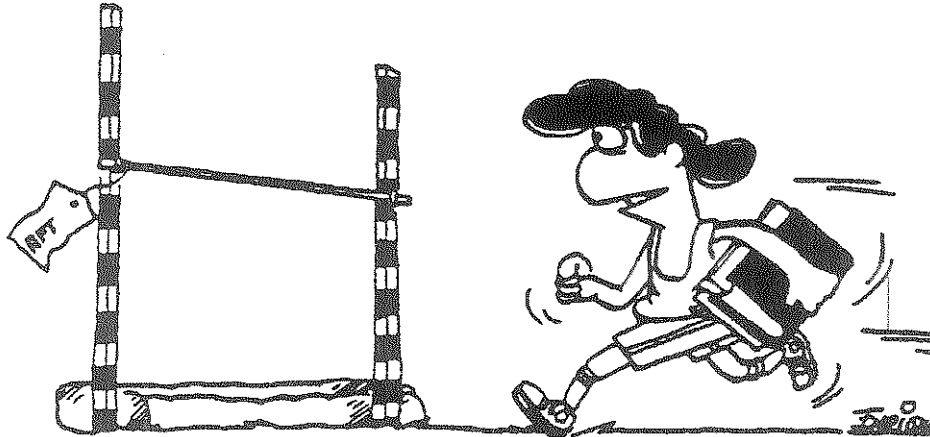
After working through this chapter, the student should be able to:

- indicate whether he or she will use absolute or relative criteria

- find the discrimination or difficulty indexes of a multiple-choice question

- design a qualification check-list

ABSOLUTE AND RELATIVE CRITERIA [a]

The assessment of learning includes consideration of the behaviour of the group. Examinations with **absolute criteria** have a minimum standard that each student has to reach to pass.

The number of students that pass is independent of the marks obtained by the others. If the teaching has been of a high standard and all the students have reached the objectives, they will all pass. If, on the contrary, none of the students have reached the objectives, all will fail.

Health sciences programmes should include a minimum of absolute criteria texts, to ensure that the students who do not know how to carry out a series of fundamental tasks do not graduate.

Examinations with **relative criteria** compare the students' performance; this comparison conditions who passes.

Standards are set after the examination, according to the students' results. The number of students that pass is fixed beforehand or is determined, usually, through statistical methods. The Gauss bell is one of the most widely used for defining the pass/fail limit. This limit is situated in the middle line of the Gauss bell; if the middle point of the marking is set at 7, only the students who get higher than 7 will pass; the rest will fail.

If only 25% of the students should pass, the 25% with the highest marks will be those who pass. If there are 30 places, the 30 highest marked students will get them.

OBJECTIVE AND SUBJECTIVE TESTS

A series of factors, or outside influences, independent of the students' performance, tends to modify the objectivity of the examinations, by acting on the judgement of the evaluator. According to the degree of influence of these external factors, examinations are classified as objective or subjective.

Objective tests allow the evaluation of the students learning without consideration of outside influences alien to the student's own performance.

Apart from the suitability of the different tests, the less contact the markers have with the examinees, the higher are the chances of the marks being more objective. The most objective tests of all are closed-answer examinations carried out by computer. Closed-answer examinations are more objective than those with open question.

Subjective tests are those in which outside influences can most easily change the marker's appreciation of the student's competence. The more direct contact between marker and examinee, the more powerful outside influences will be. Oral examinations are the most subjective. Outside influences include the students' physical appearance, the way they express themselves, the way they dress, etc.

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a Newble & Cannon (1983).

THE MOST COMMON MARKING ERRORS

A series of factors can influence the marking of non-objective tests, among which the most common are:

- **Leniency errors**, when a higher mark is given through pity;
- **Centripetal errors**, or the tendency to mark towards the average marks of the evaluation scale (to avoid this it is better to use wide scales);
- The **halo effect**, the tendency to mark down the rest of the examination when an error is found;
- **Logical errors**, when there is a lack of thorough analysis;
- **Contrast or proximity errors**, when an examination is compared with the one that has just been marked.

To avoid these marking errors one can:

- mark each exam twice;
- make sure that the examinations are marked by two different evaluators and take the average of the two as the final score;
- avoid the identification of the examinees;
- mark the same question for all the students before going on to the next.

PRIORITY AND COMPLEMENTARY OBJECTIVES

The classification of objectives as priorities or complementary facilitates the designing of both types of tests. Prioritarian objectives could be included in the tests with absolute criteria, while the complementary ones would form part of those with relative criteria.

An examination can be designed combining the two types of objective. A series of questions covers the priority objectives and conditions the pass/fail. The rest of the questions, corresponding to complementary objectives, will determine the grade.

ACCEPTABLE LEVEL OF RESULTS [a]

An acceptable level of results (ALR) is the minimum level, according to absolute criteria, that permits the student to pass. The procedure to be followed is that each of the members of the tribunal, before the test is given, determines the exact answer for each question.

The **ALR of an essay test**, or an open answer test, should indicate which content should be included by the examinee in order to pass the exam. The **ALR of a practical test** will be determined by the level of performance or of execution of the task that the pupil must reach.

---

a Guilbert (1987).

To calculate the **ALR of a multiple-choice question**, each one of the members of the tribunal will mark the options to each question as being either good or bad. A good option can be defined as one that is possible and that the student cannot eliminate straight away.

A bad option can be defined as one that students should eliminate automatically, owing to incongruity with the question or lack of relation to the statement.

The ALR of each question is calculated by dividing 1 by the number of good options (including the correct answer).

> *The fundamental cation of intercellular behaviour is:*
>
> *a. Sodium*   *d. Proteins*
> *b. Nitrogen*   *e. Magnesium*
> *c. Potassium*

> *The ALR would be 1/3 after eliminating Nitrogen and Proteins because they are not cations.*

The ALR of a five-option question all of whose options are considered good would be 1/5. If all the bait is bad, the ALR would be 1/1. (**Bait** is the name given to the options that are not the correct answer).

The sum of all the individual ALR for each question gives the ALR for the examination. The better the design of an examination, the lower the ALR will be, because the student must know the subject to answer well. The poorer the design of an examination, the higher the ALR.

Because the ALR depends on the opinion of experts, the ALR for one set of questions will vary from group to group.

MARKING CHECK-LISTS

Marking check-lists are set up to measure knowledge, attitudes or skills, specifying the answers the pupil must give and giving each a set mark. They attempt to minimise the lack of objectivity of some examination types, particularly open-answer and practical examinations.

Grading scales can be included or left out. Options include:

- pass / fail
- excellent / good / normal / bad / very bad
- satisfactory / unsatisfactory
- procedure correct / procedure incorrect

The same examination can be marked qualitatively or quantitatively.

Checklists for an essay

Instructions:
Put an X in the box you consider to be the closest to reality.

Important information provided:

☐ Covered	☐ Not covered
☐ Treated in detail	☐ Treated superficially

Complementary information provided:

☐ Covered	☐ Not covered
☐ Treated in detail	☐ Treated superficially

Reasoning:

☐ Logical	☐ Illogical
☐ Adequate	☐ Inadequate
☐ Structured	☐ Unstructured

Presentation:

☐ Tidy	☐ Untidy
☐ Clear	☐ Confused
☐ Clean	☐ Dirty
☐ Legible	☐ Illegible

Diagrams or tables:

☐ Suited to the text	☐ Unsuited
☐ Useful for understanding	☐ Useless

Instructions:
Mark each of the following parameters on a scale of 1 to 5.
5 = excellent, 4 = good, 3 = average, 2 = bad, 1 = very bad

Important information given:

☐ Covered
☐ Dealt with in detail

Complementary information given:

☐ Covered
☐ Dealt with in detail

Reasoning:

☐ Logical
☐ Suitable
☐ Structured

Presentation:
- [ ] *Tidy*
- [ ] *Clear*
- [ ] *Clean*
- [ ] *Legible*

Diagrams or tables:
- [ ] *Suited to the text*
- [ ] *Useful for understanding*

Checklist for marking a medical record for pain

Instructions:
Place an X in the boxes for done or not done, according to the performance of the student and score the level of procedure from 1 to 5.
5 = very good, 4 = good, 3 = average, 2 = bad, 3 = very bad.

POINTS TO BE MARKED	DONE	NOT DONE	SCORE
Location			
Severity			
Date of onset			
Cause			
Type			
Radiation			
Others			
		Total score	

CLOSED ANSWER EXAMINATION MARKING

Closed-answer examinations are easier to mark objectively because they can be given a fixed mark for each of the options presented to the student.

Although varying weight can be given to the different questions, in general the marking tends to be homogeneous, assigning a point to each question and perhaps subtracting points for every wrong answer. Whether to subtract points depends on the teachers' preference. A whole range is found, from taking away one point for each wrong answer to taking away only 0.1. In the literature, every author has a reason for using a particular value. The most important advantage of subtracting points for wrong answers is that, when students have doubts about a question, they prefer to leave it blank rather than guess. This eliminates correct answers owing to sheer luck to a certain extent.

In tests with true-false items, the common practice is not to count the wrong answers, but make up the final mark by counting only the correct answers. A minimum pass mark is established beforehand; this attempts to account for the factor of chance and is usually set at 75% of the questions.

In tests with multiple choice questions, each question is usually set as being worth one point and points are usually subtracted as 1 divided by the number of options. In questions with 5 options, the value will be 1/5 (0.20), in those with 4 options, 1/4 (0.25), in those with 3, 1/3 (0.33).

In closed, branched or lineal examinations, a positive or negative marking system is set for each of the different options, with the sum of all the points obtained constituting the definitive mark.

In an **OSCE**, each station usually has a different value depending on its importance. The final mark will be the average of the marks for the different stations.

Marking a closed lineal structure examination

CASE PRESENTATION
A 12-year-old patient is brought to your surgery, complaining of abdominal pain from which he has been suffering for the last two days.

1. *What possible diagnoses would you consider?*

1A. Peptic ulcer	0 points
1B. Appendicitis	2 points
1C. Hiatusl hernia	1 point
1D. Gallstones	0 points

2. *What questions would you ask the patient in order to aid your diagnosis?*

2A. If there is fever	2 points
2B. When the pain started	1 point
2C. Where the pain is	1 point
2D. If there is flatulence	-1 point
2E. If movement aggravates pain	2 points

3. *What areas of the patient would you examine, and how?*

3A. Feeling the abdominal wall	1 point
3B. Carrying out the Blumberg's sign test	2 points
3C. Feeling the peripheral pulses	-2 points
3D. Abdominal auscultation	0 points

INFORMATION
Following examination the patient presents a hard abdomen and a positive Blumberg's sign.

4. *What complementary tests would you request?*

4A. GSS	2 points
4B. A straightforward radiography of the abdomen	0 points
4C. A leucocytary formula and count	2 points
4D. An echogram	0 points
4E. An endoscope examination	-2 points

INFORMATION

The GSS presents a figure of 31 in one hour and leukocytes of 11 000/mm ^{3}; nothing of interest is noted in the radiograph and the echogram.

CASE ENDS

With the preceding information you can confirm the diagnosis of _____.

MARKING OPEN-ANSWER EXAMINATIONS

Open answer examinations are the most difficult to mark owing to the possible variations in the answers. The most difficult examinations to mark are therefore those with essays.

Newble & Cannon [a] described a method of **marking unstructured essay questions** that tries to avoid the most common errors. The marker divides the exams into different piles after the first reading according to a very general appreciation of the standard, and then classifies them in a definitive manner. The papers can be separated at the beginning into just two piles (good and bad) or into five (excellent, good, average, bad and very bad). The more attentive the first reading is, the easier it will be to separate the papers into different piles, although part of the global evaluation is lost. This method is very tiring when there is a high number of examinations to be marked.

Other types of open-answer examinations, such as those calling for short answers or modified essays, are easier to mark because they have shorter and more structured answers. These are easier to evaluate objectively.

ANALYSIS OF TEST QUESTIONS [b]

Test questions allow, especially when a computer is available, an analysis of their effectiveness and construction. This is done by determining two characteristics. Difficulty and discrimination and the analysis of the percentage of baits used.

In order to find the necessary levels of difficulty and discrimination, it is necessary to establish the so-called strong and weak groups of students. The **strong group** comprises the 27-33% of students with the highest marks.

The **weak group** is the 27-33% of students with the lowest marks.

Example:

Of a group of 21 pupils, and using a figured 30%, the strong groups would be the seven students with the best marks, and the weak group the seven with the worst marks. The rest of the students are eliminated from the calculations of difficulty and discrimination.

---

a Newble & Cannon (1983).

b Ebel (1965).

The **level of difficulty** allows one to determine to what extent a question is easy or difficult. It is actually a level of easiness; the higher the level, the easier the question. The level 0*100, 100 being very easy and 0 very difficult.

$$\text{Level of difficulty} = \frac{E + D}{N} \times 100$$

The **discrimination level** determines the capacity of the question to differentiate the strong group from the weak.

$$\text{Level of difficulty} = 2 \times \frac{E - D}{N}$$

Where **E** = the number of correct answers in the strong group, **D** = the number of correct answers in the weak group, and **N** = the total number of students in both groups.

If we add the percentage of answers to these levels we will be able to identify the questions whose bad formulation forced the students to make mistakes.

Exercises

CHOICE OF CRITERIA

1. In your programme would you carry out:

Absolute Criteria Tests	YES	NO
Relative Criteria Tests	YES	NO

2. Give your reasons for these answers.

CALCULATING ALR

Pretend that this is an examination for the Faculty of Medicine and calculate ALR for it.

1. Which of the following is not a secondary reaction to a blood transfusion?

a. haemolysis
b. fever
c. arterial hypertension
d. cardiac insufficiency
e. epilepsy

2. The congenital anomaly "blind rectum" represents what proportion of the total of anorectal anomalies?

a. 67.5   b. 20%   c. 3%   d. 35%   e. 50%.

3. The inability to bend the back from a supine position in vertebral tuberculosis constitutes the:

a. Marañon's sign
b. Pott's sign
c. Angelescu's sign
d. Arce's sign
e. None of the above

4. The fundamental cation in the intercellular compartment is:

a. Sodium
b. Nitrogen
c. Potassium
d. Proteins
e. Magnesium

5. Among the following micro-organisms, the one that causes subacute bacterial endocarditis is:

a. Streptococcus viridans
b. Staphylococcus Aureus
c. Pneumococcus
d. Haemophilus influenzae
e. Streptococcus ß-haemolyticus

6. Which of the following temperatures can be considered as the most normal in the human organism?

a. 34-35°C   b. 35-36°C   c. 36-37°C   d. 37-38°C   e. 38-39°C

Compare your results with those on the next page.

1. A, b, c, and d are eliminated and only one option remains.

   1/1 = 1

2A.   B, c and d are eliminated and two options remain.

        1/2 = 0.5

2B.   B and c are eliminated.

        1/3 = 0.33

3.   They are all valid.

        1/5 = 0.2

4.   B and d are eliminated.

        1/3 = 0.33

5.   They are all valid.

        1/5 = 0.2

6A.   A and e are eliminated.

        1/3 = 0.33

6B.   A, b, d and e are eliminated.

        1/1 = 1

The ALR for option A is:

   1 + 0.5 + 0.2 + 0.33 + 0.2+ 0.33 = 2.56

And for option B:

   1 + 0.33 + 0.2 + 0.33 + 0.2 + 1 = 3.06

If each question is worth 1 point, in option A, students will need a minimum mark of 2.56 out of 6,while they will need 3.06 points for option B.

1. Calculate the difficulty and discrimination levels of the questions on page ( ): supposing that the total number of pupils examined is 21 and there are 7 in the strong group and 7 in the weak one.

Question	Correct answers		Discrimination level	Difficulty level
	strong group	weak group		
1	7	4	....	....
2	7	7	....	....
3	3	4	....	....
4	5	2	....	....
5	7	0	....	....
6	6	2	....	....

$$\text{Level of discrimination} = 2 \times \frac{F - D}{N}$$

$$\text{Level of difficulty} = \frac{F + D}{N} \times 100$$

Compare your results with those on the following page. If they do not coincide, have you applied the formula correctly? If you have, check your multiplication skills!

| Question | Correct answers | | Discrimination | Difficulty |
	strong group	weak group	level	level
1	7	4	0.43	79
2	7	7	0	100
3	3	4	-0.14	50
4	5	2	0.43	50
5	7	0	1	50
6	6	2	0.57	57

If one adds the analysis of selected options to these levels, one can evaluate each of the questions (the results of the selection of each of the options are usually expressed as a percentage) and the total number of pupils who sat the examination is taken into account (in this example, 21).

Percentage of answers

Question	Answer	A	B	C	D	E
1	B	14.3	52.4	9.5	9.5	14.3
2	B	---	85.7	14.3	---	---
3	A	38	23.8	9.6	23.8	4.8
4	E	4.8	---	57.1	4.8	33.3
5	D	14.3	9.6	9.6	42.7	23.8
6	D	47.6	4.8	---	47.6	---

What would be your appraisal of these questions?

2. What does the analysis of the questions on the previous page suggest to you?

1.

2.

3.

4.

5.

6.

Compare your answers with those below.

Question 1 is relatively easy, with average discrimination and possibly with all the options well put, given that there is an even distribution of answers among the baits.

Question 2 is very easy or all the students knew it and therefore it does not discriminate between good and bad students Options a, d and e should be considered bad baits, as none of the pupils chose them.

Question 3 is of intermediate difficulty that discriminates negatively; more answers came from the weak group than the strong group. For a start, the question should be considered badly formulated, with some sort of problem in options b and d, which has led some of the students in the strong group to make a mistake.

Question 4 is of average difficulty and discrimination. Option b should be analysed, because it must be an easily recognisable bait which none of the students choose.

Question 5 is of average difficulty and maximum discrimination between strong and weak students; all the strong students answered it well but none of the weak ones did. The distribution of answers in the different options can be considered adequate.

Question 6 has average difficulty and discrimination, but the best should be revised. Options b, c, and d must be unacceptable baits that the students eliminate automatically.

9. OTHER ELEMENTS
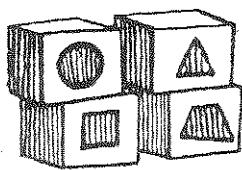
After working through this chapter, the student should be able to:

- select the staff that will constitute the programme's committee.
- identify the characteristics that teachers ought to have

DESCRIPTION OF PROGRAMME ORGANISATION

Introduction

This chapter analyses the elements that contribute to the success or failure of the programme, although they are not part of the educational process itself. These are: the information system, the management of the programme and teachers' characteristics.

The management of the programme follows the same patterns as the management of any institution or programme. A good leader is the one who succeeds in involving the personnel in the process, makes them feel part of it and consults them on the decisions that affect them.

Information

How can the organisation of the programme be described? Everyone involved in the Educational process -teaching staff, students, administrators, etc.- knows the details and feels part of the process. Any process in which the participants do not feel involved is doomed to fail.

Many of the problems that arise when establishing a programme or curriculum are due to the lack of information of the personnel involved in the process. This causes misunderstandings, fears and reticence that are sometimes difficult to overcome.

Any programme in which participants do not feel involved is doomed to failure.

The information can be transmitted in different ways. The most suitable way depends on the programme and the environment in which it is to be carried out. The choice of the form of information should depend on:

- who needs to be informed
- the number of people to be informed
- the physical characteristics of the site of the programme
- the amount of information to be transmitted

The characteristics of the group to be informed will determine the information system.

Information can be provided by different means. It is important to choose the most appropriate one for the people involved, the characteristics of the programme and the environment.

The information transmission process may use:

(a) written means:
   - information sheets
   - bulletin board
   - posters

(b) oral means:
   - meetings and committees
   - personal information

The people to be informed is the determining factor in the choice of means. When the number of people is high, it is convenient to use written means; if the number is small, oral means are more effective. When the people to be informed have a low cultural level, oral or simplified written means should be used. When the building is big or units or departments are dispersed it will be necessary to send the information to the individuals personally.

ENVIRONMENT FOR LEARNING

What sort of atmosphere should be created for teaching? Although not normally considered in the planning of a programme, a suitable environment is fundamental. The environment for the learning process affects it enormously.

Important factors to consider include the comfort of the classrooms, their suitability to the number of students and the strategies to be used, the accessibility of resources, and the adequate functioning of audio-visual aids.

Students' well-being or discomfort affect their morale and therefore their learning. If the classroom is too hot or too cold, they will feel uncomfortable and wish only to get out as soon as possible; if using slides or overheads, the classroom must be dark enough for them to be seen or students will stop attending. The following will influence the creation of a **good or bad environment**:

- the suitability of the classrooms and resources
- the accessibility of the classrooms
- the transmission of information
- the accessibility of the teaching staff
- the relationship between the teachers and the students
- relationship between the teachers, the students and the administration
- the ease of moving from one place to another in the building

CHARACTERISTICS OF TEACHERS

What characteristics should the teaching staff have? This issue is a source of conflict in education. The answers seem to be quite clear when selecting teachers are for primary schools; they begin to be more controversial at secondary school level, and become even more complicated for university and postgraduate level teachers. This higher level group is often selected on the basis of professional or research activities, and thus on the assumption that a good professional is automatically a good teacher.

For example, a teacher can be an excellent scientist or clinical worker and a terrible speaker. This would make him or her a bad lecturer, but, if he or she has a talent for communication with students on a one-to-one basis, he/she would be an excellent tutor.
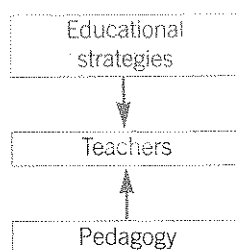
The programme and the strategies to be used determine whether particular teachers are good or bad. It is very important to ensure that new members will fit into the system. The balance between the system and individual contributions is highly unstable. [a]

MANAGEMENT

How should the process be managed? To achieve a desired goal, management is as important in an educational programme as in a factory or a company. The number of people who should be involved in the organisation depends on the size of the programme, although it is essential that, in every Educational process, there be **one person in charge** of directing it. A good management structure makes the process effective and efficient, motivates the personnel and uses the resources in the best way possible.

In a highly specific programme, with a small number of teachers and a small number of students, one of the teachers can be in charge. On the other hand, the direction of the curriculum of a faculty or school is a much more complicated business, and a committee should be in charge of the decision-making. It is important to involve all the teaching staff, or at least all of those responsible for a part of the process. If they are not involved, they do not feel like participants, and winning their co-operation will be difficult. In addition, it is important to seek the participation of the students and listen to their suggestions and complaints.

There are three basic forms of management, depending on the type of participation: when the process is managed from a central nucleus that informs and controls the rest of the personnel involved (central nucleus), when all the actors participate equally (equal participation) and a combination of both (mixed system).

Central nucleos   Equal participation   Mixed
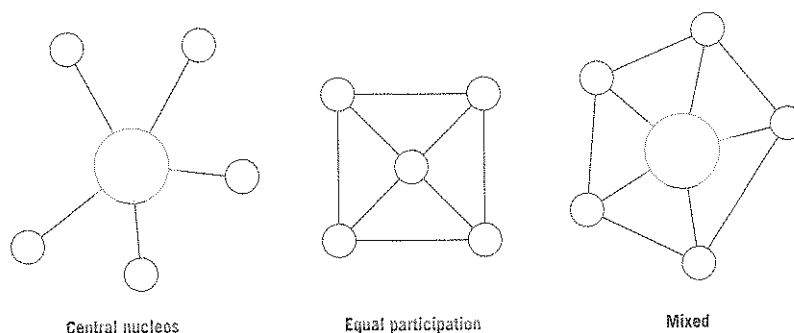
a Sockett, H 1992

Although many people are not willing to participate actively in programme direction, as it often takes up a lot of time, they feel that they should be consulted about any decision to be made. The following should therefore be considered:

(a) who has to take part:
  - the number of people
  - their status
  - whether they participate as individuals or as the representatives of other people

(b) how their participation will be organised.

When preparing a meeting, make sure you will do the following:

1. define the subject matter.
2. give the big picture of the subject.
3. state what the audience will discuss in the session.
4. explain how all the individual topics fit together.
5. find out any relevant background to and interest of the audience.
6. list the topics to be covered.
7. list the times allotted to each topic.
8. make sure everybody has a common understanding of the terms to be used.
9. explain details.
10. give examples if relevant.
11. conduct an exercise to re-enforce participation.
12. summarise the conclusions.
13. define ways to implement the conclusions.
14. set the date of and subjects to be covered at the next meeting.

Changing strategies

In an institution such as a medical or nursing school, changes to a more modern curriculum that is integrated, based on problem solving, or that is multiprofessional and that changes the role of the teachers and the students, are difficult to establish. Fears, sometimes not well defined but due to a lack of information or demonstrating a possible loss of control by teachers, can raise obstacles.

Most teachers have a feeling of power in their teaching position, and participatory systems in which decisions are taken by consensus or majority vote represent a threat to their autonomy. Disciplines are considered an identity element within the university structure and any attempt to change them is felt as a loss of identity. There is also fear of the unknown and the new roles that every change implies on a smaller or larger scale. Although the changes can be seen as positive in the long run, the administration of the institution and the inertia of the systems do not facilitate the introduction of new strategies.

In general, students do not accept change easily. They fear the unknown and are incapable of comparing different systems because they lack the information or because they do not have role models to follow. Most of them find it easier to follow a paternalistic approach to learning than to be responsible for their own learning, which modern pedagogy expects from them.

Big changes are difficult to establish in traditional schools. It is usually easier to start with small pilot studies in specific areas or to design parallel tracks. As mentioned in the introduction, the teaching–learning process should be dynamic and able to adjust to the needs and the environment in which they are taken place. Each intervention in the process must have a positive effect.

The introduction of any change must be a well-designed process, ensuring the:

- definition of precise objectives;
- adequacy of resources, and implementation strategies;
- establishment of appropriate evaluation systems, and
- information and motivation strategies.

The leader of an educational programme should be able to:

- keep the process going;
- make sure that the work is being done;
- support the process;
- motivate the personnel involved;
- promote active participation;
- support new initiatives;
- assess the advantages or disadvantages of new solutions, and
- identify problems and find solutions.

Exercise

In a group

1. Repeat the general objective you chose for your programme.

_____

_____

_____

2. At whom was your programme directed?

_____

3. What information system will you use to describe the organisation of the programme?

   3.1 Who will you inform:

   _____

   3.2 Why:

   _____

   _____

   3.3 What information system will you choose:

   _____

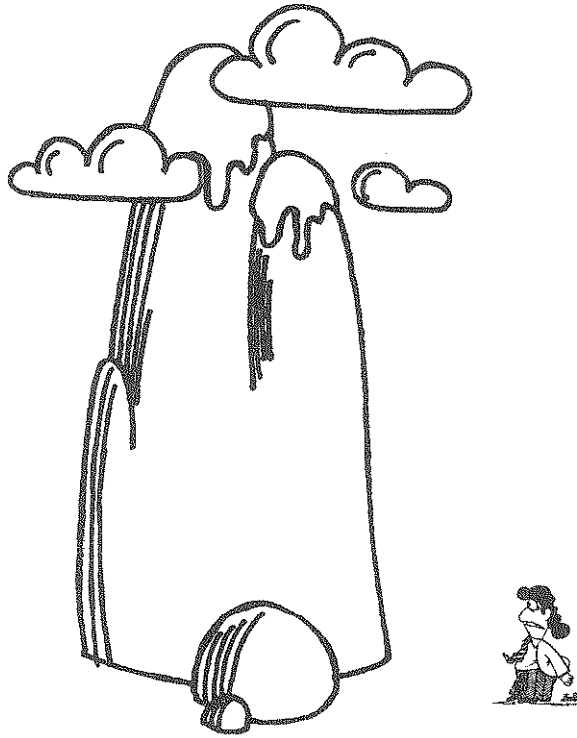   3.4 Why have you chosen that one and not another:

   _____

   _____

4. What elements do you consider important to create a suitable atmosphere?

_____

_____

5. Who should manage the process and how would they organise participation?

_____

_____

_____

6. What characteristics should the teaching staff have?

_____

_____

_____

10. PROGRAMME EVALUATION

After working through this chapter, the student should be able to:

- choose the information methods to evaluate two elements of the programme
- formulate changing strategies
- formulate five key questions for the evaluation of the programme

Introduction

Quality assurance is a widely accepted strategy to improve the quality of health services, but very few educational institutions evaluate their training programmes. The need to adjust the programmes to practice, the increasing competitiveness in the labour market and the limitation of resources are, on the one hand, driving students to claim an appropriate education and, on the other hand, forcing the institutions to establish mechanisms to make the training process effective and efficient.

> The assessment of educational programmes is the equivalent to the quality assurance in health services. Quality is the degree of excellence

With the autonomy of universities, society must establish the processes or ensure the quality of education. In the United States, competition in the labour market is very high. The titles obtained in different universities have different values, education is expensive and the students can select the institution they like. The institutions must therefore ensure the efficacy and efficiency of their resources. In many European countries, students are assigned to a university depending on their place of residence, the titles have equal value and competition between universities is based on research and not education. Here, the control of the system is very low. Some countries, like the United Kingdom, have established a committee that evaluates the programmes and facilities of educational institutions.

A programme or curriculum is a complex thing with many variables, which have already been analysed and must be adjusted, like pieces of a puzzle. The more complex the programme, the more difficult its evaluation will be.

The purpose of curriculum evaluation is to check that:

- the goals have been achieved;
- he educational objectives have been fulfilled;
- he processes, strategies and evaluation systems are adequate to meet the objectives;
- resources are efficiently used and the process is cost-effective; and
- students and teachers are satisfied.

There are three types of curriculae: the one on paper, the one that takes place in reality and the one that students experiences. In an ideal situation, the curriculum could be represented as a single circle, but in reality there are three independent circles, with some overlap, depending on the closeness to the real situation. [a]


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a Coles, 1985
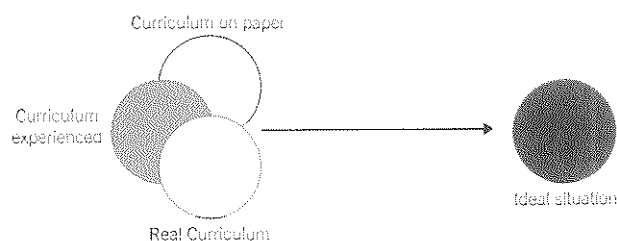
> Programme evaluation is the process of making informed judgement about the cha-
> racter and the quality of an educational programme or parts thereof. [a]

Decisions, in relation to the design of a programme evaluation system, determine: [b]

- what will be evaluated
- who will participate in the evaluation
- how information will be collected
- how the results will be interpreted
- what measures will be taken.

Evaluation can be related to the final outcome or the process, i.e. evaluation of the outcome measures the extent to which specific objectives have been achieved, or how well the results of the programme meet the already specified criteria. Evaluation of the process addresses the strategies and methods followed to achieve the objectives, how the programme functions, in what context it operates, what problems or issues it encounters, and the facilitating or hindering elements. [c]

If one analysis only the final product, it may be too late. The key to success depends on the process that deals with the final product. The evaluation of the product is related to **efficacy**, while the evaluation of the process is related to **effectiveness**. [d]

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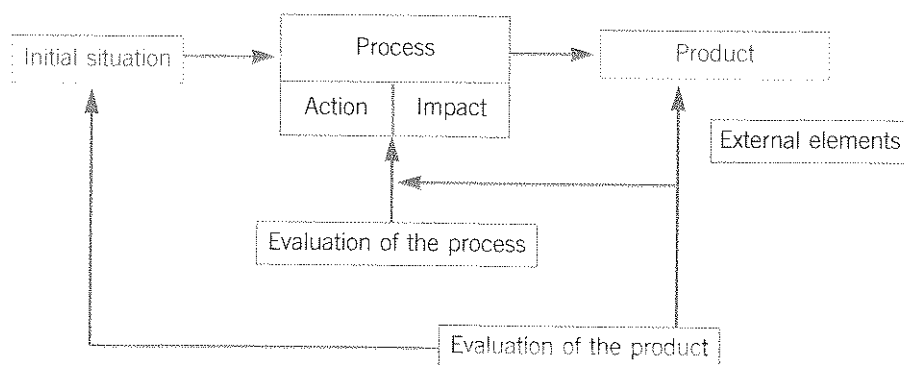
a Katz, F.M., 1978.

b European Health care Management Association, 1993; Leparski, E. & Nüssel, E., 1987; Shoboski, O. & Sukkar, M., 1988.

c Katz, F.M., 1978

d Leparski, E. & Nüssel, E., 1987.

The evaluation of the final product of education is very difficult.

To evaluate the quality of the final product of a medical or nursing school, one must evaluate the performance of the graduates in practice and compare it with that of graduates of other medical or nursing schools.

The evaluation of a programme must be a continuous process aiming to improve professional training and maximise the efficiency and efficacy of the system.
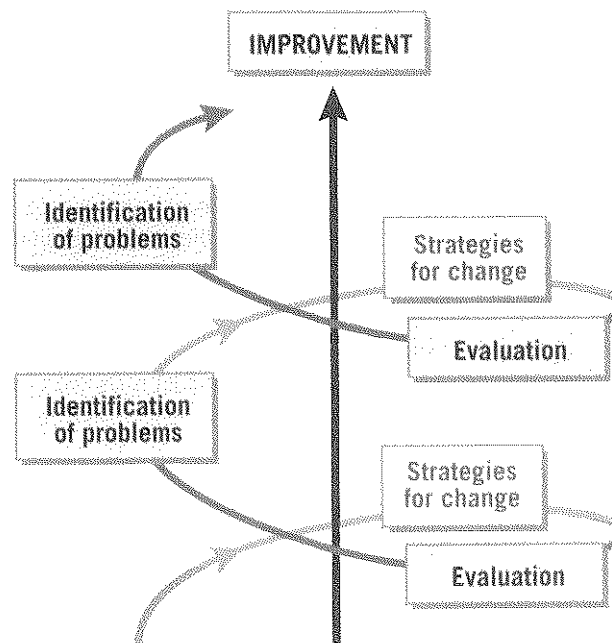
All quality assurance programmes must have:

- an evaluation strategy
- a system to collect information
- a system to analyse and disseminate information
- a mechanism for making decisions and implementing changes

The start of the process is usually painful, because many teachers feel that it is a reproach and are not willing to introduce any changes [a]. As we mentioned in the previous chapter on changing strategies, teachers must feel a part of the process, sense that it should be beneficial to all parties and not to feel threatened by it.

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a Shoboski, O. & Sukkar, M., 1988.

What is going to be evaluated

The possibilities for evaluation within a programme are almost infinite. The choice of elements to be examined depend on the purpose of the evaluation. These elements can include:

- objectives
- strategies and methods
- the learning evaluation system
- the teachers
- the students
- the facilities of the institution

A battery of questions can be formulated to evaluate the different elements. The list is indicative, not exclusive. [a]

The adequacy of objectives in relation to the goals of the programme

1. What is the general objective of your programme?
2. Is the general objective based on practice needs?
3. Which are the specific objectives?
4. Are the specific objectives in accordance with the general objective and the practice needs?
5. How have these objectives been established?
6. Are these objectives implicitly or explicitly stated; are they published; are they known to students and teachers?
7. Have the objectives been achieved, and, if so, to what extent?
8. How frequently are the objectives reviewed?

The adequacy of strategies and methods

1. Are the strategies and methods used the most appropriate to facilitate learning?
2. Are the timetables and the tasks known to the student?
3. Are the timetables published?
4. To what extent are timetables followed?
5. Is there any conflict of interest or time between different activities?

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7 Modified from European Health Care Management Association, undated.

The quality of the evaluation systems

1. Is the type of exam appropriate for what has to be evaluated?
2. What is the periodicy of exams?
3. Are exams objective or subjective?
4. Are analysis techniques used?
5. Are there marking check-lists for evaluation?
6. What number of students pass the exams?
7. Are there tutorial sessions for those who fail?
8. Are students allowed to revise their exams?
9. Is the period between the exam and the publication of results reasonable?
10. Are the students' claims accepted?
11. Are the factors related to academic failure analysed?

The teachers

1. What is the number of teachers, and the ratio of students to teachers?
2. Are teachers trained in educational techniques?
3. What number of hours does each teacher devote to teaching?
4. What is the availability of teachers to students?
5. Is there a fixed time for consultation or questions?
6. How many students consult their teachers?
7. Does the selection process allow the selection of the best teachers?
8. What are the mechanisms for continuing education of the teachers?
9. Are there facilities for the teachers to attend scientific meetings?
10. Are there any activities for updating teaching skills?
11. Is there a minimum of journals available?
12. What is the absenteeism rate of the teachers?
13. Are the teachers satisfied with their work?

The students

1. What is the absenteeism rate of the students?
2. Do students participate in the decision-making process?
3. What is the level of students' satisfaction?
4. Is the selection process appropriate?
5. Are there mechanisms to compensate for initial deficiencies?
6. Are the students motivated?
7. Do students receive feedback on their activities?

The institution facilities

1. The library:
   (a) what are the opening hours?
   (b) what does the library contain?
      - text books?
      - scientific journals?
      - documents produced by teachers?
      - audio-visual material?
   (c) is the access to material open or restricted?
   (d) what facilities exist to borrow material?
   (e) is there strong control of the loan policy?
   (f) is there access to databases?
   (g) is there a cost for students and/or teachers for use of the facilities?

2. The classrooms:
   - are they of appropriate size and layout?
   - are the conditions (heating, light, accessibility) adequate?
   - do they have the audio-visual systems required?

3. Other:
   - are there areas in which students can spend their free time?
   - are there document reproduction facilities?

Management

1. Who participates in the decision-making process?
2. Are the opinions of students and teachers taken into consideration?
3. Are the decisions implemented?

How information will be collected

Collecting the pertinent information is sometimes a long process that requires the collaboration of other persons involved in the evaluation.

The procedures to collect information include: [a]

- analysis of existing documents (objectives, timetables, evaluation sheets, material in the library)
- quantitative methods; and
- qualitative methods.

A combination of qualitative and quantitative methods provides a better information. The quantitative data provide information to identify problems and the qualitative data, to interpret them. Education is a very complex process in which many factors (preferences, personal relationships, feelings, study habits, etc.) interact that are difficult to evaluate quantitatively, but which are very important to the efficacy and efficiency of the process.

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a Coles, C.R. & Gale Grant, J.; 1985; Shoboski, O. & Sukkar, M., 1988.

Quantitative methods

Quantitative methods are used in general to provide basic information to identify problems, such as the proportion of students that fail, , the absence of students from some classes, the number of volumes available in the library, reactions of students and teachers, etc.

Quantitative methods include: [a]

- attitude scales
- rating scales
- controlled studies
- observation schedules

Qualitative methods

Qualitative methods provide information to understand the underlying causes of the identified problems.

Qualitative methods include: [b]

- interviews (structured, semistructured or discussion groups)
- observation
- report analysis

The result of qualitative methods is usually a report analysing and explaining a particular situation.

Qualitative methods can be very close to quantitative methods; a structured interview is similar to a questionnaire and the results can be quantified. Each evaluator should use the method most appropriate for the situation and environment, considering what is going to be evaluated, the type of information needed and the resources available.

If one asks students in an interview about a teacher, many are afraid to express their opinions openly, but they will do so in an anonymous questionnaire. If the method is not appropriate, the results will not have any value.

Analysis and report of the results

The next step is to analyse the evaluation results and to prepare the report. It should include the measures that need to be implemented to improve the process and solve the identified problems.

The presentation of result depends on the number of people involved in the process. Any report must be clear and comprehensive and summarise the findings and the causes. The report can be done orally or written. In any case, the mechanisms to discuss the findings and the measures to be implemented should be clearly put in place before the report is issued.

If just one professor or department wants to evaluate a programme, the mechanisms are much simpler than those needed to evaluate a whole curriculum. In the latter case, many people with different schedules, priorities and loyalties may be involved.

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a, b Coles, C.R. & Gale Grant, J.; 1985; Shoboski, O. & Sukkar, M., 1988.

The presentation of results is similar to that described for information transmission in the last chapter (page 140) and the decision-making process to implement changes is similar to the management process (page 142).

> **If one is committed to a systematic and comprehensive analysis of the process, one can ensure its improvement.**

| Exercise |

1. Specify two elements of your programme that you would like to evaluate.

    a)

    b)

2. Specify the methods you would use to collect information on these elements.

    a)

    b)

3. Look at the facilities of your institution. Are they appropriate for your program-
    me? If they are not, what facilities do you need?

AUTOEVALUATION

Indicate the correct answer. There is only one correct answer per question.

1. Learning is understood as being:

    1) Teacher-student interaction.

    2) A change of behaviour produced in the student.

    3) Knowledge transmitted from the teacher to the student.

    4) Application of the principle of transference.

    5) Knowledge, habits and attitudes acquired by the student.

      a) 1+2   b) 2+4   c) 3+5   d) 4+1   e) 5+2

2. All of the following teaching situations favour learning, except one. Indicate which:

    a) Stimulating the student to become active.

    b) Facilitating the discovery of concepts

    c) Frequently checking on the student's level

    d) Favouring the particular nature of learning

3. The techniques of determining needs can be used for:

    a) Identifying professional responsibilities.

    b) Assessing a programme's efficiency.

    c) Deciding the pass or failure of students.

    d) Assessing the questions of a "test" style examination.

4. The analysis of critical incidents allows for:

    a) The gathering of data on professional performance

    b) The assessing of the students' hospital performance

    c) The determining of badly set questions in an examination.

    d) The analysing of the state of a patient.

5. The study of mistakes in practice allows for:

    a) Defining the tasks that a professional should carry out.

    b) Defining the contents of a programme.

    c) Working out educational objectives.

    d) Rectifying errors in education.

6. *Which of the following cases cannot be considered as being an advantage in defining educational objectives?*

    a) *Allowing the students to evaluate their progress over the length of their learning period.*

    b) *Allowing the teacher to choose pertinent questions for an examination.*

    c) *Allowing the teacher to choose his/her teaching methods suitably.*

    d) *Allowing the student to know in depth about the content, organisation and timetable of a course.*

    e) *Allowing the student to clearly demonstrate the acquisition or absence of specific behaviours at the end of the course of study.*

7. *The objectives should be carried out according to:*

    1. *Social needs.*

    2. *The needs of the institution*

    3. *The lecturer's knowledge*

    4. *The pupil's knowledge*

        a) *1 + 3*   b) *1 + 4*   c) *2 + 3*   d) *2 + 4*

Educational objectives can be considered within three fields: the cognoscitive field, that has to do with knowledge, the psycho-motor field, or the one that deals with skills, and the affective field that has to do with attitudes.

Indicate the objectives of questions 8 - 15 according to the following key:

    a = knowledge

    b = attitudes

    c = skills

    d = knowledge and attitudes

    e = knowledge and skills

The student should be able to:

8. *Describe the basic steps to be followed when taking a blood pressure reading.*

9. *Put the sleeve of the blood pressure gauge in the right place.*

10. *Tell the patient to sit down on entering the surgery.*

11. *Give information about the problems of abortion without making a moral judgement.*

12. *Give an intermuscular injection whilst following the monitor's instructions.*

13. *Copy a histogram.*

14. *Co-ordinate a health team.*

15. *Have a positive attitude toward the members of the health team.*

16. *Learning should be more effective in:*

   a) *an expert lecture*

   b) *seminars*

   c) *demonstration sessions*

   d) *practical sessions*

Which of the characteristics indicated in questions 17 to 25 can be considered advantages of:

   a) an expert lecture

   b) seminars (small-group discussion sessions)

   c) expert lectures and seminars

   d) self-learning

   e) seminars and self-learning

17. *It activates the student.*

18. *It allows the students to reach a given objective.*

19. *It provides the student with feedback on their own learning.*

20. *It adapts to the student's work rhythm*

21. *It allows discussion of knowledge.*

22. *It stimulates teamwork*

23. *It is economical in both time and facilities.*

24. *It allows the pupil to develop their own confidence.*

25. *It eases evaluation.*

26. *An overhead projector is used for projecting:*

   a) *Dark shapes on overhead transparencies.*

   b) *Dark shapes on paper.*

   c) *Slides*

   d) *X-rays*

27. Which of the following is NOT an aim of the use of images in teaching?

a) Increasing memorial capacity.

b) Increasing transferral capacity.

c) Increasing motivation.

d) Clarifying concepts.

28. The main goal of evaluation is:

a) Deciding on PASS or FAIL

b) Checking to see whether the objectives of the course have been achieved.

c) Measuring the effectiveness of the course or programme.

d) Classifying the students

29. Formulative evaluation allows for:

a) Informing the student about their progress.

b) Classifying the students.

c) Deciding on PASS or FAIL.

d) None of the cases above.

30. Certificate evaluation does NOT have as an objective:

a) Informing the student about their progress.

b) Substituting one programme for another.

c) Grouping the students.

d) Deciding on PASS or FAIL.

31. "An acceptable level of results" means that:

a) 50% of the pupils have passed.

b) A pupil needs to score 5 to pass.

c) A pupil will pass as long as they know "just enough"

d) A previously set number of pupils will pass

32. Written exams called "objective " are NOT justified to measure the ability of pupils to:

a) Remember precise information.

b) Resolve problems.

c) Make decisions

d) Communicate with the patient.

e) Interpret data.

33. Which of the following types of examination can be considered as the most objective?

1. Essay.
2. Short answer.
3. Test.
4. Oral.
5. Practical.

a) 1 + 2b)   2 + 3   c)   3 + 4   d)   4 + 5   e)   1 + 3.

34. The type of examination that should be used to measure psycho-motor skills is:

a) Multiple-choice test.
b) Multiple open answer test.
c) Graph analysis.
d) Observation.
e) Problem-solving.

35. If we choose a number of students to follow a certain programme by means of comparison of their performances, we are using a test of:

a) Absolute criteria
b) Relative criteria
c) Recertification
d) None of the above

36. If we decide that every pupil should be capable of carrying out an electrocardiogram, we should apply a test of:

a) Absolute criteria
b) Relative criteria
c) Recertification
d) None of the above

37. Integrated education is taken to mean:

a) That which joins a range of disciplines in the same type of teaching.
b) The results from the joining of several professionals as teachers in the same type of teaching.
c) That which joins students from different professions in one teaching.
d) Teachers act solely as tutors.

38. When a group receives a series of biochemical objectives and the students are oriented towards the place where they can obtain the material necessary to achieve them, we say that this teaching method is:

a) *Based on problem solution.*

b) *Self-study.*

c) *Opportunist.*

d) *Optative.*

Check your answers with those below.

Answers to Auto-evaluation

1. – e	11. – d	21. – b	31 .– c
2. – b	12 – c	22. – b	32. – b
3. – a	13. – c	23. – a	33. – c
4. – a	14. – d	24. – b	34. – b
5. – d	15. – b	25. – e	35. – c
6. – d	16. – d	26. – a	36. – a
7. – b	17. – e	27. – b	37. – c
8. – a	18. – d	28. – c	38. – c
9. – e	19. – d	29. – d	39. – b
10. – b	20. – d	30. – a	40. – c

GLOSSARY

Absolute criteria. In assessment, criteria that establish a minimum level that the students must reach to pass.

Acceptable level of results (ALR). This is the minimum level, according to absolute criteria, that permits the student to pass.

Action. Element of Educational objectives that indicates the activity to be carried out, as defined by a measurable, active verb.

Active learning. That in which the student participates actively.

Affective field. Includes affective states.

Analysis grid. Technique used for determining priorities by considering the importance of the problem, the relation between risk factors and the problem, the technical capability for resolving the problem and the feasibility of intervention .

Analysis of professional conduct. Obtaining information from a number of professionals who are considered among the best, about the critical situations they have encountered during their practice and how they dealt with them. (see critical incident technique).

Attitude. Predisposition to perceive, feel or behave in a particular manner towards specific aspects of certain people.

Automatism. Level in skills involving the performance of a skill automatically, without thought about the steps to follow.

Bad option. In an examination, an option that the students should eliminate automatically, owing to incongruity with the rest of the question or the lack of relationship to the statement.

Bait. In a multiple choice question, all the options that are not the correct answer.

Branched structure. Problem structure in programmed education or evaluation in which the answers depend on the route that the student takes.

Centripetal error. Error in the marking of examinations in which there is a tendency to mark towards the average marks of the evaluation scale.

Certification. Evidence that a student meets the standards of performance required for employment or further training.

Closed branched structure. Problem structure in programmed education in which the student follows a route that depends on the answers he or she has chosen.

Closed lineal structure. Problem structure in programmed education or evaluation in which each question is presented with a series of possible answers, although the student can only progress through the correct answers.

Closed structure. Problem structure in programmed education or evaluation in which students must choose the correct answers from among a series of options offered.

Cognitive field. Includes processes that are purely intellectual.

Competence. Combination of the knowledge, attitudes and skills necessary for carrying out professional tasks.

Conditions. See situation.

Content. Element of the Educational objectives that indicate the subject to be mastered or the skill to be carried out.

Contrast or proximity error. Error in the marking of examinations resulting from the comparison of a paper with one previously marked.

Control. Level in skills field involving the capability of carrying out an action by following instructions.

Co-ordinated teaching. Type of teaching in which disciplines maintain their identity, but are applied in a logical and ordered way to a common problem.

Criteria. Element of Educational objectives which indicates the minimum level required in the performance of a given task.

Critical incident technique. The collection of facts to characterise the efficiency or inefficiency of professional practice.

Delphi technique. Technique used to determine needs to be included in a programme.

Demonstration sessions. These show the students how to carry out a practical activity or reiterate the need for the acquisition of knowledge or attitudes.

Dexterity. Manual or mental adroitness; skill.

Difficulty. A figure determined by calculation, showing how easy or difficult an examination question is.

Discipline-based education. A strategy in which disciplines are covered separately and individually.

Education and training based. A programme on competence adapted and limited to the professional.

Educational strategies. These constitute the philosophies that can underlie the teaching and learning process of a programme.

Effectiveness of solution. In the Hanlon method, a factor determined by whether the resources and technology are available to act on a problem.

Elective-based education. That in which the students make up their own curricula by selecting courses within the range offered to them.

Essay. Examination involving writing to a specific length on a given topic.

Evaluation. The process that assesses the achievement of objectives and the efficiency of programmes and teachers; a value judgement and a test of performance.

Expert committee. A group of people who are considered experts in the field concerned and will define what they believe to be the requirements for the programme.

Extrinsic incentive. One that has no relationship to the learning process; the student works to achieve it but not to learn.

Feasibility of intervention. A component of the Hanlon method, determined by considering pertinence, economic feasibility, acceptability, resources available and legality.

Feedback. In this context, information received by students about their own learning.

Formative evaluation. That which identifies failures in learning in order to correct them; it has no coercive component.

General objectives. Aims chosen on the basis of the functions that the trained professional has to perform.

Good option. In an examination, an option that is possible and that the student cannot automatically eliminate.

Halo effect. Error made in examinations which the marker, on finding the error, is induced to mark down the rest of the examination..

Hanlon method. Technique used to determine priorities by considering: (a) the magnitude of the problem; (b) the severity of the problem; (c) the effectiveness of the solution and (d) the feasibility of the intervention programme (combined according to the formula (a+b) (c x d)).

Horizontal integration. Type of teaching that co-ordinates the disciplines traditionally covered in the same course or year.

Imitation. Level in skills field involving the repetition by the students of an observed action until they can carry it out themselves.

Imprecise active verb. Indicates an action that is difficult or impossible to measure.

Incentive. Motivation provided to stimulate learning.

Incidence. The number of new cases of an illness in a determined period divided by the number of people in the population exposed to it.

Incident. Observable activity that is complete enough to allow the deduction of its effects.

Individual teaching. That in which the teacher works individually with each student.

Information transmission. A strategy in which the teacher transmits knowledge to the students in an ordered manner, and usually orally.

Integrated teaching. Type of teaching in which traditional disciplines lose their identities to form a new discipline.

Interiorization. Level in attitudes field involving the perception of phenomena, which forms part of the values of the person and allows him or her to adopt an attitude automatically.

Intermediate objectives. Descriptions of the activities needed to meet the general objectives.

Interpretation of data. Level in knowledge field involving the application of ideas, principles or methods to tackle a new situation or phenomenon .

Intrinsic incentive. One that is directly related to the learning process; the satisfaction lies in the learning itself and the student works to learn.

Knowledge. Collection of facts, values, information etc. to which one has access through study, intuition or experience.

Learning. A change in conduct, that is more or less permanent, owing to practice or experience and producing a change in behaviour.

Learning objectives. These indicate the change of conduct needed.

Lecture. Teaching method in which the teacher transmit his or her knowledge orally to the students.

Leniency error. Error in the marking of examinations in which the student's mark is increased through pity.

Level of discrimination. A figure determined by calculation, to determine the capacity of an examination question to separate the strong group of students from the weak one.

Lineal structure. Problem structure in programmed education or evaluation in which the student must answer a series of questions and can progress only through correct responses.

Logical error. Error in the marking of examinations resulting from a lack of thorough analysis.

Magnitude of the problem. In the Hanlon method, the number of affected people in relation to the total population.

Marking check-list. A check-list that is set up to measure knowledge, attitudes or skills, specifying the answers that a student must give and giving each set a mark .

Measurable active verb. Indicates a measurable action to be carried out.

Modified essay. Examination that requires students to answer linked questions in writing in order to solve a case or problem.

Morbidity data. Statistics on illnesses in individuals or a population.

Mortality data. Statistics on deaths in a population.

Motivation. The student's desire to learn.

Multiple choice question. Form of assessment in which a student is presented with two or more solutions to a question or problem of which only one is correct.

Multiprofessional education. That in which the students who do or will follow different careers learn together for certain periods during their training.

Negative incentive. One that makes learning obligatory through scare tactics.

Object. As an element of Educational objectives, it indicates the theme or the skill to be covered.

Objective structured clinical examination (OSCE). This is a combination of the various types of examination; the students rotate through a series of stations in which they carry out different tests.

Objective test. That which allows the evaluation of the student's learning without consideration of outside influences alien to the student's own performance .

Open branched structure. Problem structure in programmed education in which the student determines his/her own path and can choose what has to be done after making each choice.

Open lineal structure. Problem structure in programmed education or evaluation in which the student must answer a series of questions and can only move on through correct answers; no possible answers are offered.

Open structure. Problem structure in programmed education or evaluation that requires students to give their own answers to the questions..

Operative objectives. These indicate a job to be done.

Operative verb. Indicates an action to be carried out.

Opinion survey. Technique to identify opinions through an oral or written questionnaire..

Opportunist education. That which is conducted on the basis of the opportunities that arise, with no definite plan.

Oral examination. That in which the student gives oral answers to the questions put to them.

Overhead projector. Apparatus for projecting transparencies.

Pairing question. Form of assessment in which two series of options have to be put in pairs..

Participatory lecture. A variation of the traditional lecture that allows students to participate actively.

Passive learning. That in which the student does not actively participate.

Pedagogical method. Path that has to be followed to offer knowledge in the easiest and most advantageous way, putting into practice, in an ordered and rational way as many principles and rules as necessary.

Pertinence. Level of correlation between the programme's objectives and its content.

Positive incentive. One that reinforces learning by encouraging voluntary study.

Practical evaluation. That in which students must show capabilities or attitudes in a real or stimulated situation.

Practical sessions. The students acquire skills through practice.

Prevalence. The number of cases of an illness found in a determined period divided by the number of people in the population being studied.

Principle of transference. Transferring knowledge, attitudes or skills learnt in particular situations and to solve particular problems to different situations or problems.

Priority. Circumstance having precedence in rank.

Problem solving sessions. The students learn by solving problems in practice.

Problem-based learning. A strategy in which problems are used as a stimulus and focus of students' activities.

Programmed education. It is designed so that the students can reach a desired objective without the help of a teacher, by means of progress through a set of sequential approaches .

Psychomotor field. Includes the manual tasks to be carried out .

Real life situation. The students learn in the environment in which they will have to carry out the task.

Recall. Level of knowledge field involving the ability to recall information, processes, principles, methods, etc..

Receptivity. Sensitivity to the existence of a certain phenomenon and the willingness to receive.

Relative criteria. In assessment, criteria that compare the students' performances. This comparison conditions who passes.

Sanctioning evaluation. That in which a minimum level is set to determine who has passed, or job placement; it has a coercive component.

Self-learning. Students learning by themselves, without the intervention of a teacher.

Seminars. Discussion sessions on theoretical subjects, generally led by a teacher.

Severity of the problem. In the Hanlon method, the seriousness of the problem according to social and health considerations.

Short-answer questions. Examination type in which students are required to give brief answers to open questions.

Simulated patients. People who are trained to simulate different illnesses.

Simulated situation. The students learn in a situation as close as possible to the real-life situation.

Simulation material. Complementary material that allows the creation of artificial situations for learning that approach real life situations, to a certain extent.

Situation (in Educational objectives). Element that indicates the conditions in which the student must be able to carry out the action.

Skill. Dexterity to carry out a task.

Solution of problems. Level of knowledge involving the application of the principle of transference to find the best solutions to the problems that occur in new situations.

Specific objectives. What the students should be able to do after the completion of the programme. Also called Educational objectives.

Standard-based education. That in which the curriculum is fixed in advance and all the students pass through a set of prescribed courses, with no opportunities for choice.

Student-based teaching. A strategy in which the students are responsible for their own learning and for choosing the path to follow to achieve it.

Study of errors of practice. Analysing the errors in professional practice; one of the forms of critical incident technique.

Subjective proof. That in which outside influences can most easily change the marker's appreciation of the student's competence.

Systematic education. That which demands the clear definition of the objectives and the means necessary to reach them.

Tasks analysis. Systematic and attentive observation of a representative sample of the population in a specific field.

Teacher-based teaching. A strategy in which the teacher decides on , directs and controls the teaching/learning process.

Teaching. Process of facilitating learning.

True / false questions. Form of assessment in which the student has to indicate whether each option is true or false.

**Trustworthiness.** As a quality of evaluation, the capability of producing consistent results.

Uniprofessional education. That which addresses each profession in isolation.

Validity. As a quality of evaluation, measuring what was intended to be measured.

Vertical integration. Type of teaching that co-ordinates disciplines usually covered in different courses or years.

Written examination. That in which the students present their answers in written form.

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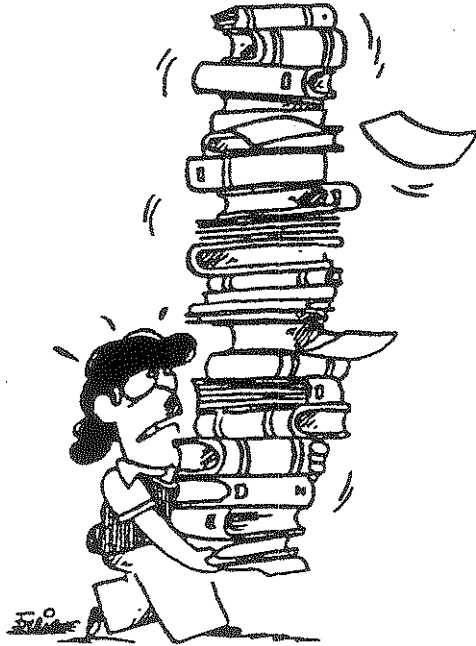
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