Educational Handbook for Health Personnel
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Educational Handbook for Health Personnel

Sixth Edition

J.-J. Guilbert

How to help educators to increase their skills so as to make learning easier for the students

World Health Organization, Geneva
1987

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Objectives of the Handbook

When you have studied this handbook you should be able to:
identify priority health problems and define the professional tasks which will provide the basis for determining educational objectives;

plan a curriculum;

construct tests and other measurement devices.

These skills will be based upon a measurable gain of knowledge concerning:

- relationship between professional training programmes and subsequent practice;
- principles of learning and role of the teacher;
- role of objectives in educational planning;
- principles and methods of curriculum planning;
- principles and practice of educational evaluation.

You will also have strengthened your desire to go on learning and acquiring skills in education and will have mastered an effective way of setting about it.

Preface

This 1998 updated reprint of the sixth edition in English is being published shortly before the thirtieth anniversary of the Handbook. The first edition was prepared in 1969 on the basis of the first educational workshop organized by the WHO Regional Office for Africa in Brazzaville. Initially, the Handbook was widely used in the African Region, and has since served as the main textbook for numerous WHO-sponsored workshops attended by over 4000 participants in different parts of the world. Thanks to the constructive comments of many users, the Handbook has become a collective work and has been translated into 15 languages.

During the past three decades the presentation and content of the Handbook have evolved, but its basic principles have remained the same: community-oriented education, directed at individuals and population groups and taking their health needs into account; learner-centred education, keeping the learners in an active situation and gradually helping them to become the architects of their own learning so that they become and remain competent for their professional role.

The application of these two principles has been particularly reinforced in this updated version. Relevance to the priority health needs of the population has been stressed in the first chapter. Problem-based learning has been described in some detail in the third chapter. Over 55 new pages and several new exercises have been added.

This Handbook is now entering a new phase. I am convinced that the time is ripe for the preparation of adaptations to national and to specific professional situations. The Handbook has hitherto aimed to address the needs of educators for the health professions in any part of the world equally well. But it is clear that health care and the services provided by health professionals of all kinds are strongly influenced by the specific local situation.

Adaptations of the Handbook can be made only through the initiatives and efforts of leading educators in the health professions in different countries. Several possibilities exist. The adaptation to a national, regional or other type of local situation could include maps, epidemiological, economic or other data,
national health plans, etc., as well as exercises directly related to the specific local situation. Such an adaptation has recently been prepared in Spain. An adaptation for a given profession, e.g., nursing, nutrition, or social work, could contain exercises directly related to the specific profession, together with additional relevant information, as needed, all of which would form a supplement to the Handbook in its current form. Such an adaptation is now being planned in Italy for the nursing profession. The Nutrition Unit of WHO in Geneva has produced an adaptation of the Handbook for nutritionists. Anyone interested in such initiatives should write to the author, care of the Office of Publications, World Health Organization, 1211 Geneva 27, Switzerland.

J.-J. Guilbert

Geneva
Switzerland

Acknowledgements

The revision of this Handbook has entailed much time-consuming and meticulous work over the last two years. Many people have offered advice and help, and supplied documents which we have been able to put to good use. The initial stimulus came from a study by A. Oshaug (Oslo) and D. Benbouzid (WHO), and from Dr P. Chastonay of the Institute of Social and Preventive Medicine (Geneva).

Many of the thousands of colleagues who have taken part in workshops with the author of the Handbook have helped by their questions and comments to make this revised edition more relevant to the needs of users. These contributors are too numerous to be mentioned by name.

For whom is this Educational Handbook intended?

Originally, in 1969, the first edition was written for teachers of the health sciences. Subsequently, however, the Handbook was used above all by hundreds of participants in meetings organized by WHO or held with WHO assistance (educational planning workshops, teaching methodology seminars, etc...).

A survey of 200 users carried out in 1975 revealed the following opinions.

A very small minority (10%) felt that the Handbook should be supplied only to participants in controlled educational activities (workshops, seminars, courses, etc.) or reserved for teachers of teachers. The majority, however, felt that dissemination should be as wide as possible, and be directed to all teachers of health sciences at all levels, to health administrators with staff supervision responsibilities, and to students, so as to help them to draw maximum benefit from their learning activities and participate in their organization. Another poll, conducted in 1978, produced very apposite comments from about 100 users in all parts of the world and the consensus was still in favour of the widest possible distribution. Many teachers of the various health professions (dentists, nurses, sanitary engineers, physicians, pharmacists, etc.) have stated that the Handbook answers their needs, but some think that the author’s training as a physician has still too often biased the choice of examples. A further effort has been made with this edition to produce a text better suited to everyone working in the health professions. It is, however, very difficult to strike a perfect balance, for many reasons. While it is still true that most of the examples relate to the medical and nursing professions, it is the author’s hope that each user of the Handbook will make a personal effort at adaptation, replacing the examples given by other more suitable ones whenever necessary. This has already been done by nutritionists.
Jargon and meaning of words

Many users of the previous editions have asked for special care to be taken to simplify the language used. We hope they will be satisfied. It has not, however, been possible to avoid using certain technical terms (for example: discrimination index). Neither has it been possible to avoid assigning precise and restricted meanings to words which are often used interchangeably in everyday parlance (for example: task, activity and function). In all such cases the words are defined in the Glossary (p. 6.01 et seq.).

It is very important that we should understand one another, and for that we must give identical meanings to the words we use. But it is just as important not to get bogged down in endless discussions. Your aim is not to draft definitions of words for a dictionary.

So please accept the definitions proposed in this Handbook, at least while you are using it.

How to use the Handbook

The presentation and layout of this Handbook are unusual.

It should be stressed at this point that the approaches suggested in this book are the result of a deliberate choice by the author and reflect his ideas in the field of education: they focus on individual and community health needs, while at the same time placing students in an active learning environment and making them the architects of their own education. Various theories sometimes regarded as contradictory are explained to the reader so as to give him food for reflection, rather than to subject him to any philosophical constraint. It is for the reader to make his choice, to draw initial conclusions and, in particular, to seek solutions for his own teaching problems by taking what is worth using among the various theoretical approaches suggested. To reject them wholesale would hardly be constructive; it would be preferable to propose better ones.

For each chapter a list of objectives is included to give you an idea of what you will get out of the chapter.

The theoretical input is presented in the form of original documents or short quotations from texts listed in the bibliography.

All through the Handbook there are exercises to help you to determine whether you have increased your skills (see check list).

Certain documents are printed in large type so that they can be easily made into transparencies for use with an overhead projector (see technique on page 3.46).

The page numbering is also unorthodox: every chapter begins with a number ending in 01 (for example page 3.01 is the first page of the third chapter), however many pages there may be in the previous chapter. This makes it easier to find a specific passage in the Handbook.

Rather than try to explain the whys and wherefores of this unusual layout, which some find irritating and complicated at first, and others as intriguing as a detective story, it seems simpler to invite you to use this book just as it is. You will then draw your own conclusions as to the reasons for its layout. There must be some... even if the author is not aware of them all!
In any case you are warned not to read this Handbook like a conventional book, starting with the first page and hoping to get to the last. It is meant to be used as determined by the questions you put to yourself, your needs, and the teaching problems that bother you - by your own objectives, in short, whether or not they are already articulated.

This is why we are going to try and help you in this essential but unusual and therefore difficult undertaking.

First situation: you are alone (on a desert island) or else you are accustomed and prefer to work alone. You are going to need grit, perseverance and 35 to 50 hours of free time.

Good Luck!

Second situation: a colleague also has the Handbook and agrees to work with you. It will not be such an uphill task. If you can get together a small working group of five persons, still better.

Third situation: you are taking part in an educational workshop. The working methods for such a meeting are described in this Handbook and group dynamics will do the rest.

In any case, the first thing to do is to identify your needs.

You are invited to proceed in three stages.

**Identification of your needs as an educator**

**First stage**

What are the educational questions that you would like to have answered? (For example: what is an educational objective?, what does the word 'validity' mean with reference to an examination?).

What are the educational tasks that you would like to take on? (For example: organizing a nutrition course for student nurses or teaching how to interview a patient).

What are the educational problems you would like to solve? (For example: I am in charge of 600 students in different university years: how am I to organize field work in preventive medicine?)

Now...... Try to draw up a preliminary list of your questions, educational tasks or problems for the coming 12-month period.

**EXERCISE**

**Identification of your needs as an educator**

**Second stage**

Would you like to find out how much you know before studying the rest of the Handbook? One way of doing this is to try to answer the questions in a pre-test.

1 This pre-test deals only with theoretical knowledge relating to group 2, page 2. You will have an opportunity of gauging how far you have achieved the group 1 objectives by doing other exercises which
appear throughout the Handbook.

To do so, read *straight away* the questions on pages 1.73 - 1.76, 2.45 - 2.47, 3.93 - 3.96 and 4.87 - 4.90 and enter your answers on the answer sheet, page 10.

If your score is low in this pre-test, this should be a source of satisfaction, for it may show that you were right to start perusing this Handbook and that it will be worth your while continuing so that you can improve your weak spots.

The test will help you make a personal diagnosis of the teaching areas you need to bring up to date. Your aim in doing this test is not to find the right answer but *simply to take note of the fact that you do not find it!* You may also rest assured that your score in the *post-test* will be another occasion for satisfaction for it will show an appreciable gain after you have used the Handbook.

If your score in the pre-test is high, you should choose areas which are still uncertain (those for which you did not find the correct answer) and go into the matter more thoroughly.

**Answer sheet for pre-test**

To check your raw score compare your answers with those given on page 5.34.

**Identification of your needs as an educator**

**Third stage**

To use this Handbook effectively for your own needs, it is proposed that you choose from among the following educational tasks or objectives (broken down into four main themes) the ones which interest you and in which you would like to achieve a degree of competence.

The time required for personal work (study of the text, practical exercises) on some of these tasks will be more or less long. Some call for a few minutes’ work, others several hours to allow for study of the documents suggested (p. 14).

To guide you in this first choice, do not forget to take into account the questions and problems you listed on p. 8 and your weak and strong points (results of pre-test, p. 5.34).

Limit this initial choice to *about 10* tasks, circling the numbers of those that seem most important for you on the list (numbered 1 - 40) appearing on pages 12 - 13.

It is natural that you should have some difficulty in making your choice at this stage, for you are not yet familiar with educators’ jargon. Do not forget the Glossary (pp. 6.01 *et seq.*). Don’t worry..... in any case there is no risk involved!

Moreover, you can always adjust your choice as your work progresses.

Once your initial choice has been made, turn to p. 14 and follow the instructions given there: study the suggested pages and do the corresponding exercises.
List of educational objectives

1. Educational objectives

1. Define the following terms: professional task, activities, functions, role, institutional objective; specific objective; domains of practical skills; communication skills and intellectual skills.

2. List the health problems in your own community in order of priority.*

3. Analyse the causes of these problems.*

4. Identify the parts of the system of which your establishment is a part and list the actors (organizations or people) who either utilize or collaborate with the health services.*

5. Define the professional functions of a member of the health team whom your teaching institution is responsible for training (general educational objectives) so as to deal with the health problems of society.*

6. Analyse a professional function (professional profile) by defining the various intermediate components (activities) making it up.*

7. Define a professional task and identify its components (domains of practical skills, communication skills and intellectual skills).*

8. Draw up a list of the specific educational objectives relating to a professional task, stating explicitly what you feel the student should be able to do after a given course of instruction (that he was not able to do previously) and corresponding to the domains of the communication skills or practical skills involved in this task.*

9. Taking a specific objective in a non-intellectual domain (i.e. practical or communication skills), define in the form of contributing educational objectives what theoretical knowledge you feel the student should possess if he is to attain that objective.*

10. Make a critical analysis of specific educational objectives (listed by a colleague), indicating in particular whether they include all the requisite elements (act, content, condition, criteria).*

2. Evaluation planning

11. Draw up a list of the possible reactions of colleagues in your faculty to the idea of having to define educational objectives derived from professional tasks and propose strategies for overcoming those reactions.*

12. Draw a diagram showing the relationship between evaluation and the other parts of the educational process.

13. Define the principal role of evaluation, its purpose and its aims.

14. Describe the difference between formative and certifying evaluation.

15. List the good and bad features of a test.

16. Compare the advantages and disadvantages of tests in current use.

17. Define the following terms: validity, reliability, objectivity, and describe the relationship that exists between them.
18. Choose an appropriate evaluation method (questionnaire, written examination, objective test (MCQ or short, open-answer question) or essay question, oral examination, direct observation, etc.) for measuring the students’ attainment of a specific educational objective. Compare the alternatives in a specification table.*

19. Define (in the form of an organizational diagram) the organization of an evaluation system suitable for your establishment, and list the stages involved. Indicate:

(a) the most important educational decisions you have to take;

(b) the data to be collected to provide a basis for those decisions;

(c) the aims of the system and subsystems in terms of decisions to be taken and the object of each decision (teachers, students, programmes).*

20. Identify obstacles to and strategies for improvement of a system of evaluating students, teachers and programmes.*

* Work in small groups is recommended for these objectives. Individual work will usually be appropriate for the others.

3. Programme construction

21. Explain the differences between “education”, “teaching” and “learning”, and describe the new trends in the teaching/learning system and the various learning situations.

22. Define the concept of relevance and list the stages in the construction of a programme.

23. Indicate the aims and general methods of teaching, list 10 conditions which facilitate learning on the basis of the list and evaluate a specific learning activity.

24. Specify at least two advantages and two disadvantages for each technique and medium used in teaching.

25. Select a teaching method that will make an educational objective easier to achieve. Compare the alternatives in a specification table.*

26. Construct a programme, using a specification table, or decide whether a programme or course needs revision.*

27. Construct a self-learning package or a didactic problem for problem-based learning.*

28. Define the role which, as a teacher, you would like to assume in order to motivate and facilitate the learning of students for whom you are responsible.*

29. Identify the obstacles liable to be encountered in setting up a curriculum for problem-based education that is geared to the acquisition of stalls and me health needs of the community, and describe strategies for overcoming them.*

4. Implementation of evaluation

30. Indicate the different elements that should be considered in the evaluation of a teaching programme.
31. Indicate the different elements that should be considered in the evaluation of the educational objectives of a teaching programme, learning materials and human resources.

32. Define the advantages and limitations of a system of evaluation of teaching by the students.*

33. Construct an observational rating scale and/or a practical test to evaluate the behaviour of a student in the domain of communication and/or practical skills.*

34. Propose a question for a written (open-book) examination of the essay type or a series of six short, open-answer questions and indicate the norms of performance permitting objective marking (marking table).

35. Draw up three multiple choice questions (MCQ) in the domain of intellectual skills - at least two of the objectives must measure an intellectual process superior to level 1 simple recall (either level 2 interpretation of data or level 3 problem-solving).*

36. Indicate the advantages and limitations of a programmed examination.

37. Define the following terms: prerequisite level test, pre-test, interval test, comprehensive pre-final; indicate their purpose and the stages at which they are set.

38. Explain the difference between a relative and an absolute criteria test.

39. Calculate the acceptable pass level for an MCQ examination and establish the scoring criteria and norms which permit determination of the passing grade of a mini-test (made up of the questions mentioned in objectives 33, 34 and 35).*

40. Do an item analysis of a question (calculate the difficulty index and the discrimination index and draw the relevant conclusions).

* Work in small groups is recommended for these objectives. Individual work will usually be appropriate for the others.

Theoretical background that will help you reach the educational objectives of the workshop

<table>
<thead>
<tr>
<th>For objective</th>
<th>Study the following pages of the Educational Handbook</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>glossary and pp. 1.06, 1.07 and 1.19 to 1.78</td>
</tr>
<tr>
<td>2</td>
<td>obj. 1 and pp. 1.09, 1.11, 1.17, 1.18 and 1.66</td>
</tr>
<tr>
<td>3</td>
<td>obj. 1 and 2, and p. 1.10</td>
</tr>
<tr>
<td>4</td>
<td>obj. 3 and pp. 1.12 to 1.18</td>
</tr>
<tr>
<td>5</td>
<td>obj. 4 and pp. 1.19 to 1.39</td>
</tr>
<tr>
<td>6</td>
<td>obj. 5 and pp. 1.41 to 1.46</td>
</tr>
<tr>
<td>7</td>
<td>obj. 6 and pp. 1.19, 1.20, 1.29 to 1.39 and 1.48 to 1.54</td>
</tr>
<tr>
<td>8</td>
<td>obj. 7 and pp. 1.55 to 1.66, 1.68 and 1.69</td>
</tr>
<tr>
<td>9</td>
<td>obj. 7 and pp. 1.68 to 1.71</td>
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<tr>
<td>10</td>
<td>obj. 8 and pp. 1.70 and 1.71</td>
</tr>
<tr>
<td>11</td>
<td>obj. 1 and pp. 1.72 to 1.78 and 3.86 to 3.91</td>
</tr>
<tr>
<td>12</td>
<td>pp. 2.02 to 2.05</td>
</tr>
<tr>
<td>13</td>
<td>pp. 2.02 to 2.14, 2.18 and 2.19</td>
</tr>
<tr>
<td>14</td>
<td>pp. 2.02 and 2.15 to 2.17</td>
</tr>
</tbody>
</table>
... and do the corresponding exercises: see list on next page.

**Recapitulative table of exercises proposed in the Handbook**

<table>
<thead>
<tr>
<th>OBJECTIVE</th>
<th>EXERCISE</th>
<th>PAGE</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>Identifying priority community health problems</td>
<td>1.09</td>
</tr>
<tr>
<td>3</td>
<td>Causal analysis of health problems</td>
<td>1.10</td>
</tr>
<tr>
<td>4</td>
<td>Identifying health policy orientations</td>
<td>1.11</td>
</tr>
<tr>
<td>4</td>
<td>Identifying support systems and actors</td>
<td>1.17</td>
</tr>
<tr>
<td>5</td>
<td>Identifying professional activities</td>
<td>1.28</td>
</tr>
<tr>
<td>5</td>
<td>Defining the main functions of health personnel</td>
<td>1.33, 1.38</td>
</tr>
<tr>
<td>22, 26</td>
<td>Analysis of the relevance of a programme</td>
<td>1.39</td>
</tr>
<tr>
<td>6</td>
<td>Breakdown of a function into professional activities</td>
<td>1.45, 1.46</td>
</tr>
<tr>
<td></td>
<td>(professional profile)</td>
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</tr>
<tr>
<td>7</td>
<td>Identifying components of a professional task</td>
<td>1.54</td>
</tr>
<tr>
<td>8</td>
<td>Selecting active verbs relating to a task</td>
<td>1.59</td>
</tr>
<tr>
<td>10</td>
<td>Identifying the elements of a task</td>
<td>1.63</td>
</tr>
<tr>
<td>10</td>
<td>Identifying the elements of an educational objective</td>
<td>1.64</td>
</tr>
<tr>
<td>8</td>
<td>Drawing up specific educational objectives</td>
<td>1.68</td>
</tr>
<tr>
<td>9</td>
<td>Drawing up contributing educational objectives</td>
<td>1.69</td>
</tr>
<tr>
<td>10</td>
<td>Critical analysis of an educational objective</td>
<td>1.70</td>
</tr>
<tr>
<td>1 to 11</td>
<td>Evaluation of knowledge about educational objectives</td>
<td>1.73, 1.76</td>
</tr>
</tbody>
</table>
Chapter 1: Priority health problems and educational objectives

1.01

Priority health problems and educational objectives

1.02

The aims of this first chapter are to show: that the health problems of the community must be taken as the starting-point for the construction of a relevant educational programme; the advantages of defining educational objectives on the basis of professional tasks; that if the precision and clarity of these objectives are important, their relevance to health problems is even more so; and
that an approach based on objectives will ensure that health personnel are better prepared to perform a role that is relevant to the health problems of society.

Those interested in this approach should read the following works by R.F. Mager:

*Preparing instructional objectives* (1962).

*Goal analysis* (1972).

*Measuring instructional intent* (1973) (Chapter III, pages 15 to 46) Fearon Publishers, California, USA.

And the following publication by the World Health Organization:


After having studied this chapter and the reference documents mentioned you should be able to:

1. Define the following terms: professional task, activities, functions, role, institutional objectives; specific objective; domains of practical skills, communication skills and intellectual skills.

2. List the health problems in your own community in order of priority.*

3. Analyse the causes of these problems.*

4. Identify the parts of the system of which your establishment is a part and list the actors (organizations or people) who either utilize or collaborate with the health services.*

5. Define the professional functions of a member of the health team whom your teaching institution is responsible for training (general educational objectives) so as to deal with the health problems of society.*

6. Analyse a major professional function by defining the various intermediate components (activities) making it up.*

7. Define a professional task and identify its components (domains of practical skills, communication skills and intellectual skills).*

8. Draw up a list of the specific educational objectives relating to a professional task, stating explicitly what you feel the student should be able to do after a given course of instruction (that he was not able to do previously) and corresponding to the domains of the communication skills or practical skills involved in this activity.*

9. Taking a specific objective in a non-cognitive domain (i.e. practical skills or attitudes), define in terms of contributing educational objectives what theoretical knowledge you feel the student should possess if he is to attain that objective.*

10. Make a critical analysis of specific educational objectives (listed by a colleague), indicating in particular whether they include all the requisite elements (act, content, conditions, criteria).*
11. Draw up a list of the possible reactions of colleagues with whom you work in your faculty to the idea of having to define educational objectives derived from professional tasks, and propose strategies for overcoming those reactions.*

* Work in small groups is recommended for these objectives. Individual work will usually be appropriate for the others.

If you are not certain of where you are going you may very well end up somewhere else (and not even know it)

Mager

1.03

1.04

Every individual should have access to a type of education that permits maximum development of his potential and capabilities.

Education is a process, the chief goal of which is to bring about change in human behaviour.

The result of education is an expected change in the behaviour of the student in the course of a given period.

This behaviour will be defined explicitly in the form of educational objectives derived from professional tasks that respond to the priority health problems of the community.

An evaluation system will be planned so that better educational decisions can be taken.

A programme will be prepared and implemented to facilitate attainment of educational objectives by the students.

The evaluation process will be used to measure the extent to which the objectives have been achieved... it will measure the student’s final abilities ... and the effectiveness of programme and teachers.

This is the Educational Planning Spiral

The educational planning spiral

1.05

The object of education is not to shape citizens to the uses of society, but to produce citizens able to shape a better society.

The educational planning spiral

1.06

Programme reform has been a source of concern for many years to those training health personnel and the alarm has often been sounded. However, the strength of the traditions impeding necessary reforms has been such that it has not been possible to avoid serious disturbance in many universities throughout the world, always caused by a reaction in face of the apparent diehard conservatism of the
system.

It would, however, be negative and dangerous merely to accuse of incompetence those at present in positions of teaching responsibility. They should be offered help.

Societies change and have always been changing, but until the present century their evolution was relatively slow and adaptation to change was possible without unduly violent disorders.

The form of teaching has remained unchanged for centuries. The university has wrapped itself in its privileges and remained deaf to the cry from without. The needs of society, the practical side of the matter, have been left to chance, whereas specific features of the situation in each country are changing ever more rapidly. Hitherto, unfortunately, little or no account has been taken of those features and the training of health personnel has followed traditional systems. What is required now is to make sure that educational programmes are relevant.

There can be no question of continuing to copy the models of the past or, in the case of developing countries, foreign models.

The educational system leading to the development of health personnel, at all levels, must be re-examined within the context of the needs of the country concerned.

Those who are interested in a more detailed analysis of needs, organization of health services, and the definition of tasks and functions than it is possible to give in this Handbook should consult specialized texts on these aspects (see Bibliography, p. 7.01).

There are a few health sciences institutions in different parts of the world that have not only succeeded in introducing significant changes over the past two decades but have also amply demonstrated that the effort has been worth while. No educational system can be effective unless its purposes are clearly defined. The members of the health team must be trained specifically for the tasks they will have to perform, taking into account the circumstances under which they will work.

The sum total of these tasks, or professional profile, can only be defined in accordance with a plan in which the nature of the services to be provided is specified, priorities are allotted, the staff needed to provide these services determined, etc.

Professional training programmes must then be tailored to meet these needs.

There is room for some degree of optimism in this sphere, for no financial assistance is needed for a move in the right direction. All that is needed is a resource distributed more or less equally around the world: mental ability. The management of that resource is the art of organizing talent and of coping intelligently with change.

Defining the professional tasks of health personnel to be trained, the very basis of the educational objectives of training centres, is of crucial importance.

Thus an educational programme, instead of being the result of a non-selective accumulation of knowledge built up over the centuries, must be shaped selectively in terms of the goal to be achieved. If that goal is modified in the course of time, the programme must also be modified accordingly.

Definition of professional tasks must proceed from a study of needs, take account of available resources and indicate clearly and precisely what various categories of personnel will be called upon to do during their professional careers in a
given type of health service.

The first step is to map reality.

**The road to relevance**

1.07

**Mapping reality**

Mapping reality means identifying the factors that have an impact on the health of the community; in other words, getting on the road to relevance.

- Identifying the health problems of the community
- Identifying the overall goals of national health policy
- Identifying support systems
- Identifying institutional goals
- Identifying the players in activities relating to health

**Personal notes**

1.08

**What is meant by relevance?**

1.09

The most important quality in an educational programme is its *relevance*. Training programmes for health personnel must enable the graduates to cope effectively with the problems they will encounter in the context of their work.

The first step is therefore to identify and analyse the *health problems of the community* so as to be able to define the community’s health needs. These elements will serve as the starting point for the design of an educational programme.

A first comprehensive assessment of health problems will bring to light so many complex problems that it would be impossible (and probably futile) to include them all in an analysis of the health situation. It will therefore be necessary to define priorities and select those that are regarded as most important for an educational programme.

These factors should then be examined to see how they interact, or in other words, to make a *causal analysis*.

**EXERCISE**

Rank (*in order of priority*) the health problems in your own community.

1 Use criteria 1, 2 and 3 given at the top of page 3.52.

<table>
<thead>
<tr>
<th>High-priority community health problems</th>
</tr>
</thead>
</table>

**EXERCISE**

1.10

Make a *causal analysis* of the priority health problems you have identified.

| Problem | Cause |
You may now wish to reconsider the order of priority you had established.

**Identifying health policy orientation**

1.11

Most countries have developed some sort of policy orientation to address health problems. But they may not have formulated any explicit goals. If your country has not set itself any health goals, it would be useful to review existing national plans in areas with some relation to health, such as nutrition, agriculture or education, in order to derive an idea of the country’s general goals for health.

You should now obtain copies of your country’s relevant documents on these questions.

**EXERCISE**

On the basis of your country’s plans, identify the general national goals that relate to the health situation. Compare them with the health problems you have already identified (page 1.09)

<table>
<thead>
<tr>
<th>General national goals for health</th>
</tr>
</thead>
</table>

**System?**

1.12

The word system is used frequently in the Handbook. Let us take a few minutes to explore its different meanings.

A system is often defined as a set of interacting components or elements aimed at a common goal.

**Support system**

A support system refers here to an institution, organization, administrative structure, or other community structure that facilitates the effective implementation of a health care activity (e.g. the education system).

**Health system**

1.13

Glossary of terms used in the Health for All Series No. 1-8.
Geneva, World Health Organization, 1984 (Health for All Series No. 9).

A health system is the complex of interrelated elements that contribute to health in homes, educational institutions, workplaces, public places and communities, as well as in the physical and psychosocial environment, and the health and related sectors. A health system is usually organized at various levels, starting at the most peripheral level, also known as the community level or the primary level of health care, and proceeding through the intermediate (district, regional or provincial) to the central level.

**Educational institutions - one of the support systems for health care activities**

1.13
Taking these definitions and the objectives of your institution as an element in society, you should regard your institution as one of the support systems for health care activities.

Any programme of action intended to improve the health situation in a society (at the national, district, local, family or individual level) must be able to draw support from different sectors. Various fields of action may be delineated or left open by overall national policy. The political system will therefore have a crucial role to play if general policy decisions are needed for programmes of action to be implemented.

The authorities and administrative structures, with the powers of decision that are delegated to them, often have a strong influence on health care at various levels, for although they can facilitate initiative and action, they can also hamper them and be a source of constraint.

For the right decisions to be taken, both in terms of policy and administration, it is essential to have a database designed in the light of the information requirements of the users, that is, of the general public. This database is also important for the formulation of training programmes or for more limited educational activities. The circulation of information among different users often leaves much to be desired. A proper system of communication between the different sectors is essential for the information needed for decision-making to be circulated and for the various sectors to be able to keep each other informed of their activities. This will prevent unnecessary overlap, duplication and errors, thus making for better use of resources. This is often the weakest link in a support system.

In many countries the infrastructure is inadequate. This weakness is evident in transport, communications, water supply, waste disposal, etc., which are clearly vital sectors and which have varying degrees of influence on the health situation.

There are many other sectors that might be mentioned, but we shall confine our attention to the support system which is the subject of this Handbook, namely, the education system. This system is responsible for education and training from the primary level to the university and beyond. It is important that it should function well, as it must supply human resources with the skills needed by the other support systems. It is fair to say that the existence of an efficient education system is a prerequisite for any action to improve the health situation in a country. Here we shall deal only with the part of the system that is concerned with education for the health professions.

Figure 1 (p. 1.14) represents the support systems for the health system:

- the political system;
- the structures and authorities of the administrative system;
- the general system (or general infrastructure);
- the education system.

Unfortunately, it all too often happens that most of these systems act as a constraint rather than a support to health care activities. However, by regarding them as support systems, we will force ourselves to see their positive side and the ways in which they can provide support.

Figure 1. Position of the educational system in relation to all the elements that have an influence on the system which must respond to the health needs of the population.
The actors involved in activities related to health care

1.15

The participants involved in activities related to health care (whom we shall call here the actors), both in the health system itself and in the support systems, may be institutions, public or private agencies, or individuals. Some of them directly provide health services (e.g. nurses or doctors). Others work in areas in which certain aspects are relevant to health - they are indirect providers of care. They may belong to interprofessional groups which include health personnel, or occupy positions in which they are natural partners in dialogue or collaboration with health professionals (e.g. agronomists).

Then there are the users of the health services. Some will have occasional recourse to competences in the area of health (e.g. school-age children) while others will be more regular users (e.g. diabetics). Dialogue between all these users and providers will produce valuable feedback for those whose task it is to design training programmes for health personnel.

These actors are very numerous. We shall nevertheless attempt to identify them, simply in order to understand how important and necessary it is that there should be dialogue between them and how difficult and complex this is likely to be.

Personal notes

1.16

EXERCISE

1.17

For each of the high priority health problems (column 1) you listed previously (page 1.09), state the support systems concerned in your country (column 2); the providers of direct (column 3) or indirect (column 4) care and the occasional (column 5) or regular users (column 6).

<table>
<thead>
<tr>
<th>High priority health problems</th>
<th>Support systems</th>
<th>Actors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

There are nearly always more actors involved than you might expect! Compare your list with the list on the next page... and draw your own conclusions.

EXERCISE

1.18

Now examine the long list of actors reproduced below (for an example comprising only two health problems).

- Underline those you mentioned in the previous exercise;
- Place brackets round the actors you did not mention and relate them to the particular health problem(s) which concern them.

1 Drawn up by a group of participants in the Community Health Course, Faculty of Medicine University of Geneva, Switzerland, 1989.
<table>
<thead>
<tr>
<th>High priority health problems</th>
<th>Support systems</th>
<th>Providers</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resulting from internal aggression (lifestyle)</td>
<td>- all citizens - general infrastructure - education system</td>
<td>- doctors - nurses - dentists - pharmacists - health educators - gynaecologists - psychiatrists - psychologists - paediatricians - nutritionists - dietitians</td>
<td>- teachers - journalists - media specialists - publicists - caterers - chefs/cooks - food industry - farmers - industrialists - tobacco and alcohol regulatory authorities - agronomists</td>
</tr>
</tbody>
</table>

**Importance of defining professional tasks**

1.19

If we stress the importance of the prior definition of professional tasks, it is because this is a precondition for ensuring that training programmes are really designed to meet the population's health needs. Over the last 20 years or so, teachers, under the cloak of an educational revival, have used the title of educational objectives to disguise what they had been in the habit of teaching in the past. Such educational objectives have favoured the creation or continuation
of training programmes which all too often seem hardly relevant to the needs of
the population.

Indeed, if educational objectives are based on faulty principles, then the best
system of training may well give bad results. There is even a danger that a
bad message will be better communicated, and this is certainly not the goal
sought.

We therefore propose to demonstrate that the professional profile of a member of
the health team and the educational objectives providing a basis for construction
of his training programme must be almost identical.

We shall also be stressing two principles that are of fundamental importance for
education. Principle no. 1: it must be oriented towards the community as well as
the individual, taking account of the health needs of each particular
collectivity, i.e. education must be community-oriented. Principle no. 2: it must
keep students in an active situation, gradually helping them to become the
architects of their own learning activities, i.e. education must be
learner-centred.

Another important point to bear in mind is that it can be useless to try to
change a programme or teaching methods without also changing the system of
evaluation (particularly examinations). Experience has shown that if, on the
other hand, the evaluation system is modified, this has a much greater impact on
the nature of learning than has modification of the programme unaccompanied by
any change in the evaluation system. Evaluation provides a sound basis for
programme planning. Therefore, an evaluation mechanism should be set up before
proceeding to any reform of the programme. This makes it possible to measure the
level at the outset (prerequisite level) and the level at the finish and thus to
determine whether the change has been positive or not. This process can be
represented by what is called the educational planning spiral (page 1.05).

If the teaching staff are given an opportunity to gain the new knowledge they
need and to acquire the appropriate modern teaching skills, they will feel more
secure and instead of being confined to limited personal experience they will
accept the use of more formal educational research methods.

This can be a powerful stimulus for institutional change, particularly when used
by faculty members whose experience in the educational process has already
alerted them to the ways in which educational innovation can be accomplished with
the greatest possible enthusiasm and the least possible hostility on the part of
their colleagues. Such innovation, based upon carefully gathered information and
developed according to sound educational principles, could enable some medical
education institutions to explore, in particular, non-traditional means of
preparing the members of the health team for the professional tasks they will
have to undertake. Without the encrusted educational tradition that long
adherence to a single system creates, the opportunity for innovative
experimentation is far greater.

This is a very difficult task which may well have daunted the most conscientious.
We consider that teachers should be offered assistance in this field.

That is the main reason why this Handbook has been prepared and used during
workshops on educational planning.

Organizational diagram of the educational system for health professionals

1.20
Selection of training goals

Traditionally, this selection has been made by relying on the judgement of experts to determine what a neophyte in the profession ought to know and ought to be able to do. In the past we have relied almost exclusively on this method. As a result curricula are crammed with an ever-burgeoning amount of new and highly specialized knowledge which the student often perceives as irrelevant to his own goals and which, in fact, may be of little value to other than the super sub-specialist. Certainly expert opinion is an important source of information about the knowledge and skills which trainees should be able to demonstrate, but it is also possible to make this decision on the basis of scientific evidence about what competent health personnel need to know and need to be able to do in order to fulfill their responsibilities. A number of procedures have now been developed for collecting such data which provide an empirical basis for working out a behavioural description of the essential components of professional competence. This is of great assistance to faculties in setting goals and designing curricula. Three of these procedures are of special interest: the critical incident technique, task analysis and analysis of epidemiological data.

The critical incident technique

This method consists of collecting data about specific types of behaviour that characterize professional effectiveness and ineffectiveness and using these data to make an objective, empirical assessment of the essential performance requirements of the profession. This technique is an outgrowth of studies in aviation psychology made in the United States during the Second World War. In that programme it was found that in reporting the reasons for eliminating a trainee, pilot instructors and check pilots frequently offered such cliches and stereotypes as “lack of inherent flying ability”, “poor judgement” or “unsuitable temperament.” In an effort to determine the specific characteristics of personnel that contributed to success or failure, combat veterans were asked to report incidents observed by them that involved behaviour which was especially helpful or especially inadequate in accomplishing the assigned mission. This request concluded with the statement: Describe the officer’s action. What did he do? The several thousand incidents submitted in response to this inquiry were analysed and categorized to provide a relatively objective and concrete description of the critical requirements of combat leadership.

To apply this method to the health professions, several thousand incidents describing observations of especially effective or ineffective colleague behaviour are collected from several hundred health workers representing various age groups, geographical areas, professional categories and specialty interests. For example, in a critical incident study of intern and resident performance (i.e. of the general practitioner) commissioned by the US National Board of Medical Examiners, the American Institute of Research collected over 3000 incidents from physicians across the country. The incidents submitted involved all areas of behaviour: practical, communication and intellectual skills. They identified, for example, such general requisites of competence as Skill in gathering clinical information, i.e. in taking a competent history and in performing an adequate physical examination, or Skill in relating to the patient and in gaining his cooperation in a treatment plan. In a similar study conducted by the University of Illinois Center for Educational Development of the critical performance requirements in orthopaedic surgery, over 1700 incidents were collected from more than 1000 orthopaedic surgeons representing various practice settings and sub-specialty interests. An empirical classification defining 94...
critical performance requirements, grouped into nine major categories of competence, was derived from the incidents. This operational and prospective definition of the essential components of competence could then be used to determine the goals of specialty training, the design of programmes for their achievement and the criteria and methodology for their evaluation. If educational planning were regularly based on such operationally defined, empirically derived goals, educational programmes would look quite different.

Task analysis

1.22

A second method of determining the essential components of professional competence which should define educational objectives consists in detailed task analysis of what various categories of health personnel actually do, and in deriving from that list of tasks a statement of the knowledge and skills (what should be done, not merely what is done) which they must have to perform competently. Such a task analysis should be based on careful, systematic observations of the activities of a representative sample of various categories of staff or on the daily logs of a representative sample who report in minute detail the way in which they spend their working days over a specified period of time, or on some combination of these two approaches.

Wherever this method has been employed, the results have been most enlightening. For example, in a limited pilot study of paediatricians in a typical small US city, researchers found that all the physicians had different but consistent patterns for taking a history and performing a physical examination. Of the 481 patient visits observed, 222 were well children; an average of 10.2 minutes was spent with these children (range: 7.5 minutes to 13.6 minutes) in contrast with an average of 8.1 minutes spent with ill children (range: 7.4 minutes to 10 minutes). Of the 259 ill children, 104 (i.e. 40%) were diagnosed as having an infection of the upper respiratory tract, 15 had chronic illnesses and five had potentially dangerous diseases. For the total group of 481, optic fundi were examined only nine times and rectals were performed in only six cases; two physicians did not percuss the lung fields for any patient. The greatest amount of time was spent in discussion of nutrition and child development. The single most frequent topic on which advice was rendered in well-child care concerned toilet training. The authors of this study concluded, Few aspects of well-child care appear to require the skill of a physician... the question is also raised as to whether current training programmes are aggravating the physician manpower shortage by overtraining in relation to community health needs.

This is a question that could apply to all members of health teams in every country; only task analysis or comparable empirical studies will give us the answer.

Epidemiological studies

One of the most interesting of the newer approaches to the use of such studies consists in combining three arbitrarily weighted factors - disease incidence, individual disability and social disruption - to define priorities in health care needs and, hence, in educational effort. As initially developed by Dr John W. Williamson ², the three factors are computed as follows: disease incidence consists of a simple tabulation of the frequency of the disease (e.g. pneumonia) or other medical condition (e.g. pregnancy) in the target population. Individual disability involves a determination of the extent of patient disability or risk associated with a given medical condition; an Individual Disability Weight (IDW) is calculated for each condition from three elements: the average length of


hospital stay, mortality rates and complication rates. Social disruption represents an estimate of the disruption that would be produced by a given disease or condition in the social group of which the patient is a member; it is based on such factors as cost of illness, age of patient and number of dependents, socioeconomic standing and the like. For each discharged patient a Total Priority Weight (TPW) is calculated combining these elements. This Total Priority Weight is then arbitrarily apportioned among patient diagnoses. Finally, a cumulative total for each diagnosis is calculated from the total patient sample. The resultant ranking represents a quantitative estimate of health care needs or priorities for the population at risk.


It is clear that even with unlimited resources not all of these needs could be met in the present state of our knowledge. The next step therefore consists of determining what portion of total health care needs can be met, given our present understanding of disease and our present treatment possibilities. This portion indicates the target area for application of professional skills and helps to define educational priorities. The goals of education for health service staff can therefore be defined as encompassing those areas of health care needs that cause the greatest total preventable disability - i.e. those that cause the greatest total disruption that could be reduced or minimized by early diagnosis and appropriate intervention.

In his early studies using this method to review hospital practice in two large community hospitals in widely separated metropolitan areas in the United States, Dr Williamson found that pregnancy, including uncomplicated delivery, ranked first or second in priority in both hospitals, that cerebral vascular accidents ranked among the first five diagnostic categories in both hospitals and that fractures of the lower extremities ranked among the first five in one hospital. These particular conditions are mentioned because in certain educational institutions there is a general tendency to reduce the amount of clinical instruction for the general medical student in some of these areas. For example, instruction in orthopaedic surgery is often elective despite the fact that trauma in general accounts for a very significant proportion of total preventable disability.

While the study reported above was limited to hospital practice, the same method could easily be applied to any level of health practice. In addition, while the findings from such epidemiological studies and the particular weights to be assigned to such factors as individual disability and social disruption will, of course, vary markedly in different parts of the world, the approach is clearly applicable to any society for which health personnel are being trained.

In all parts of the world, use of such data will modify the goals and priorities of educational institutions and the emphases in curricula by focusing far greater attention on ambulatory medicine and on the more common causes of disability.

**Implications of applied research on goals and priorities**

It can be seen from the above that the means are now at hand for supplementing expert judgement with data derived from empirical studies to assist us in defining the roles and, hence, the skills required of students on completion of programmes. If such studies were carried out as a matter of course and if the findings were used to develop explicit educational objectives for the health professions, we should see revolutionary changes in the kinds of health professionals produced and in their training programmes. Furthermore, such changes would have a far greater impact on meeting health care needs than would simple expansion of educational facilities of the conventional type.
Here we should mention some simpler but also more rapid and less costly techniques which can be used to complement or replace other methods. These methods are not mutually exclusive:

- Interviews with members of the profession, who are asked to describe what, in the light of their experience, should be the functions and tasks of any member of the health team.

- Questionnaires, made up of either open-answer questions (what are the functions of...?) or closed-answer questions (which of the tasks listed below...?).

- Personal log-books kept by health professionals, describing the actual work carried out each day and recording the time spent on each activity.

- The simplest method consists of asking each of a group of colleagues to put himself in the shoes of a person needing care and to describe the functions and tasks that he would wish a given member of the health services to be able to perform. Comparison of the lists submitted will lead to rapid agreement on a common list of sufficiently high quality to provide a basis for a productive discussion on the relevance of the programme, for example.

The following pages (1.25 to 1.27) describe the services provided by a health unit in one country. This list was obtained using the questionnaire method in a survey carried out in Egypt in 1969.

1.24

Transformation of the present professionally oriented technologically dominated health system into a patient-oriented system is the needed ingredient for any successful curriculum change. The patient should be the primary concern of both education and service.

George A. Silver

Example of services provided by rural health units


Each health unit is meant to serve a population of 5000 persons, normally in one village and maybe a few smaller settlements around it. The health team of each of these rural health units is made up basically of:

One physician (in charge)
One assistant midwife
One assistant sanitarian, and
One laboratory assistant.

The rural health unit provides the basic health services for the population it serves, i.e.:

A. Maternal and child health work
B. Communicable disease control work
C. Vital and health statistics work
D. Environmental sanitation work, and
E. Medical care work.
A. Maternal and child health work

(a) Prenatal care activities:

1. Comprehensive examination of new patients.
2. Follow-up examination of patients.
3. Urine analysis (sugar and albumin, microscopic examination).
4. Taking blood samples and determination of haemoglobin level.
5. Weighing of pregnant women.
8. Referral of patients to hospitals.
9. Giving subcutaneous, intramuscular and intravenous injections.
10. Supervision of cleanliness of pregnant women.
11. Carrying out health education activities.
12. Home visiting for non-attenders and during the ninth month.

(b) Natal care activities:

13. Preparation of delivery bags.
15. Conducting abnormal labour, and transfer to hospital where necessary.

(c) Postnatal care activities:

17. Home visiting for puerperal cases.
19. Giving subcutaneous, intramuscular and intravenous injections.
20. Carrying out health education and family planning activities.

(d) Child care activities:

22. Supervision of child cleanliness.
23. Vaccination against diphtheria, tuberculosis, etc.
24. Taking temperature.
25. Carrying out medical examination.
27. Referral of patients to hospitals.
28. Isolation of communicable disease cases.
29. Giving subcutaneous, intramuscular and intravenous injections.
30. Taking blood samples.
32. Prescribing the diet.
33. Home visiting for non-attenders.

(e) Miscellaneous technical activities:

34. Preparing the clinic.
35. Sterilization of instruments and supplies.
36. Training of midwives and assistant midwives.
37. Preparation of drugs for distribution.

B. Communicable disease control work

(a) Activities related to cases:

38. Isolation of cases.
39. Disinfection of cases (during and after treatment).
40. Dusting of cases (for disinfection).
41. Giving instructions at home (education).
42. Supervision of domiciliary treatment of tuberculosis patients.
43. Recording in communicable disease register.
44. Search for the source of infection.

(b) *Activities related to contacts:*

45. Surveillance of contacts.
46. Immunization of contacts.

(c) *General preventive activities:*

47. Vaccination against poliomyelitis, diphtheria and tuberculosis.
48. Noting names of non-attenders.
49. Preparation of list of families.
50. Carrying out periodic dusting.
51. Recording in disinfection and dusting registers.
52. Controlling insects and rodents.
53. Carrying out epidemiological surveys for case-finding.
54. Isolation of detected cases.

(d) *Activities related to deaths:*

55. Receiving notifications of deaths and search for relations.
56. Examination of the dead and establishment of death certificates.
57. Recording in the appropriate registers.
58. Issuing of burial permits.

**C. Vital and health statistics work**

59. Recording of births and deaths in the appropriate registers.
60. Making weekly and monthly reports.
61. Calculation of death rates, etc.
62. Making statistical studies and interpretations.

**D. Environmental sanitation work**

63. Numbering of houses and population census.
64. Mapping areas and facilities.
65. Ensuring cleanliness in and around dwellings.
66. Hygienic disposal of refuse.
67. Constructing latrines in village houses.
68. Control of bilharzial snails.
69. Identification of breeding places of mosquitos.
70. Mapping breeding places of mosquitos.
71. Checking hygiene of public latrines.
72. Carrying out measures ordered by doctor.
73. Supervision of environmental sanitation activities.
74. Examination of food in public places.
75. Taking samples from food.
76. Destroying spoiled food.
77. Surveillance of market and street vendors.
78. Taking water samples from public standpipes.
79. Enforcement of laws concerning cemeteries.
80. Examination and certification of food handlers.
81. Carrying out health education activities.

**E. Medical care work**

(a) *Diagnosis activities:
82. Preparing the patient.
83. Taking the history.
84. Recording clinical observations.
85. Weighing the patient.
86. Taking the temperature.
87. Counting the respiration.
88. Counting the pulse.
89. Measurement of blood pressure.
90. Clinical examination.
91. Requesting laboratory tests.
92. Taking blood samples and administering transfusions.
93. Microscopic examination of blood and blood grouping.
94. Urine examination for parasites, chemical analysis and microscopic examination of urine.
95. Requesting X-ray examination.
96. Examination of stools.

(b) Therapeutic activities:

97. Prescribing treatment and/or diet.
98. Giving subcutaneous, intramuscular and intravenous injections and drips.
100. Applying artificial respiration.
101. Catheterization.
102. Application of hot or cold compresses.
103. Administration of enemas and use of stomach pump.
104. Suction of mucus.
105. Making dressings.
106. Eye painting and irrigation.
107. Making surgical stitches and performing minor operations.
108. Removal of surgical stitches.
110. Observing patient’s condition.
111. Application of external treatment (ointment).
112. Radiotherapy.
113. Physiotherapy.

F. Administrative work

114. Assignment of jobs and activities.
115. Checking attendance.
117. Conducting legal investigations.
118. Management of equipment and supplies.
120. Filling in forms.
121. Book-keeping.
122. Correspondence.
123. Preparation of monthly and annual reports.
124. Recording attendance in waiting-room.
125. Supervising housekeeping of the unit.
126. Supervising transportation.

Please Note!

You are reminded that this list, drawn up in 1969, describes the services as they were and not as they should have been. It might seem that preventive activities deserved greater prominence.

A list of the services provided by health facilities is essential for verifying the relevance of the everyday work of the various members of the health team. It is from this that their professional profiles and their training programmes.
should be derived.

EXERCISE

1.28

1. Take one category of health personnel (e.g. physician, or nurse, or midwife, or medical assistant, or sanitarian) and circle the items on the preceding list corresponding to the activities which that category of staff is supposed to carry out in your country at present.

2. Then think of some activities which that same category does not undertake at present but which you feel, in the light of your personal experience, it should undertake to improve the level of health of the population it serves, Draw a square around each of the corresponding items on the list.

3. Describe below any unlisted activities that you consider relevant.

Educational objectives (derived from the tasks that make up the professional profile)

1.29

What the students should be able to do at the end of a learning period that they could not do beforehand.

Educational objectives are also called learning objectives as opposed to teaching objectives.

They define what the student, not the teacher, should be able to do (in accordance with principle no. 2, page 1.19 and 1.79).

The definition of the objective of a course is that of the result sought, not a description or summary of the programme.

Relationship between professional acts in the health field and educational objectives

Note: The size of the circles relates to the number of objectives: the more specific they are the more numerous they are. The triangle indicates that at the general level objectives are wide, broad, vague, and that specific objectives are punctual, narrow, precise.

1.30

Types of educational objectives

1.31

1. General objectives: Correspond to the functions of the type(s) of health personnel trained in an establishment.

Example: Providing preventive and curative care to the individual and the community, in health and in sickness.
2. Intermediate objectives: Arrived at by breaking down professional functions into components (activities) which together indicate the nature of those functions.

Example: Planning and carrying out a blood sampling session for a group of adults in the community.

3. Specific (or instructional) objectives: Corresponding to (or derived from) precise professional tasks whose results are observable and measurable against given criteria.

Example: Using the syringe to take blood sample (5 ml) from the cubital vein of an adult (criteria: absence of haematoma; amount of blood taken within 10% of the amount required; not more than two attempts).

These three types of objectives, taken together, make up the Professional Profile

To gain better understanding of these three levels of educational objectives and the relationship between them, study pp. 1.36 - 1.37 and 1.41 - 1.48

Data necessary for formulation of relevant educational objectives

1.32

Health needs, demands and resources of society.
Services to the patient (list of tasks).
Services to the community (list of tasks).
The profession itself.
The students.
Progress in sciences.
The scientific method.
etc...


1 An annex to the report clarifies what different authors mean by educational objectives, examines the different levels and types of objectives, lists the potential benefits of taking the trouble to formulate objectives and reviews the data considered necessary for this. There is also a short section on how to word objectives properly.

EXERCISE

1.33

Take the time to list the main functions of the category of health personnel that interests you (dentist, nurse, sanitary engineer, physician, pharmacist, midwife, etc.). Where possible, refer to documents published on the subject in your country (national health plan, professional publications, etc.). If no such data are available, rely on your own experience.

The professional functions of ...................... 1 are as follows:

1. ______________________________________
2. ______________________________________
3. ______________________________________

1 WHO Technical
Please read the following pages and then do the exercise on page 1.38

**Primary health care** is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country’s health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system, bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process.

A health team is a group of persons who share a common health goal and common objectives, determined by community needs, towards the achievement of which each member of the team contributes, in a coordinated manner, in accordance with his/her competence and skills, and respecting the functions of others. The manner and degree of such cooperation will, of course, vary and has to be solved by each society according to its own needs and resources. There can be no universally acceptable composition of the health team.

The primary health care approach:

1. reflects and evolves from the economic conditions and sociocultural and political characteristics of the country and its communities and is based on the application of the relevant results of social, biomedical and health services research and public health experience;

2. addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly;

3. includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs;

4. involves, in addition to the health sector, all related sectors and aspects of national and community development, in particular agriculture, animal husbandry, food, industry, education, housing, public works, communications and other sectors; and demands the
coordinated efforts of all those sectors;

5. requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of primary health care, making fullest use of local, national and other available resources; and to this end develops through appropriate education the ability of communities to participate;

6. should be sustained by integrated, functional and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need;

7. relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community.

**General objectives: professional functions**

1.36

There will be as many lists of these as there are categories of staff trained in the institution concerned.

The following examples of general educational objectives at the institutional level are real sets of objectives as formulated by health personnel training institutions.

They are only examples. Compare them with the functions you listed on p. 1.33. You may find that some of the items are almost identical. At this general level the acts required to meet the health needs of the population will have some points in common all over the world. This is quite understandable. At this level of general functions it is not surprising that nurses, physicians, midwives or dentists, for example, should exercise similar types of functions, such as treatment, prevention, planning, education of the public, training of colleagues, etc. The differences between the professions will emerge from the more detailed list of intermediate objectives, describing the activities of each category and from the even more specific list of tasks. The different types of objectives form a whole. They are given meaning by their relationships and interdependence. Taken together they make up the professional profile.

What should be noted at this stage is that all the examples are relatively short (one page) and rather vague. You will also note that they define everything the students should be able to do at the end of their training.

They do not define what the teachers do but rather what the institution’s end-product is. They are also known as institutional objectives.

The fact that the examples that follow are numbered does not imply that they are classified in order of importance. Obviously each function can be more or less important as compared with another, depending on the health system in which the qualified student will work and on the overall stage of development of the country.

The prominence of the function health education of the public will depend on the population’s general level of education. Similarly, functions relating to planning will be very different depending on the development context and degree of organization of the country. Physicians and nurses in less developed countries
may have to assume greater responsibilities in this field than their counterparts working in more developed countries.

Whatever the relative importance of a given function, what counts at this stage is that it exists: you will find it useful to bear this in mind throughout the training process. Now read the examples that follow.

Professional profiles

**Institutional Objectives (1)**

The graduates of the M.D. programme should be able:

1. To identify health problems in their totality and to show skills in collecting, processing and presenting data pertaining to health problems, and subsequently to resolve and manage them, from the individual level through the family level to the community level.

2. To diagnose and manage frequently occurring diseases in the community (including emergencies), to identify and provide primary care in serious diseases, taking account of their physical, emotional and social aspects.

3. To manage health centres at various levels and in a variety of settings and to work effectively and efficiently in health teams, in teaching, research and service, with available facilities.

4. To apply basic principles in health education in order to assist and lead the planning, implementation and evaluation of health programmes in promoting health, preventing disease, cure and rehabilitation, according to the needs of the community and local social, religious, customary and cultural values which can influence the state of health and disease.

5. To identify personal limitations, and to nurture the capacity and interest in enhancing their knowledge and developing personal characteristics required for professional advancement through an awareness of personal assets and limitations.

6. To function as an effective and efficient member of a team with a sense of responsibility and dependability.

   1 Adapted from Gadjah Mada University Faculty of Medicine, Yogyakarta, Indonesia.

**Institutional Objectives (2)**

At the end of his M.D. programme the graduate will have acquired or developed the knowledge, abilities, and attitudes necessary to qualify for further education in any medical or related health career. The achievement of the general goals should enable a student:

1. To identify and define health problems at both an individual and a community level and to search for information to resolve or manage these problems.

2. To examine the underlying physical, biological and behavioural mechanisms of health problems. This includes a spectrum of phenomena from the molecular to those involving the patient’s family and community.
3. To investigate community health problems and to recommend efficient and effective approaches to deal with environmental, occupational, behavioural, and public policy issues.

4. To develop the clinical skills and methods required to define and manage the health problems of patients, including their physical, emotional, and social aspects, within the context of effective health care.

5. To recognize, maintain, and develop the personal characteristics and attitudes required for a career in a health profession. These include:
   a. Awareness of personal assets, limitations, and emotional reactions.
   b. Responsibility and dependability.
   c. Ability to relate to, and show concern for, other individuals.

6. To be a self-directed learner, recognizing personal educational needs, selecting appropriate learning resources, and evaluating personal progress.

7. To assess critically professional activity related to patient care, health care delivery, and health research.

8. To function as a productive member of a small group which is engaged in learning, research, or health care.

9. To work in a variety of health settings.

2 From McMaster University, Canada.

Institutional Objectives (3)

The graduate of the new baccalaureate nursing programme will be prepared to function as a generalist with beginning competencies in a specialized area of nursing.

3 From the University of Washington School of Nursing.

The graduate will be prepared to function in a variety of settings and be able to:

1. Obtain health histories and make general health assessments.
2. Provide safe and competent care in emergency situations and acute illnesses.
3. Provide supportive care to persons with chronic or terminal health problems.
4. Provide health teaching, guidance and counselling.
5. Assist persons to maintain optimal health status.
6. Provide for continuity of health services.
7. Assume leadership responsibility for planning and evaluating nursing care.
8. Work effectively with all persons concerned with health care problems.

This baccalaureate nurse, as a practitioner of nursing, will be accountable and responsible to clients for the quality of nursing whether administered directly or indirectly.
These three examples of professional profiles are from both developed and developing countries.

What is striking is the overall similarity between the functions listed, even if they are expressed in different terms:

A. Professional profile: identifying and analysing health problems in order to:
   - provide treatment
   - provide preventive care
   - plan policies, activities and services (management)
   - participate in the health education of the population
   - collaborate with other services in the interests of overall development
   - train health personnel
   - participate in research

B. Methodological functions:
   - evaluate one’s own activities
   - develop one’s own skills continuously

They were gathered during a world-wide survey designed to collect general educational objectives for nurses and physicians. Identical results were obtained; that is, the same functions came up in practically every case. This collection of functions corresponds to the role that health services personnel are expected to fulfil.

Throughout this Handbook you will be invited to use this list of functions (and others if necessary, depending on the health needs of the population in your country) as the basis for your future educational decision-making.

To demonstrate how such an obvious list can in fact be a very effective instrument, you are invited to use it at once in making a quick analysis on the next page.

EXERCISE

1.38

After reading the previous four pages, revise if necessary your own list of functions.

The professional functions of ................. are as follows:

Everyone who uses a word knows what he means by it. The problem is that not everyone realizes that other people may have different meanings for the same word.

Mager

EXERCISE

139

Tricky test to force you to think about the relevance of a programme

Take the functions you listed on p. 1.33

For each function that corresponds to one of those listed in the table below, ask yourself the following two questions:
In the institution where I work

1. are teaching activities organized to help students acquire skills corresponding to each function listed?

2. do the examinations (counting towards award of diploma) effectively measure the students’ abilities in relation to each function listed?

- Where you can answer YES (without blushing), mark a cross in the + column,

- If no corresponding activity is organized by your institution, mark a cross in the 0 column,

- If you are not sure, mark a cross in the + or - column.

<table>
<thead>
<tr>
<th>Function</th>
<th>Teaching activities that help student to perform function</th>
<th>Examinations providing effective measurement of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curative</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Preventive</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Planning</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Health education</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Collaboration within and outside the health services</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Training of other personnel</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Research</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>+</td>
<td>+ or -</td>
</tr>
<tr>
<td>Self-training</td>
<td>+</td>
<td>+ or -</td>
</tr>
</tbody>
</table>

Draw your own conclusions ..........

General educational objectives provide a useful basis for preparation of a relevant programme

Personal notes

1.40

Professional activities and intermediate objectives

1.41

Intermediate educational objectives are obtained by breaking down each function (or general objective) into smaller components. These components are professional activities which in their turn can be broken down into more specific acts that are called professional tasks, as long as they can be measured against given criteria. (See p. 1.48 et seq. for specific objectives.) It can also be said that all objectives that are neither general nor specific are on the intermediate level. That is, there can be several intermediate levels rather than a single one.

The pages that follow give examples of intermediate objectives. 

Unlike general objectives, whose vagueness makes them fairly universal, intermediate objectives should reflect the health needs of a population living in a given context. This professional profile would have been different in the case of a general practitioner in Finland or in Cameroon because of the special geographical
epidemiology of each country. The social and political system and the type of health services provided will also have an influence. These are the factors that ensure the relevance of educational objectives. Another important point to be taken into consideration: this list, like any other list of educational objectives, is only a means or working instrument and not an end in itself. It was drawn up as a basis for choosing instruments of evaluation for measuring the skills of students during their internship.

1 Prepared by a multidisciplinary group of teachers from Algeria. Workshop on docimology, Timimoun, Algeria, February 1977.

Examples of intermediate educational objectives

These intermediate educational objectives were derived from general objectives defining the functions of a general practitioner. They refer to the paediatric aspect of the work.

The general practitioner should be able to carry out the following activities:

1. Diagnose and treat major childhood disorders:

- abnormal development of the embryo or fetus
- infections in newborn babies
- emergency surgery on newborn babies
- jaundice of the newborn
- vomiting in infants
- cardiac insufficiency
- acute diarrhoea
- dehydration
- convulsions
- purulent meningitis
- tuberculous meningitis
- tuberculosis
- eruptive fevers
- viral bronchopneumonia
- bacterial pneumonia
- septicaemia
- childhood skin disorders
- urinary infections
- acute glomerular affections
- abdominal tumours
- enlargement of liver
- enlargement of adenoids
- enlargement of spleen
- kala azar
- malaria
- throat infections
- otitis
- orthopaedic problems in children

2. Carry out activities relating to patient care, taking of samples, laboratory work and use of equipment.

2.1 Sampling techniques:

- blood (including blood from umbilical cord)
- abscess
- cerebrospinal fluid (CSF)
- urine
- puncture of ascites, pleura
2.2 Techniques relating to patient care, preventive measures and laboratory work:

- immunization
- perfusion, intramuscular injection, transfusion
- catheterization, enema
- blood grouping
- haematocrit
- erythrocyte sedimentation rate
- CSF count

2.3 Use of equipment:

- sphygmomanometer
- otoscope
- aerosol spray
- aspirator
- electrocardiograph
- ophthalmoscope

3. Distinguish between normal newborn babies and those at risk; organize prevention and early detection of possible dangers.

3.1 Recognize growth anomalies.

3.2 Recognize anomalies of psycho-motor development.

3.3 Work out with the parents a diet suitable for the needs of their child.

3.4 Recognize dietary anomalies.

3.5 Plan a surveillance programme for a normal child and for one at risk.

3.6 Enter findings in the child’s medical record.

4. Plan, in collaboration with the parents, individual and collective surveillance of growth, nutrition and psychomotor development in children (newborn babies, infants, children).

4.1 Plan care of a normal newborn baby.

4.2 Plan treatment of a newborn baby with a diabetic mother.

4.3 Plan treatment of a rhesus negative newborn baby.

4.4 Plan treatment of a newborn baby with kidney disease.

4.5 Plan treatment of a newborn baby with low birth weight.

4.6 Plan treatment of a premature baby.

4.7 Plan treatment of a baby born after abnormal labour.

5. Identify somatic problems (particularly relating to growth and nutrition), psycho-motor and emotional problems in a sick child on the basis of medical history and clinical examination.

5.1 Question parents of a sick child and make a record of the information obtained.
5.2 Examine a sick child.

5.3 Make a note of the findings.

5.4 On the basis of a clinical examination, determine the problems presented by a sick child (particularly relating to growth, nutrition and psychomotor development).

6. Protect children individually and collectively against the effects of hereditary conditions, communicable diseases and accidents.

   6.1 Offer advice on genetic matters to parents.

   6.2 Determine the mode of transmission of hereditary diseases.

   6.3 Detect and treat hereditary diseases.

   6.4 Investigate home conditions of a child with a communicable disease.

   6.5 Examine contacts of a child with a communicable disease and apply preventive measures.

   6.6 Carry out all immunizations.

   6.7 Draw up a schedule for a child never or inadequately immunized.

   6.8 List, in order of frequency, the accidents that happen to children in a given sector.

   6.9 Organize and participate in a campaign to prevent accidents to children.

7. Identify mental health problems in children; propose measures and participate in their application.

   7.1 Determine the priority mental health problems in children of his own health sector.

   7.2 Coordinate health, administrative and educational resources available for dealing with mental health problems in children (particularly those relating to maladjusted or abandoned children).

8. Evaluate the effects on child health of the environment; propose appropriate measures and ensure that they are applied, individually and collectively.

   8.1 List environmental factors in his own area of work.

   8.2 Help improve environmental conditions in collaboration with the health authorities.

   8.3 Identify a child seriously threatened by his environment.

   8.4 Detect and treat a disorder caused by the environment.

   8.5 Advise parents on drawing optimum benefit from a favourable environment.

9. Be accessible to the child and his family, providing health education and the support needed in case of disease or disability.

Organize his plan of work to ensure that:
9.1 He is accessible to the child and his family.

9.2 He has time to listen to them.

9.3 He has time to talk to them.

9.4 He has time to reassure them.

9.5 He has time and the ability to provide the child and his family with the necessary health education.

10. Organize prevention, detection and follow-up of deficiency diseases and chronic conditions.

10.1 Apply national regulations for the prevention of deficiency diseases.

10.2 Detect and treat the following deficiency diseases in a given population:

- protein and calorie malnutrition
- marasmus
- kwashiorkor

- hypovitaminoses
- vitamin D deficiencies (rickets)
- vitamin A deficiencies (hemeralopia, xeroma)
- vitamin B complex deficiencies (beriberi, pellagra, megaloblastic anaemia)
- vitamin C deficiencies (scurvy)

- iron deficiency (anaemia due to lack of iron).

10.3 Detect and treat chronic conditions in children:

- diabetes
- haemoglobinopathy
- thalassaemia

- rheumatic conditions
- metabolic disorders (phenylketonuria, glycogenosis, glucose 6-phosphate dehydrogenase deficiency, galactosaemia)

- congenital or acquired heart conditions
- chronic respiratory insufficiency (mucoviscidosis, bronchial dilatation, deformations of the thorax, asthma)

- epilepsy
- haemophilia

- chronic allergic conditions (eczema, allergies in the upper respiratory tract, asthma)

11. Organize, participate in, and evaluate treatment and preventive activities (medical and otherwise).
11.1 Allocate tasks among members of a health team in his area of work.

11.2.1 Carry out a paediatric consultation.
11.2.2 Decide to admit a patient to hospital.

11.3 Work in a ward as part of a team.

11.4 Organize reception and surveillance of emergency cases.

11.5 Take part in the activities of a maternal and child health centre.

11.6 Deal with problems relating to drugs and equipment.

11.7 Help organize an immunization campaign.

11.8 Propose and ensure application of non-medical measures required to back up medical activities in the field of prevention and hygiene.

11.9 Set up a mechanism of periodic evaluation by all team members of his own and the team’s activities, in terms of their objectives.

12. Help families to use health and administrative bodies concerned with improving child health.

12.1 Ensure health coverage of all children living in the area.

12.2 Enumerate the health structures that exist in the area.

12.3 Enumerate the administrative, political and economic bodies in the area.

12.4 Assess the role played by each of the preceding in improving child health.

12.5 Organize optimum use of health facilities.

12.6 Promote and enforce measures aimed at improving child health.

13. Plan training and retraining of health staff.

13.1 Identify any insufficiency in the skills of members of the health team.

13.2 Organize the training and/or continuous education of members of the health team.

13.3 Evaluate the training and further education activities of health team staff.

The definition of educational objectives has become almost a fashionable subject of conversation... defining them is becoming a mark of modernity... but, as with all slogans, there is a danger that we shall get used to them without understanding their purpose, their nature, their advantages, their limitations and the risks involved.

In drawing up educational objectives, what counts is not their formal definition but their relevance to the professional tasks of the personnel to be trained and to the priority health problems of the population.

EXERCISE
Preparing a Professional Profile

You have seen how others have formulated intermediate educational objectives. For each of your general objectives (functions) (page 1.33), list all the intermediate objectives you consider necessary, using the following type of grid:

You now have the main components of a PROFESSIONAL PROFILE which can be used to start planning the evaluation process.

Building in relevance

1.47

Before going any further, think about the concept of relevance and about the fact that educational objectives are a means and not an end.

It seems reasonable to believe that an educational programme has more chance of being effective if its purposes have been clearly expressed. Experimental research in the field of evaluation indicates that it is not possible to measure the results obtained from an educational system if its objectives have not been explicitly defined. But a desire for precision should not divert us from a much more important concern: the need for relevance.

To be relevant an educational programme, rather than being the result of a non-selective mass of knowledge accumulated over the centuries, should be selectively shaped in terms of the aims to be achieved. Each time the goal is modified, the programme too must be modified accordingly.

Thus relevance is the degree of conformity that exists between training programmes on the one hand and the population's health needs and resources on the other.

When determining a professional profile, therefore, we must take into account the health needs and resources of society, the health professions, the progress of science, the capabilities of the students, the social and cultural context, etc. Moreover, the study made of these factors must be prospective in nature since we are training personnel for the future.

1 The epidemiological, sociological data, etc., and the operational research necessary for such a prospective analysis are not dealt with in this Handbook. For information on these matters the reader should consult specialized publications dealing with the organization of health services (see Bibliography, p. 7.01 et seq.).

The method traditionally used is to bring together eminent professors and the result of their deliberations is presented as a list of chapter headings. Often, existing programmes are used as the main source of data for the preparation of the new programme. The professors indicate the number of hours to be devoted to the various subjects to be dealt with: this generally leads to a conflict of personalities and it is the most forceful, the most persuasive, sometimes the most irascible or noisiest of the participants in the discussions who obtains the largest number of hours. The result is that the time factor becomes a constant and that competence remains an undefined variable.

2 For example, the length of medical studies may be fixed by administrative regulations at 6 years (or 7, 5, etc.): this is the
time constant On the other hand, there is hardly any definition of the competence of graduates, and this can lead to great variability.

In the absence of a definition of relevant educational objectives, discussions on programmes, teaching methods and evaluation methods are difficult and often futile.

When educational objectives have been established at the intermediate level (lists of activities), it is then possible to determine with some precision which learning activities are likely to facilitate the attainment of an objective and which are not.

Methods of evaluation (of students, teachers and methods) will also depend on the objectives to be achieved. Evaluation consists in being able to say to what extent and how the specific objective (task) set has been achieved. If one has not bothered to lay down a measurable objective, it will be difficult to make any kind of evaluation. To select a type of examination (to use an old-fashioned term) without specific educational objectives (or the definition of an acceptable level of performance) makes no more sense than to try to choose a measuring instrument without knowing what has to be measured. Only over the last two decades have investigators in the field of testing and measurement begun to work out a solution to this problem. Here, too, the weight of tradition and emotional reactions make themselves felt.

Professional tasks and specific educational objectives

1.48

Having established the principal functions that outline the role of a health worker, we then went on to achieve a greater degree of precision by describing the activities corresponding to each function. Now we must go further and define each of the specific professional tasks corresponding to each activity. Let us continue with the example furnished by our Algerian colleagues.

They decided to define the tasks corresponding to activity 11.4: Organize reception and surveillance of emergency cases (see p. 1.43).

Here is the list:

11.4.1 Check the availability of equipment needed for emergencies (drugs, instruments, beds), using a checklist.

11.4.2 Treat, in order of urgency, several patients who arrive at once.

11.4.3 Support the vital functions of a child, in accordance with an ad hoc outline of procedures.

11.4.4 Avoid any action that could endanger the life of the child.

11.4.5 Handle the child gently.

11.4.6 Reassure the child.

11.4.7 Explain to the parents why the child must be kept in hospital.

11.4.8 Offer moral support to the parents.

11.4.9 Organize a surveillance schedule for an emergency case.

11.4.10 Decide to move the patient.
11.4.11 Plan the move.

11.4.12 Prepare a newborn baby for transfer.

11.4.13 Prepare a child for transfer.

11.4.14 Explain to the parents how the administrative structures involved in admissions and departures function.

11.4.15 Identify the various administrative structures involved in a referral.

11.4.16 Distribute work among health personnel assigned to the emergency service.

11.4.17 Elicit the reasons for various surveillance activities from nursing staff.

11.4.18 Explain the reasons for various surveillance activities to nursing staff.

11.4.19 Reassure the mother of a child admitted to hospital.

The definition of educational objectives must result from a collective effort, in which the students have a part to play.

Any hopes that teachers may have of developing the motivation of students will be realized only when the latter have really been able to make a choice, that is, to decide for themselves on the tasks (educational objectives) to be performed. For this the tasks (objectives) must be clearly defined and presented as a choice; it is even better if the students can participate in their formulation.

### Identifying the components of a task

1.49

An analysis of the tasks listed above shows that performance of some tasks involves not only practical skills (e.g., handle the child,..., 11.4.5) but also communication skills (e.g., explain to the parents,..., 11.4.7) and, finally, intellectual skills (e.g., distribute work among health personnel, 11.4.16). All three components are involved in some tasks; in others, only two (e.g., 11.4.5 or 11.4.16) and sometimes only one (11.4.11). In some cases the various components (practical, communication and intellectual skills) overlap to such an extent that it is possible only to identify the one that predominates. For example, Offer moral support to the parents (11.4.8) is principally a matter of attitude (communication skills). Of course, in some cultural contexts this could be expressed by an act, a gesture or a tone of voice. To know what attitude to adopt, previous knowledge of the milieu and its customs is obviously necessary. Another example is Decide to move the patient (11.4.10). This is primarily an intellectual problem. The decision (intellectual activity) will be taken on the basis of the information available at a given moment. Of course, that information will have been obtained by means of practical skills (physical examination of patient) and the human aspect of the problem cannot be overlooked. To sum up, it can be said that a professional task will often be represented by practical skills. Since those practical skills usually involve another person (the patient, his family, a colleague), a certain attitude (communication skill) will be appropriate. Lastly, some measure of intellectual skill (knowledge) will be needed for performance of the task.

Identification of all the components of each task is therefore recommended, to ensure that each component is taken into account during the successive stages of
the educational process. The learning process and teaching activities will be designed to facilitate assimilation of each component, and the same will apply when the time comes to evaluate the students.

The classification that follows will help you by providing more details about the three domains of practical, communication and intellectual skills.

If the jargon seems obscure, remember to consult the Glossary (p. 6.01 et seq.).

Classification of professional tasks into three domains: practical, communication and intellectual skills

1 Summary of an article by Dr J.-J. Guilbert, Didakta Medica, February 1971.

1.50

To help teachers in the correct formulation of educational objectives, systems of classification into domains (practical skills; attitudes or communication skills; intellectual skills and knowledge) and within each domain (different levels of the process) have been put forward by various specialists in education and psychology.

One of their reasons was to try to clear up the confusion resulting from the use of ambiguous objectives such as The student should have a good understanding (or knowledge) of...

For some, good understanding of the law of X may mean that the student should be capable of giving the mathematical formula for the law or saying what it means, and for others that he should also be able to use the formula to solve a problem or show the interdependence of the law in relation to other phenomena. No one questions the need for students to have a good understanding of a particular phenomenon, law or principle, fact or theory. However, what satisfies one teacher and enables him to say whether a student has in fact achieved a good understanding may be very different from what would satisfy another teacher, unless they have agreed on what they mean by good understanding through the use of unambiguous terminology.

Education studies have often been criticized for the imprecision of their terminology and concepts. The chief value of a classification is that it enables educators to communicate more precisely among themselves.

This improved understanding will enable those responsible for programme construction to work together. A classification system could also be of use in evaluating the results of a system of education.

Definition and evaluation of the quality of the instruction in a school, country or region poses a very difficult problem; and a well-designed system of classification can play an important role in finding a solution. Another important function is to help educators to prepare examinations for students who have received instruction. A classification is also useful in general as a research tool in education and evaluation.

We do not feel that strict classification is possible. Overlapping of adjacent categories will occur everywhere, as is the case in all aspects of human thought and activity. What counts is not to label but to understand and to develop a common language.

We do not propose to give a detailed account of the various classification systems put forward by B.S. Bloom, D. Krathwohl, R. Gagne or E. Thorndike. We shall limit ourselves to presenting an appropriate and simplified classification for each of the three domains.
1. Domain of attitudes (communication skills).

The dictionary tells us that an attitude is "behaviour representative of feeling or conviction; a persistent disposition to act either positively or negatively towards a person, group, object, situation or value" (Webster).

For the purposes of this Handbook we shall restrict this domain to everything concerning relations between health personnel and the members of the community they will serve. It will therefore be almost entirely a matter of interpersonal relations. This is why it is referred to as a communication skill (for human values see p. 1.67).

Three levels can be distinguished.

1.1 The first is the level of Receptivity or attention; it implies sensitivity to the existence of a certain phenomenon and includes a willingness to receive.

Example: Noticing the anxiety of a patient awaiting the result of a laboratory test for a disease that can have serious consequences.

1.2 The second level is that of Response. This implies sufficient interest in the phenomenon noticed to do something about it.

Example: In the case described in the previous example, the response would be to say a few reassuring words to the patient so that he does not feel alone.

1.3 The third level is that of Internalization. This implies that your perception of a phenomenon has found a place in your scale of values and has affected you long enough for you to adapt yourself to the value system of the other person. This enables you to adapt your attitude to the other person as if you were experiencing the same phenomenon yourself.

Example: On the death of a child, your attitude to members of the family will show them that you care about their grief and are ready to help them to get over it. This does not mean that you have internalized their grief but that you have internalized the attitude that enables you to offer them effective help.

2. Domain of practical skills

By this we mean the routine actions carried out by health workers (intramuscular injection, lumbar puncture, etc.). Three levels can be distinguished:

2.1 The first level is that of Imitation. The student, exposed to an observable action, makes an attempt to copy it step by step, guided by an impulse to imitate: he needs a model.

Example: A student nurse who has seen intramuscular injections performed several times tries to imitate the movements involved... using an orange.

2.2 The second level is that of Control. At this stage the student is able to demonstrate a skill according to instructions and not merely on the basis of observation. He also begins to differentiate between one set of skills and another and to be able to choose the one required. He starts to be adept at handling selected instruments.

Example: The student becomes accustomed to carrying out certain acts while performing routine minor surgery under supervision.

2.3 The third level is that of Automatism. A high degree of proficiency is attained in using the skill, which now requires only a minimum of energy.
Example: An experienced nurse washes a bed-ridden patient carefully and without causing any discomfort; or a physician deftly intubates a road accident victim in the midst of the surrounding confusion.

3. Domain of intellectual skills

In 1963, C. McGuire \(^1\) proposed a classification system derived from that of Bloom and designed more specifically for use in the preparation of achievement tests for students.

\(^1\) Centre for Education Development, University of Illinois Medical School.


Levels

1. Knowledge
   1.1 Recall
   1.2 Recognition of meaning

2. Generalization

3. Solving of a routine problem
   3.1 Interpretation of data
   3.2 Application

4. Solving of an unfamiliar problem
   4.1 Analysis of data
   4.2 Special application

5. Evaluation

6. Synthesis

Three levels are probably enough for the purposes of defining educational objectives and student evaluation. The three levels are taken from McGuire’s system.

1. Recall of facts.
2. Interpretation of data.
3. Problem solving.

3.1 The first level is that of **Recall** of facts. This involves remembering the facts, principles, processes, patterns and methods necessary for efficient performance of a professional task.

Example: The student must be able to converse with his fellows and his teachers using professional language which he should understand without constant reference to a dictionary or other text; or communicate orally with members of society; or communicate in writing (scientific articles, reports, findings, etc.).

3.2 The second level is that of **Interpretation of data**. This is a process of application or use of ideas, principles or methods to deal with a new phenomenon or situation.

Example: After analysing observable data, the student interprets their meaning, grasps their relationships and arranges them into a known pattern.
3.3 The third level is that of **Problem solving** (relating to diagnosis, treatment, organization, etc.). This at best should include finding solutions for a problem arising from new situations with no precedent to serve as a guide.

**Example:** The student, faced with a pathological condition for which he has not been prepared, is able to get on the right track by applying scientific methods and a sound experimental approach.

The only purpose of these classification systems is to permit analysis of the learning process and to help teachers in educational decision-making. It is obvious that human behaviour can rarely be divided neatly into practical, communication and intellectual skills. The same division in objectives is somewhat artificial. Neither teachers nor those responsible for preparing programmes can separate them entirely.

These differences will remain artificial as long as we lack the instruments of evaluation needed for simultaneous study of learning experiences in the various domains (practical, communication and intellectual skills). It is to be hoped that explicit definition of educational objectives will gain in importance so that research workers in education can solve certain problems and the choice of appropriate teaching methods will be made easier.

---

The coding of information for scientific purposes involves reduction of the individual to a few basic characteristics.

Beware! Oversimplification of data can lead to absurd conclusions.

---

**The three classifications (simplified)**

**Note:** Please remember that in human behaviour the three domains are often intricately connected.

---

**EXERCISE**

**Indicate by a cross the components [practical skill (P), communication skill (C) or intellectual skill (I)] of each of the 19 tasks listed below.**

Mark two crosses in the box corresponding to the dominant component.

<table>
<thead>
<tr>
<th>Domains</th>
<th>List of Professional Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>P C I</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>1. Check the availability of equipment needed for emergencies (drugs, instruments, beds), using a checklist.</td>
</tr>
<tr>
<td></td>
<td>2. Treat, in order of urgency, several patients who arrive at once.</td>
</tr>
<tr>
<td></td>
<td>3. Support the vital functions of a child, in accordance with an <em>ad hoc</em> outline of procedures.</td>
</tr>
<tr>
<td></td>
<td>4. Avoid any action that could endanger the life of the child.</td>
</tr>
<tr>
<td></td>
<td>5. Handle the child gently.</td>
</tr>
<tr>
<td></td>
<td>6. Reassure the child.</td>
</tr>
<tr>
<td></td>
<td>7. Explain to the parents why the child must be kept in hospital.</td>
</tr>
<tr>
<td></td>
<td>8. Offer moral support to the parents.</td>
</tr>
<tr>
<td></td>
<td>9. Organize a surveillance schedule for an emergency case.</td>
</tr>
<tr>
<td></td>
<td>10. Decide to move the patient.</td>
</tr>
</tbody>
</table>
11. Plan the move.

12. Prepare a newborn baby for transfer.

13. Prepare a child for transfer.

14. Explain to the parents how the administrative structures involved in admissions and departures function.

15. Identify the various administrative structures involved in a referral.

16. Distribute work among health personnel assigned to the emergency service.

17. Elicit the reasons for various surveillance activities from nursing staff.

18. Explain the reasons for various surveillance activities to nursing staff.

19. Reassure the mother of a child admitted to hospital.


**Definition of specific educational objectives in relation to a task**

1.55

- Refer to the example of a task (p. 1.31): Using a syringe, take a blood sample (5 ml) from the cubital vein of an adult.

- Break it down into components. The main component is a *practical skill*, but the other two (*communication* and *intellectual skills*) are also involved.

- This type of act occurs frequently in the daily routine of health workers. It resembles the administration of intramuscular injections, lumbar punctures, puncture of ascites, pleura or articulation, gastric intubation.

- The *communication skill* appropriate to all these acts will be the same. It can be defined by acceptable types of behaviour which, when described in an observation table, can be used as criteria (introducing yourself to the patient, making sure that he knows what you are going to do, etc.).

- For all these acts an intellectual skill (which requires a certain amount of theoretical knowledge) is needed (anatomy, sterilization procedures, secondary effects, etc.): this is usually the *prerequisite level* which in its turn can be defined in terms of specific enabling educational objectives (also called contributory objectives):

  - sketch from memory the position of the cubital vein;

  - list the measures to be taken to ensure sterility during the act.

(In both cases criteria should be established from a textbook.)

- In addition to the task, certain criteria are proposed in this example (absence of haematoma; amount of blood taken within 10% of the amount required; not more than two attempts). These criteria confirm that the person who set the task considered the *practical skill* to be its principal component.

To sum up, a specific educational objective can be defined as a task accompanied by criteria indicating an acceptable level of performance for its principal component.

\[ \text{Specific Objective} = \text{Task} + \text{Criteria} \]
Specific educational objectives

1.56

What are the qualities of a specific educational objective?

It must be all of the following:

**Relevant:** Its definition should be free of any superfluous material but cover every point relating to the aims in view, i.e., the general objectives derived from the health needs of society.

**Unequivocal:** Loaded words (words open to a wide range of interpretations) should not be used, to avoid any possibility of misunderstanding. What do we mean when we say we want a student to know something? Do we want him to be able to recite, or to solve, or to construct? To say merely that we want him to know tells him too little or too much. The objective is unequivocal when you describe what the learner will have to do to demonstrate that he knows, or understands, or can do.

**Feasible:** It must be ensured that what the student is required to do can actually be done, within the time allowed and with the facilities to hand. Remember, too, the basic condition for feasibility: the minimum (practical, communication and intellectual skills) to qualify for the course. This is the prerequisite level.

**Logical:** The objective must be internally consistent.

**Observable:** It is obvious that unless there is some means of observing progress towards an objective, it will be impossible to tell whether the objective has been achieved.

**Measurable:** One often hears most of what I teach is intangible and cannot be measured. Even rough measurement is better than none at all, for if no measurement is made instructors tend to assume that a goal has been achieved just because they have taught the subject. If your teaching skills cannot be evaluated, you are in the awkward position of being unable to demonstrate that you are teaching anything at all. That is why the objective must include an indication of acceptable level of performance on the part of the student.

This does not mean that an objective that does not lend itself to measurement by present-day techniques is necessarily a bad objective. On the other hand, the existence of a criterion for measurement will make it easier to choose or construct a valid evaluation mechanism, however sketchy this mechanism may be at the start.

At the same level of specificity as the specific educational objectives are the contributing objectives. These must possess the same qualities as the specific objectives corresponding to a professional task. They are concerned with the knowledge which the teachers in a traditional programme, and both teachers and students in a programme using the problem-solving approach (see Chapter 3), consider useful for the performance of a professional task.

<table>
<thead>
<tr>
<th>Prerequisite Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>What the learner has to be able to do before undertaking an educational programme.</td>
</tr>
<tr>
<td>words often used but open to many interpretations</td>
</tr>
</tbody>
</table>
to know to write

to be aware of to identify

to understand to differentiate

to really understand to solve

to appreciate to construct

to fully appreciate to list

to believe to compare

to have faith in to contrast

etc.

Mager, 1962

1.57

List of active verbs for stating educational objectives

1.58

- nonrestrictive list -

Abbreviate
Act
Administer
Aid
Allow for
Analyse
Apply
Appraise
Arrange
Assist
Ask
Assemble
Attend
Audit
Avoid
Bring
Build
Calculate
Care for
Categorize
Change
Chart
Check
Choose
Circle
Cite
Classify
Clean
Close
Collaborate
Collect
Communicate
Compare
Compile
Complete
Compute
Conclude
Conduct
Connect
Construct
Contrast
Contribute
Control
Convert
Cooperate
Correct
Create
Criticize
Decide
Decrease
Deduce
Defend
Define
Delimit
Demonstrate
Derive
Describe
Design
Designate
Detect
Determine
Develop
Diagnose
Differentiate
Direct
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Discriminate
Display
Dissect
Distinguish
Divide
Do
Draw
Edit
Effect
Encourage
Enumerate
Enunciate
Establish
Estimate
Evaluate
Examine
Exchange
Execute
Explain
Extract
Extrapolate
Facilitate
Fill
Find
Follow
Formulate
Furnish
Generalize
Generate
Get
Give
Guide
Hold
Identify
Illustrate
Implant
Include
If you feel the list on the previous page is incomplete, go ahead... add the active verbs relating to the category of health personnel that interests you.

Relevance is the essential quality of educational objectives
Objectives that have every quality except relevance are potentially dangerous

1.60

Elements of a specific educational objective

1.61

the act } 
the content } \text{the task} 
the condition } 
+ the criteria

To say what one means by an objective is to reduce neither the importance of the objective nor its profundity ... the act of writing it down means merely that what was once secret is now open for inspection and improvement.

R.F. Mager

Description of the elements of a specific educational objective

1.62

Act and Content

- The act is expressed by an active verb describing the intent of the task aimed at.

- The content specifies the subject in relation to which the act is to be performed. (Example: Repair a binocular microscope or take a sample of venous blood. The act is the verb in italic; the rest of the sentence is the content.)

It is perfectly acceptable for the description of the act (of a specific objective) to be stated in terms of a performance indicator and not in terms of the actual act required, as long as the latter is quite clear.

The performance indicator is the description of an act whose satisfactory performance implies that the student is able to accomplish the actual act required. (Example: Underline in the diagram the names of all the veins that pass in front of the corresponding artery.) Here it is obvious that if the act consists of underlining it is only a performance indicator which shows that the student is able to distinguish veins passing in front from those in any other position.

In all cases, the appropriate procedure with regard to the act (the actual act or a performance indicator) is as follows:

1. Identify the act (for example, by underlining it in the sentence).

2. Decide whether it is an actual act or a performance indicator.

2.1 If it is a performance indicator, decide whether it enables an inference to be made concerning the actual act.

(a) If so, decide whether it can be simplified and whether it corresponds to the student’s level.

(b) If not, write another one.

2.2 If it is an actual act, decide whether it is explicit or implicit.
(a) If it is explicit, decide whether it can be simplified and whether it corresponds to the student’s level.

(b) If it is implicit, include a performance indicator.

Condition. This is the description of the resources available for carrying out the act (data, equipment).

Criterion. The definition of the acceptable level of performance expected from the student. It must be selected in close relationship with the active verb describing the act. It may measure the expected outcome following performance of the act or the process adopted to achieve it. An outcome criterion is preferable, for it provides a better measure of relevance, but it can be selected only if the outcome is entirely within the student’s control.

Let us take a specific educational objective and identify each of its elements:

Identify on frontal X-ray films of the thorax the presence or absence of opacities of the pulmonary parenchyma, of more than 2 cm diameter in 80% of cases.

Act: Identify the presence indicates the act to be performed.

Content: Opacities of the pulmonary parenchyma.

Condition: Frontal X-ray films of the thorax are provided to the student.

Criterion: The student must identify in 80% of cases any opacity of over 2 cm diameter.

Some people mistakenly conclude that there is no difference between contributing objectives and test items. That is true only in the case where the main intent of the objective is overt. R.F. Mager

EXERCISE

1.63

Identify the four elements of the following objective:

To be able to: repair a binocular microscope (brand X, Y or Z) having been informed of the defect and given a descriptive diagram, appropriate tools and spare parts, so that the microscope functions according to specifications.

Act:
Content:
Conditions:
Criterion (or criteria) or acceptable level of performance:

You can check your choice by turning to p. 1.76, questions 15 - 20 and the answers on p. 1.80.

Answers to exercise on page 1.54

<table>
<thead>
<tr>
<th></th>
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</tr>
</tbody>
</table>

If your choices were different, it does not necessarily mean they are wrong. Possibly the active verbs used for some of the tasks are open to several
EXERCISE

1.64

Please Note!

N.B. Before you start this exercise you should cover the area in the shaded box.

Decide which of the specific educational objectives given below (prepared by participants in workshops) conform to the standards described in the preceding pages. Is each one really a professional task? Does it include an act and content, conditions and a criterion? (Answer Yes or No). What is its principal component?

<table>
<thead>
<tr>
<th>Specific educational objectives. The student must be able to:</th>
<th>Professional task</th>
<th>Act and content</th>
<th>Condition</th>
<th>Criterion</th>
<th>Principal component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make the diagnosis of anaemia on the basis of a detailed - haematological picture described in the patient's records.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>++</td>
</tr>
<tr>
<td>2. Determine the health conditions of a family in its environment by making three home visits.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>++</td>
</tr>
<tr>
<td>3. During a prenatal consultation, recognize at least three major symptoms of pre-eclampsia.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>+</td>
</tr>
<tr>
<td>4. Give oral care with the available equipment (according to technical sheet X) to a patient continued to bed and conscious.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>+</td>
</tr>
<tr>
<td>5. Read one issue of a professional journal every fortnight, outside working hours. Criterion: write a summary (not more than 10 lines) of at least one of the articles.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>++</td>
</tr>
<tr>
<td>6. During a prenatal consultation, carry out examinations for detecting and preventing complications of pregnancy (according to technical sheet Y).</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>+</td>
</tr>
<tr>
<td>7. Make a survey (prepare questionnaires, carry out the survey, interpret the results) of the habits and customs of a population for the identification of those which represent a danger to health.</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>+</td>
</tr>
</tbody>
</table>
8. Give from memory two similar and two dissimilar characteristics concerning the immunological value of and the epidemiological indications for (a) inactivated, and (b) attenuated polio vaccines.

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>++</th>
</tr>
</thead>
</table>

9. Measure the length of a newborn baby, using an infant measuring board, with a maximum error of 1 cm.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>+ ++</th>
</tr>
</thead>
</table>

10. Identify by microscopic examination three of the following microorganisms: meningococcus; Hansen’s bacillus; human tubercle bacillus; gonococcus.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>+ ++</th>
</tr>
</thead>
</table>

11. Using an optical microscope (magnification 40), diagnose granulation tissue on a slide in five minutes, indicating at least five points of recognition present on the slide.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>+ ++</th>
</tr>
</thead>
</table>

12. Make a macroscopic diagnosis of a benign breast tumour in an operation specimen and indicate at least four characteristics of benignity observed.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>++</th>
</tr>
</thead>
</table>

Don’t forget!

The essential quality of educational objectives is their relevance to the health needs of society and to the professional profile.

1.65

The test of triviality of an educational objective is not in the words of that objective or in a statement of performance. It is in the consequence of not achieving the performance.

Mager In: Goal Analysis, p. 52

How to build in relevance and effectiveness in educational planning

1.66

Identification by students of priority health problems (PHP) in professional settings: community-based education (CBE)

1 CBE; see p. 3.67.

2 PBL: problem-based learning (pages 3.47 and 3.75).

Programme truly based on the community’s health problems and learner-centred

Some definitions

3 Sources: Oxford English Dictionary (o), Webster (w).

Role: Pattern of motives and goals, beliefs, values, attitudes and behaviour (played by a person in society) which one has to assume (o); functions performed
by someone (w); the role of a teacher.

**Function(s):** A set of *activities*, expected of a person by virtue of his position. *(The function of a chairman is to preside over meetings) (w).*

**Activity:** A combination of specific tasks whose fulfilment leads directly to the achievement of a function.

**Task(s):** Any piece of work that has to be done (o); a specific piece of work expected to be finished within a certain time; *a set of actions* necessary to the fulfilment of a given activity.

**Competence:** Ability required to carry out a task; sufficiency of qualification (o): the quality of being functionally adequate or having sufficient skill for a particular function; competence is a potential which is realized at the moment of performance.

**Performance:** The carrying out of a task: the doing of any *action* or work; the execution of an action.

**Action:** The process of doing, working (o).

**Skill:** Practical knowledge in combination with ability (o); dexterity in the execution of learned physical or intellectual tasks (w).

**Human values: something that goes without saying, but is all the better for being said.**

1.67

If the planners of the training programme wish to help the students to internalize a professional behaviour based on human values, it is important for the teachers and students to establish by consensus what is understood by these terms.

The following terms are put forward for you to think about.

**HUMAN VALUES**

- willingness
- readiness to accept advice
- flexibility
- discretion
- perseverance
- integrity
- resistance to stress
- genuineness
- sense of responsibility
- sensitivity
- openness to change
- tolerance

**HONESTY**

**EMPATHY**

**RESPECT**

**ACCEPTANCE OF ONE'S OWN LIMITATIONS**

In all our acts, human values are easier to describe than to demonstrate. They are not easy to measure either (see page 4.35). Students who lack these qualities at the outset of their studies are unlikely to acquire them later, and unfortunately they will sometimes encounter people who set a bad example by displaying the opposite qualities.

**EXERCISE**

1.68
1. Draw up **specific** educational objectives corresponding to **three** professional tasks that are familiar to you, stating explicitly what you feel the student should be able to do in relation to the general and intermediate objectives.

   If necessary, refer back to the section dealing with their essential qualities, pp. 1.48 - 1.62.

2. Identify the principal component of each objective (domain of practical, communication or intellectual skills).

3. Define the **criterion** indicating the **acceptable level of performance** for each objective.

   The student must be able to perform the following tasks:

   1st task

   2nd task

   3rd task

EXERCISE 1.69

4. For one of the tasks, describe the theoretical knowledge you think the student should have if he is to be capable of working towards the corresponding objective.

   Set out the content of this **prerequisite level** in the form of contributing **educational objectives**. Check that they include all the necessary elements (act and content, conditions, criteria).

   To show that he has the knowledge needed for task no ......., the student must be **able to**:

EXERCISE 1.70

5. For one of the tasks describe features of behaviour showing that the student has the communication skills you would regard as adequate were he responsible for a member of your own family. Describe this behaviour in terms of specific objectives.

   For task no ......., the student should have the attitude shown by the fact that he is able to:

EXERCISE 1.70

Check your Results
Indicate whether each of the specific objectives you have defined above satisfies the following conditions; use the flow chart on the next page.

It is really a professional task (or derived from one)? Has the principal domain been identified? Does it include the **four elements: act, content, condition and criterion**? (The criterion must relate to the principal component: communication skill (C), practical skill (P) or intellectual skill (I)).

<table>
<thead>
<tr>
<th>Objective No.</th>
<th>Professional Task</th>
<th>Act</th>
<th>Content</th>
<th>Condition</th>
<th>Criterion</th>
<th>Domain(s)</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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</tr>
</tbody>
</table>

1. Indicate the principal component by ++, others by +.

1.71

This flowchart is adapted from *The definition of training objectives.* Turin, Italy, International Centre for Professional and Technical Proficiency, 1985 (M.F.2.2.2.2/CMV/ILO).

The importance of a systematic approach


1.72

Experience has shown that the systematic approach described in this chapter may be used in designing educational programmes, in research planning and in practical health work, and this has some important implications:

The *relevance* of an educational programme for health personnel will increase if the programme is required to be based on the *health needs of the community*.

The methods used for the planning as well as the implementation of educational programmes influence the ways in which learners approach problem identification and analysis, plan their activities and *acquire problem-solving skills*.

The sharp difference that most often exists today between activities in the sphere of education/training and research and community health care will soon become artificial, and - it is to be hoped - will finally disappear.
When education becomes a more natural part of the research process, teachers will no doubt develop greater interest in improving their competence in educational principles and methods.

It will become natural to recognize that real educational competence is a very important part of academic qualification, which will no doubt help to raise the standard of education.

EXERCISE

1.73

Instructions: for each question select one answer. (Check your answers on p. 1.80)

Question 1.

Which of the following statements is in contradiction to the theories expounded in this chapter:

A. The change in behaviour resulting from a learning activity is called performance.

B. Final behaviour is the designation of the observable act which will be accepted as proof that the student has achieved a given educational objective.

C. The definition of the objective of a course is a description or summary of the programme.

D. The teaching intent explained by the educational objective indicates what should be the final behaviour of the student.

E. None of the above statements.

Question 2.

An educational objective corresponds to all the following elements except one. Indicate which:

A. It is sometimes also called a learning objective.

B. It defines explicitly what the teacher should do.

C. It should be the basis for the preparation of the students’ timetable.

D. It can be general or specific.

E. It is defined in behavioural terms corresponding to the taste to be accomplished.

Question 3.

Mager stresses the need to define educational objectives in operational terms (description of the type of behaviour aimed at). Among the following qualities select the one which does not correspond to one of the advantages sought by this technique.

A. It enables the student to evaluate his progress throughout his period of learning.
B. It enables the instructor to choose relevant examination questions.

C. It enables the instructor to make a satisfactory choice of teaching methods.

D. It enables the student to acquire a thorough knowledge of the content, organization and timetable of a course.

E. It enables the student to show clearly, at the end of the course, whether or not he has acquired specific types of behaviour.

**Question 4.**

A specific educational objective has all the following qualities **except one**. Indicate which:

A. It clearly communicates an educational intent.

B. It makes objective evaluation possible.

C. It defines a measurable behaviour.

D. It establishes success criteria.

E. It facilitates analysis of functions and tasks.

**Question 5.**

Indicate which of the following statements **does not correspond** to the principles of rational and effective educational planning:

A. Institutional objectives should be defined before selecting a student evaluation system.

B. Institutional objectives should be derived from the objectives of the various departments of a school.

C. Regional health needs should be considered before drawing up an educational system for training members of the health team.

D. Educational objectives should be defined before selecting educational methods and learning activities.

E. National resources and budgetary constraints should be taken into account before defining general objectives.

**Questions 6 to 11.**

There have been numerous classifications of educational objectives. One of them considers three domains:

1. domain of communication skills.
2. domain of practical skills.
3. domain of intellectual skills.

Using the following code:

A = 1  D = 1 and 3
B = 2  E = 2 and 3
C = 3
Indicate the domain(s) to which the following objectives correspond:

**Question 6.**

The student should be able to name four new ideas concerning tuberculosis control.

**Question 7.**

The student should be able to measure the length of a newborn infant with a maximum error of 1 cm.

**Question 8.**

The student should be able, when contraceptives are requested by an 18-year-old girl, to give information on four available methods without expressing any moral judgement.

**Question 9.**

The student should be able to avoid giving guilt feelings to a five-year-old enuretic child.

**Question 10.**

The student should be able to construct, using simple data already tabulated, a histogram including title, coordinates and additional details without any mistake in the curve.

**Question 11.**

The student should be able to make a health education poster for an anti-smoking campaign, given a model and the necessary materials (paper, felt, charcoal, coloured pencils, glue, scissors).

**Question 12.**

Indicate which of the following definitions corresponds to the prerequisite level:

A. What the student should be able to do at the end of the curriculum.

B. What the teacher should summarize before every course so as to place all the students on the same level.

C. The level reached by the student while pursuing an educational objective.

D. What the student should be able to do before undertaking an educational programme.

E. None of the above.

**Question 13.**

Which of the following statements best corresponds to the educational aim to be achieved:

A. The student is perfectly familiar with the anatomical structure of the thorax.
B. The student appreciates the approach centred on the basic needs of the patient.

C. The student describes in writing the various steps of a nursing care plan in relation to the needs of a patient.

D. The student has a thorough knowledge of the differences between a normal and a premature infant.

E. The student has a thorough understanding of professional ethics.

**Question 14.**

Indicate which of the following statements includes the four elements of an educational objective:

A. The teacher will give five one-hour lectures to a group of 20 undergraduate students. The lectures will deal with the physiopathological mechanisms of the inflammatory process.

B. During a simulation exercise, the student will give a brief written definition of the problem (at least 25 words) and list at least three alternative solutions, indicating which he would adopt and giving the reasons for his choice.

C. The student will show his knowledge of the mechanism of the action of aspirin on the subcortical cells.

D. Using an optical microscope (magnification 40), the student will diagnose granulation tissue in five minutes, indicating at least four diagnostic elements present on the slide.

E. The student will demonstrate to his teacher, at the patient’s bedside, that he has a good grasp of clinical method and sound critical judgement, without any prejudice to his relationship to the patient.

**Questions 15 - 20.**

Instructions. The following statement comprises certain elements numbered 1 to 4. Using the code given below, select the element(s) that correspond to each of questions 15 - 20.

(1) Repair (2) a binocular microscope (brand X, Y or Z) (3) having been informed of the defect and given a descriptive diagram (of brand X, Y or Z), appropriate tools and spare parts, (4) so that the microscope functions according to specifications.

A 1 E 1, 2
B 2 F 1, 2, 3
C 3 G 1, 2, 3, 4
D 4

Questions 15. Which is the task?

16. Which is the act?

17. Which is the specific educational objective?

18. Which is the content?
19. Which is the condition?

20. Which is the criterion?

If you help each learner to develop his/her learning objectives, you may not have to do much more than to check that these objectives have been attained.

adapted from Mager

What if it were true?.....

1.77

Notice to the reader

1.78

With some effort you have probably been able to reach most of the objectives indicated on page 1.02; this is the first and most important step but there is still a long way to go. Even to assist the students to define the specific objectives of their future professional activities will be a long job. And after that you must make sure that they correspond to the professional profile, whether explicit or not... and it would be reassuring to know that this profile is really geared to the health problems of tomorrow's population. Never forget relevance! And that is not all! Recent studies seem to show that teachers do not know how to use the educational objectives they have defined. There is no point in defining thousands of specific objectives if they are not then used as a reference for preparing the educational activities which will lead to their achievement.

There are other awkward questions. Do the objectives you have defined really reflect what is important or merely what is relatively easy to set out in the form of objectives? Will they really help the students, and will the latter be better trained than if ... etc.

You will be faced with these arguments sooner or later, probably by those who make no attempt to define their own objectives or to learn how to use them. Whatever the limits and drawbacks of this approach it has the undeniable advantage of enabling studies to be made and research to be carried on. To find replies to the questions raised above and many others there is an urgent need for research whose scientific rigour will increase the credibility of the arguments, theories and hypotheses put forward by education specialists. For, however logical arguments may be, they must be backed up by some proof. Thus any attempt at dogmatism in this field or insistence on defining objectives at all costs should be avoided. These indispensable studies will call for considerable experimentation.

You can help in carrying out such experiments.

If all this has not discouraged you, go on to the next chapter. Good luck!

It would be dangerous to measure with ever-increasing precision and objectivity educational objectives that are easy to measure (intellectual skills) and to neglect the more difficult ones (communication skills): what must be measured are those that are important for the patient and the community.

And don't forget

principle no. 1

community-oriented education is education oriented towards the community as well as the individual, taking account of the health needs of each particular collectivity.
and principle no. 2

learner-centred education keeps students in an active situation, gradually helping them to become the architects of their own learning activities.

1.79

Suggested answers for the exercise on pages 1.73 - 1.76

1.80

<table>
<thead>
<tr>
<th>Questions</th>
<th>Suggested Answers</th>
<th>If you did not give the right answer, reread the following pages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C</td>
<td>1.03 to 1.48</td>
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<tr>
<td>2</td>
<td>B</td>
<td>1.03 to 1.48</td>
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<tr>
<td>3</td>
<td>D</td>
<td>1.03 to 1.48</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>C</td>
<td>1.49 to 1.54</td>
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<td>G</td>
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<td>1.61 to 1.66</td>
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<tr>
<td>19</td>
<td>C</td>
<td>1.61 to 1.66</td>
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<tr>
<td>20</td>
<td>D</td>
<td>1.61 to 1.66</td>
</tr>
</tbody>
</table>

Personal notes

Chapter 2: Evaluation planning

2.01

Evaluation planning

2.02

This second chapter presents basic concepts in the field of educational evaluation. It stresses the very close relationship between evaluation and definition of educational objectives; and the primary role of any evaluation, which is to facilitate decision-making by those responsible for an educational system. It defines the subject, the purpose, the goals and the stages of evaluation and highlights the concepts of validity and relevance.

Those who would like to learn more about these problems should consult the following publications:

Development of educational programmes for the health professions. WHO, 1973 (Public Health Papers No. 52).
After having studied this chapter and the reference documents mentioned you should be able to:

1. Draw a diagram showing the relationship between evaluation and the other parts of the educational process.

2. Define the principal role of evaluation, its purpose and its aims.

3. Describe the difference between formative and certifying evaluation.

4. List the good and bad features of a test.

5. Compare the advantages and disadvantages of tests in current use.

6. Define the following terms: validity, reliability, objectivity, and describe the relationship that exists between them.

7. Choose an appropriate evaluation method (questionnaire, written examination, objective test [MCQ or short-answer questions] or essay question, oral examination, direct observation, etc.) for measuring the students' attainment of a specific educational objective. Compare the alternatives in a specification table.

8. Define (in the form of an organizational diagram) the organization of an evaluation system suitable for your establishment, and list the stages involved.

Indicate:

(a) the most important educational decisions you have to take;

(b) the data to be collected to provide a basis for those decisions;

(c) the aims of the system and sub-systems in terms of decisions to be taken and the object of each decision (teachers, students, programmes).

9. Identify obstacles to and strategies for improvement of a system of evaluating students, teachers and programmes.

To change curricula or instructional methods without changing examinations would achieve nothing!

Changing the examination system without changing the curriculum had a much more profound impact upon the nature of learning than changing the curriculum without altering the examination system.

G.E. Miller

1

2.03

1 International Medical Symposium No. 2. Rome. 23-26 March 1977.
What is evaluation?

2.04

An analysis of educational innovations all over the world confirms G. Miller’s opinion. In this second chapter, therefore, you are invited to plan a system of evaluation that can be used as a basis for preparation and implementation of a programme. The process is already under way, for the formulation of specific educational objectives requires definition of criteria indicating the minimum level of performance expected from the student. Educational decisions have to be made frequently during preparation and implementation of a programme; and the main purpose of evaluation is in fact to provide a basis for value judgements that permit better educational decision-making. First of all you must decide what you want to evaluate: students, teachers and/or programmes. In each case you must determine what important educational decisions you will be expected to make in your capacity as teacher or administrator, for the instruments and mechanisms of evaluation providing data for value judgements will be developed and used according to the type of decision required. A general methodology of evaluation and corresponding techniques do exist. Some are simple; others very complex and costly in time and money. Here again you will make your choice according to criteria that will ensure an adequate level of security. As in every educational process, you will have to shape all the consequences of your decisions into a coherent and logical whole. You are therefore invited to read the next pages before doing the exercise on p. 2.09.

The person who sets the examination controls the programme.

Education by objectives is not possible unless examinations are constructed to measure attainment of those objectives.

The educational planning spiral

2.05

The evaluation process provides a basis for value judgements that permit better educational decision-making

2.06

Notice to all teachers

You are reminded that evaluation of education must begin with a clear and meaningful definition of its objectives, as derived from the priority health problems and the professional profile

2.07

Evaluation ........................................ of whom?

of what?

Students

Teachers

Programmes and courses

........................................ in relation to what?

In relation to educational objectives.

(They are the common denominator.)

2.08

EXERCISE
Before starting to define the organization, stages or methods of an evaluation system suitable for the establishment in which you are teaching, it would be useful to state:

What important educational decisions* you think you and your colleagues will be taking over the next three years.

* Examples of educational decisions:

- to decide which students will be allowed to move up from the first to the second year
- or to decide to purchase an overhead projector rather than a blackboard
- or to decide to appoint Mr X full professor
- or to decide:

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You and your colleagues will have to make value judgements as a basis for each decision. It will therefore be useful to plan the construction and use of instruments of evaluation that will enable you to collect the data needed for making those value judgments (see pp. 2.40 and 2.41).

Personal notes

2.10

Evaluation - a few assumptions


2.11

Education is a process, the chief goal of which is to bring about changes in human behaviour.

The sorts of behavioural changes that the school attempts to bring about constitute its objectives.
Evaluation consists of finding out the extent to which each and every one of these objectives has been attained, and determining the quality of the teaching techniques used and of the teachers.

**Assumptions underlying basic educational measurement and evaluation**

2.12

1 See footnote to page 2.11.

Human behaviour is so complex that it cannot be described or summarized in a single score.

The manner in which an individual organizes his behaviour patterns is an important aspect to be appraised. Information gathered as a result of measurement or evaluation activities must be interpreted as a part of the whole. Interpretation of small bits of behaviour as they stand alone is of little real meaning.

The techniques of measurement and evaluation are not limited to the usual paper-and-pencil tests. Any bit of valid evidence that helps a professor or counsellor in better understanding a student and that leads to helping the student to understand himself better is to be considered worth while.

Attempts should be made to obtain all such evidence by any means that seem to work.

The nature of the measurement and appraisal techniques used influences the type of learning that goes on in a classroom. If students are constantly evaluated on knowledge of subject-matter content, they will tend to study this alone. Professors will also concentrate their teaching efforts upon this. A wide range of evaluation activities covering various objectives of a course will lead to varied learning and teaching experiences within a course.

The development of any evaluation programme is the responsibility of the professors, the school administrators, and the students. Maximum value can be derived from the participation of all concerned.

**The philosophy of evaluation**

1 See footnote to page 2.11.

2.12

1. Each individual should receive the education that most fully allows him to develop his potential.

2. Each individual should be so placed that he contributes to society and receives personal satisfaction in so doing.

3. Fullest development of the individual requires recognition of his essential individuality along with some rational appraisal by himself and others.

4. The judgements required in assessing an individual’s potential are complex in their composition, difficult to make, and filled with error.

5. Such error can be reduced but never eliminated. Hence any evaluation can never be considered final.

6. Composite assessment by a group of individuals is much less likely to be in error than assessment made by a single person.
7. The efforts of a conscientious group of individuals to develop more reliable and valid appraisal methods lead to the clarification of the criteria for judgement and reduce the error and resulting wrongs.

8. Every form of appraisal will have critics, which is a spur to change and improvement.

The psychology of evaluation

1 See footnote to page 2.11.

2.13

1. For evaluation activities to be most effective, they should consist of the best possible techniques, used in accordance with what we know to be the best and most effective psychological principles.

2. For many years readiness has been recognized as a very important prerequisite for learning. A student is ready when he understands and accepts the values and objectives involved.

3. It has long been known that people tend to carry on those activities which have success associated with their results. This has been known as Thorndike's Law of Effect. Students in any classroom soon come to realize that certain types of behaviour are associated with success - in this case, high marks on a test or grades in a course. Thus, if a certain teacher uses tests that demand rote memory, the students will become memorizers. If a test, on the other hand, requires students to apply principles, interpret data, or solve problems, the students will study with the idea of becoming best fitted to do well on these types of test items. In the long run, the type of evaluation device used determines, to a great extent, the type of learning activity in which students will engage in the classroom.

4. Early experiments in human learning showed that individuals learn better when they are constantly appraised in a meaningful manner as to how well they are doing.

5. The motivation of students is one of the most important - and sometimes the most difficult to handle - of all problems related to evaluation. It is redundant for us to say that a person's performance on a test is directly related to his motivation. Research has shown that when a student is really motivated, performance is much closer to his top performance than when motivation is lacking.

6. Learning is most efficient when there is activity on the part of the learner.

EXERCISE

Try to answer question 3 on p. 2.45.
Check your answer on p. 2.48.

Evaluation is

a continuous process

based upon criteria

cooperatively developed

concerned with measurement of the performance of learners, the effectiveness of teachers and the quality of the programme

1
This chapter is mainly concerned with the evaluation of students. Evaluation of programmes and teachers is dealt with in chapter 4.

2.14

Continuous evaluation formative and certifying evaluation

2.15

You will find the following equivalents in the literature for these two expressions:

<table>
<thead>
<tr>
<th>Formative evaluation</th>
<th>Certifying evaluation</th>
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<tbody>
<tr>
<td>or diagnostic evaluation</td>
<td>or summative evaluation</td>
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</table>

Evaluation of education must begin with a clear and meaningful definition of its objectives. We cannot measure something unless we have first defined what it is we wish to measure.

When this phase of evaluation (the definition of objectives) has been properly completed, the choice or development of suitable evaluation procedures is that much easier. Schematically represented, the educational planning spiral (p. 2.05) comprises the determination of objectives, the planning of an evaluation system, the development of teaching activities and the implementation of evaluation procedures with possible revision of objectives.

The role of evaluation should not be limited to one of penalization. It should not be just a series of only too frequent obstacles which the students are supposed to get over and which become their sole subject of concern, the actual instruction becoming quite secondary. Under these circumstances the student’s only interest is how to obtain his diploma with least effort. It is the teacher’s responsibility to convince the student that his education is directed towards wider aims than merely gaining a diploma and that helping him to do so is not the sole purpose of evaluation (see p. 2.18 and 2.19).

Evaluation should also be formative, providing the student with information on his progress. It must therefore be continuously possible. This concept has often been misinterpreted, resulting in constant harassment of the student. There is a fundamental difference between formative and certifying evaluation. In both cases the evaluation tools must have the same level of difficulty and discrimination (see pp. 4.77-4.81).

Strict Rule

Evaluation should in no way be used by the teacher against the student.

Formative evaluation


2.16

- is designed to inform the student about the amount he still has to learn before achieving his educational objectives;
- measures the progress or gains made by the student from the moment he begins a programme until the time he completes it;

- enables learning activities to be adjusted in accordance with progress made or lack of it; it is therefore a teaching method;

- is very useful in guiding the student in his own learning and prompting him to ask for help;

- is controlled in its use by the student (results should not appear in any official record);

- is carried out frequently - as often as the student feels necessary;

- should in no way be used by the teacher to make a certifying judgement; the anonymity of the student should be safeguarded by use of a code of his choice. A coding system makes it possible to follow the progress of individuals and groups while preserving anonymity;

- provides the teacher with qualitative and quantitative data for modification of his teaching (particularly contributory educational objectives) or otherwise.

Certifying evaluation

- is designed to protect society by preventing incompetent personnel from practising;

- is traditionally used for placing students in order of merit and justifying decisions as to whether they should move up to the next class or be awarded a diploma;

- is cumulative, and carried out less frequently than formative evaluation, but at least at the end of a unit or period of instruction.

EXERCISE

Try to answer questions 4 - 8 on p. 2.45.
Check your answers on p. 2.48.

We don’t care how hard the student tried, we don’t care how close he got... until he can perform he must not be certified as being able to perform.

R.F. Mager

Continuous evaluation must pit the student against himself and his own lack of competence and not against other students.

Evaluation of what?

2.17

Elements needed for the construction of an evaluation system

Evaluation should be built into all phases of programme construction. The following elements should be taken into consideration: firstly, the context in which the programme is being prepared, then the various inputs to the programme and, finally, the educational process and the performance of the learners.

1. Planning the evaluation of situation analysis and the identification of priority health problems (context)

Evaluation of the context is concerned with the initial decisions of importance for the educational programme. It is linked to the situation analysis where all the information of importance for the programme is available. If the information
available is not satisfactory, it may be necessary to collect further information in order to arrive at the right educational decisions. This may include analysis of factors in the learners’ potential job environment, selection of various job descriptions and employers’ opinions on the performance of earlier students in their jobs. The analysis made in chapter 1 could thus be part of a context evaluation. The climate that exists in relation to the programme, the content, the methods, and resources used in the programme are all contextual aspects of importance for the planning stage.

2. Planning the evaluation of the human and material resources to be used and the elements to be included in the programme (the inputs)

At all stages of the learning process there are educational decisions to be taken by teachers. It is therefore important to make sure that teachers are competent and comfortable with the teaching methodology to be used (i.e. problem-based education), and if not, that they are given the training required; some kind of evaluation must also be planned to discourage teachers from putting students in a passive learning situation; and the programme itself must be subjected to careful scrutiny before it is actually implemented.

3. Planning the monitoring of implementation (the educational process)

An evaluation system must also plan how the implementation of the programme is to be monitored. This should detect the need for modification or replacement of any of the teaching/learning activities in the programme.

4. Planning the evaluation of learners (the output)

The central component of an evaluation system is the evaluation of the learners’ performance. At this stage of planning, decisions must be made on the establishment of an evaluation committee, identification of persons to prepare instruments of evaluation, and the various administrative arrangements to be made for the evaluation of the learners’ performance.

As this element is of paramount importance, we shall examine it next.

Student evaluation: what for?

2.18

The numbers on the left refer to the exercise on this page and the questions on p. 2.46.

9 Incentive to learn (motivation)  
10 Feedback to student  
11 Modification of learning activities  
12 Selection of students  
13 Success or failure  
14 Feedback to teacher  
15 School public relations  
16 Protection of society (certification of competence)  
EXERCISE

Now try it ... indicate for each of the aims of evaluation (numbered 9-16) whether the measurement technique will be of the certifying evaluation type (C) or both certifying and formative evaluation (CF). Check your answers on p. 2.48.
Aims of student evaluation


1. To determine success or failure on the part of the student. This is the conventional role of examinations (certifying evaluation).

2. To provide feedback for the student: to keep him constantly informed about the instruction he is receiving; to tell him what level he has reached; and to make him aware through the examination of what parts of the course he has not understood (formative and certifying evaluation).

3. To provide feedback for the teacher: to inform him whether a group of students has not understood what he has been trying to explain. This enables him to modify his teaching where necessary to ensure that what he wishes to communicate to the students is correctly understood (formative and certifying evaluation).

4. The reputation of the school is something of which the importance is not always evident, at least in European schools, whose reputation is often based not on an examination system but on long-standing traditions. North American schools, on the other hand, customarily publish the percentage of students who have passed, for example, national examinations (formative and certifying evaluation).

Why does an educational programme fail?

To begin instruction before a proper system of evaluation has been constructed is likely to be a waste of effort, time and other resources. All educational programmes will experience failures and problems at some time. Without proper evaluation of all its elements for formative purposes, you might have difficulty in understanding why the programme has failed. But one of the advantages of a system of continuous evaluation is that you will usually be able to prevent failures. Romiszowski (1984) has pointed out that promising new instructional systems have been known to fail because no account has been taken of this simple principle (formative evaluation). Once the initial field-testing stage has come to a close, yielding excellent results, a project enters its final phase of regular, large-scale use and, slowly, a form of drift takes place, carrying it further and further away from the changing reality in which it was implanted. Thus, as in the case of an alien organ implanted without due care in a living organism, a rejection phase is reached and the new instructional system is eliminated, killed off by the antibodies in its environment. The way to avoid rejection of an implanted sub-system is to maintain a high level of compatibility between the new system and older, more established systems in its environment. As these are in constant change, the new system must also constantly adapt itself.

Four steps in student evaluation

Once you are satisfied with the quality of the criteria (acceptable level of performance) of the educational objectives, develop and use measuring instruments.
Interpret measurement data

Formulate judgements and take appropriate action

Common methodology for student evaluation


2.21

Evaluation of practical skills
Evaluation of communication skills
Evaluation of knowledge and intellectual skills

1. Make a list of observable types of behaviour showing that the objective pursued has been reached.

2. Make a list of observable types of behaviour showing that the objective pursued has not been reached.

3. Determine the essential features of behaviour in both lists.

4. Assign a positive or negative weight to the items on both lists.

5. Decide on the acceptable performance score.

* For the last three stages obtain the agreement of several experts.

Example. **Objective:** Reassure the mother of a child admitted to hospital

<table>
<thead>
<tr>
<th>Attitude</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain clearly what has been done to the child</td>
<td>often uses medical terms and never explains what they mean</td>
<td>often uses medical terms and rarely explains what they mean</td>
<td>rarely uses medical terms and sometimes explains what they mean</td>
<td>rarely uses medical terms and always explains what they mean</td>
<td>uses only terms suited to the mother’s vocabulary</td>
</tr>
</tbody>
</table>

etc. See the complete table on p. 4.32.

**Minimum Performance Score:** The student should score n marks out of 10 on the rating scale.

**EXERCISE**

2.21

Try to answer questions 17 - 20 on p. 2.46 and check your answers on p. 2.48.

Evaluation methodology according to domains to be evaluated

2.22

**EXERCISE**

2.23
For each of the educational objectives you have already defined (pp. 1.68, 1.69), choose from among the methods of evaluation set out on p. 2.22 the one you think most suitable for informing you and the student on the extent to which the objective has been achieved.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Method Of evaluation</th>
<th>Instrument of evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 page 1.68</td>
<td>Indirect method</td>
<td>Short, open-answer question based on the patient's record</td>
</tr>
<tr>
<td>EXAMPLES 2 page 1.68</td>
<td>Indirect method</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>3 page 1.68</td>
<td>Direct observation</td>
<td>Practical examination</td>
</tr>
</tbody>
</table>

For the purposes of this exercise the total number of students to be considered should be fixed: e.g., 100, or any other number that is realistic in your situation.

**Personal notes**

2.24

**General remarks concerning examinations**

2.25

Analysis of the most commonly used tests shows that sometimes, often even, the questions set are ambiguous, unclear, disputable, esoteric or trivial. It is essential for anyone constructing an examination, whether of the traditional written type, an objective test or a practical test, *to submit it to his colleagues for criticism* to make sure that its content is relevant (related to an educational objective) and of general interest, and does not exclusively concern a special interest or taste of the author; that the subject is interesting and real for the general practitioner or the physicians with a specialty different from that of the author; and that the questions (and the answers in the case of multiple-choice questions) are so formulated that experts can agree on the correct response. It is clear that a critical analysis along these lines would avoid the oversimplification of many tests which only too often justifies the conclusion: the more you know about a question the lower will be your score.

The author of a test *is not* the best judge of its clarity, precision, relevance and interest. *Critical review of the test by colleagues is consequently essential for its sound construction.*

Moreover, an examination must take the factor of *practicability* into account. This will be governed by the *time necessary* for its construction and administration, scoring and interpretation of the results, and by its general ease of use.

If the examination methods employed become a burden on the teacher because of their impractical nature he will tend not to assign to the measuring instrument the importance it deserves.

*A discussion is not always pertinent to the problem at hand, but one learns to allow for some rambling. It seems to help people realize that they normally use quite a few fuzzies during what they consider technical discussions; it helps*
them realize that they don’t really know what they are talking about... a little rambling helps clear the air. Asking someone to define his goal in terms of performance is a little like asking someone to take his clothes off in public - if he hasn’t done it before, he may need time to get used to the idea.

R.F. Mager

Qualities of a test

2.26

Directly related to educational objectives
Realistic and practical
Concerned with important and useful matters
Comprehensive but brief
Precise and clear

Judge the consequences of the student’s not achieving the objective by answering such questions as: If he cannot perform the objective when he leaves my instruction he is likely to...... The answer should help you decide how much energy to put into constructing a valid evaluation system to find out whether the objective is achieved as written.

R.F. Mager

Considerations of the type of competence a test purports to measure

2.27

No test format (objective, essay or oral) has a monopoly on the measurement of the highest and more complex intellectual processes. Studies of various types of tests support the view that the essay and the oral examination, as commonly employed, test predominantly simple recall and, like the objective tests in current use, rarely require the student to engage in reasoning and problem-solving. In short, the form of a question does not necessarily determine the nature of the intellectual process required to answer it.

Second, there is often a tendency to confuse the difficulty of a question with the complexity of the intellectual process measured by it. However, it should be noted that a question requiring simple recall may be very difficult because of the esoteric nature of the information demanded; alternatively, a question requiring interpretation of data or application of principles could be quite easy because the principles of interpretation are so familiar and the data to be analysed so simple. In short, question difficulty and complexity of instructions are not necessarily related to the nature of the intellectual process being tested.

Third, there is often a strong inclination to assume that any question which includes data about a specific case necessarily involves problem-solving, whereas, in fact, data are often merely window dressing when the question is really addressed to a general condition and can be answered equally well without reference to the data. Or, the data furnished about a specific case may constitute a cut-and-dried, classical textbook picture that, for example, simply requires the student to recall symptoms associated with a specific diagnosis. It is interesting to note that questions of this type can readily be converted into problems that do require interpretation of data and evaluation, simply by making the case material conform more closely to the kind of reality that an actual case, rather than a textbook, presents.

In short, just as each patient in the ward or outpatient department represents a unique configuration of findings that must be analysed, a test that purports to measure the student’s clinical judgement and his ability to solve clinical problems must simulate reality as closely as possible by presenting him with
specific constellations of data that are in some respects unique and, in that
sense, are new to him. Do not try to use a MCQ or a SOAQ to find out whether the
student is able to communicate orally with a patient!

A review of examinations currently in use strongly suggests that the most common
defects of testing are:

<table>
<thead>
<tr>
<th>Defect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triviality</td>
<td>the triviality of the questions asked, which is all the more serious in that examination questions can only represent a small sample of all those that could be asked. Consequently it is essential for each question to be important and useful;</td>
</tr>
<tr>
<td>Outright error</td>
<td>outright error in phrasing the question (or, in the case of multiple-choice questions, in phrasing the distractors and the correct response);</td>
</tr>
<tr>
<td>Ambiguity</td>
<td>ambiguity in the use of language which may lead the student to spend more time in trying to understand the question than in answering it; in addition to the risk of his giving an irrelevant answer;</td>
</tr>
<tr>
<td>Obsolescence</td>
<td>forcing the student to answer in terms of the outmoded ideas of the examiner, a bias which is well known and often aggravated by the teaching methods themselves (particularly traditional lectures);</td>
</tr>
<tr>
<td>Bias</td>
<td>requesting the student to answer in terms of the personal preferences of the examiner when several equally correct options are available;</td>
</tr>
<tr>
<td>Complexity</td>
<td>complexity or ambiguity of the subject matter taught, so that the search for the correct answer is more difficult than was anticipated;</td>
</tr>
<tr>
<td>Intended cues</td>
<td>unintended cues in the formulation of the questions that make the correct answer obvious; this fault, which is often found in multiple-choice questions, is just as frequent in oral examinations.</td>
</tr>
</tbody>
</table>

Outside factors to be avoided

In constructing an examination, outside factors must not be allowed to interfere with the factor to be measured.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complicated instructions (ability to understand instructions)</td>
<td>In some tests, the instructions for students on how to solve the problems are so complicated that what is really evaluated is the students’ aptitude to understand the question rather than their actual knowledge and ability to use it. This criticism is often made of multiple-choice examinations in which the instructions appear too complicated. The complexity is often more apparent than real and disturbs the teacher rather than the student.</td>
</tr>
<tr>
<td>Over-elaborate style (ability to avoid traps)</td>
<td>The student may disguise his lack of knowledge in such elegant prose that he succeeds in influencing the corrector, who judges the words and style rather</td>
</tr>
</tbody>
</table>
than the student's knowledge.

**Trap questions (ability to use words)**

This type of interference does not depend on a measuring instrument, but on possible sadistic tendencies on the part of the examiner who, during an examination, may allow himself to be influenced by the candidate's appearance, sex, etc. Some candidates are more or less skilled at playing on these tendencies.

**Test-wise**

This is a criticism that is generally made of multiple-choice examinations; it may in fact be applied to other forms of evaluation. In oral and written examinations, students develop a sixth sense, often based on statistical analysis of past questions, which enables them somehow to predict the questions that will be set.

**Comparison of advantages and disadvantages of different types of test**

2.30

<table>
<thead>
<tr>
<th>Oral examinations</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide direct personal contact with candidates.</td>
<td>1. Lack standardization.</td>
<td></td>
</tr>
<tr>
<td>2. Provide opportunity to take mitigating circumstances into account.</td>
<td>2. Lack objectivity and reproducibility of results.</td>
<td></td>
</tr>
<tr>
<td>3. Provide flexibility in moving from candidate's strong points to weak areas.</td>
<td>3. Permit favouritism and possible abuse of the personal contact.</td>
<td></td>
</tr>
<tr>
<td>4. Require the candidate to formulate his own replies without cues.</td>
<td>4. Suffer from undue influence of irrelevant factors.</td>
<td></td>
</tr>
<tr>
<td>5. Provide opportunity to question the candidate about how he arrived at an answer.</td>
<td>5. Suffer from shortage of trained examiners to administer the examination.</td>
<td></td>
</tr>
<tr>
<td>6. Provide opportunity for simultaneous assessment by two examiners.</td>
<td>6. Are excessively costly in terms of professional time in relation to the limited value of the information yielded.</td>
<td></td>
</tr>
</tbody>
</table>

Unfortunately all these advantages are rarely used in practice.

<table>
<thead>
<tr>
<th>Practical examinations, projects</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide opportunity to test in a realistic setting skills involving all the senses while the examiner observes and checks performance.</td>
<td>1. Lack standardized conditions in laboratory experiments using animals, in surveys in the community or in bedside examinations with patients of varying degrees of cooperativeness.</td>
<td></td>
</tr>
<tr>
<td>2. Provide opportunity to confront the candidate with problems he has not met before both in the laboratory and at the bedside, to test his investigative ability as opposed to his ability to apply ready-made recipes.</td>
<td>2. Lack objectivity and suffer from intrusion or irrelevant factors.</td>
<td></td>
</tr>
<tr>
<td>3. Provide opportunity to observe and test attitudes and responsiveness to a complex situation (videotape recording).</td>
<td>3. Are of limited feasibility for large groups.</td>
<td></td>
</tr>
<tr>
<td>4. Provide opportunity to test the ability to communicate under pressure, to discriminate between important and trivial issues, to arrange the data in a final form.</td>
<td>4. Entail difficulties in arranging for examiners to observe candidates demonstrating the skills to</td>
<td></td>
</tr>
</tbody>
</table>
Essay examinations

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide candidate with opportunity to demonstrate his knowledge and his ability to organize ideas and express them effectively.</td>
<td>1. Limit severely the area of the student’s total work that can be sampled.</td>
</tr>
<tr>
<td></td>
<td>2. Lack objectivity.</td>
</tr>
<tr>
<td></td>
<td>3. Provide little useful feedback.</td>
</tr>
<tr>
<td></td>
<td>4. Take a long time to score.</td>
</tr>
</tbody>
</table>

Multiple-choice questions

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ensure objectivity, reliability and validity; preparation of questions with colleagues provides constructive criticism.</td>
<td>1. Take a long time to construct in order to avoid arbitrary and ambiguous questions.</td>
</tr>
<tr>
<td>2. Increase significantly the range and variety of facts that can be sampled in a given time.</td>
<td>2. Also require careful preparation to avoid preponderance of questions testing only recall.</td>
</tr>
<tr>
<td>3. Provide precise and unambiguous measurement of the higher intellectual processes.</td>
<td>3. Provide cues that do not exist in practice.</td>
</tr>
<tr>
<td>4. Provide detailed feedback for both student and teachers.</td>
<td>4. Are costly where number of students is small.</td>
</tr>
<tr>
<td>5. Are easy and rapid to score.</td>
<td></td>
</tr>
</tbody>
</table>


It is a highly questionable practice to label someone as having achieved a goal when you don’t even know what you would take as evidence of achievement.

R.F. Mager

Personal notes

2.32

Evaluation in education qualities of a measuring instrument

2.33

1. Some definitions

1.1 Education is defined as a process developed for bringing about changes in the student’s behaviour. At the end of a given learning period there should be a greater probability that types of behaviour regarded as desirable will appear; other types of behaviour regarded as undesirable should disappear.

1.2 The educational objectives define the desired types of behaviour taken as a whole; the teacher should provide a suitable environment for the student’s acquisition of them.

1.3 Evaluation in education is a systematic process which enables the extent to which the student has attained the educational objective to be measured. Evaluation always includes measurements (quantitative or qualitative) plus a value judgement.
1.4 To make measurements, *measuring instruments* must be available which satisfy *certain requirements* so that the results mean something to the teacher himself, the school, the student and society which, in the last analysis, has set up the educational structure.

1.5 In education, measuring instruments are generally referred to as tests.

2. **Qualities of a measuring instrument**

Among the qualities of a test, whatever its nature, four are essential, namely, *validity*, *reliability*, *objectivity* and *practicability*. Others are also important, but they contribute in some degree to the qualities of validity and reliability.

2.1 **Validity**: the extent to which the test used really measures what it is intended to measure. No outside factors should be allowed to interfere with the manner in which the evaluation is carried out. For instance, in measuring the ability to synthesize, other factors such as style should not compete with the element to be measured so that what is finally measured is style rather than the ability to synthesize.

The notion of validity is a very relative one. It implies a concept of degree, i.e., one may speak of *very valid*, *moderately valid* or *not very valid* results.

The concept of validity is *always specific for a particular subject*. For example, results of a test on public health administration may be of very high validity for identification of the needs of the country and of little validity for a cost/benefit or cost/efficiency analysis.

*Content validity* is determined by the following question: will this test measure, or has it measured, the matter and the behaviour that it is intended to measure?

*Predictive validity* is determined by questions such as the following when the results of a test are to be used for predicting the performance of a student in another domain or in another situation:

- To what extent do the results obtained in physiology help to predict performance in pathology?

- To what extent do the results obtained during the pre-clinical years help in predicting the success of students during the clinical years?

2.2 **Reliability**: this is the consistency with which an instrument measures a given variable.

Reliability is always connected with a particular type of consistency: the consistency of the results in time; consistency of results according to the questions; consistency of the results according to the examiners.

Reliability is a necessary but not a sufficient condition for validity. In other words, valid results are necessarily reliable, but reliable results are not necessarily valid. Consequently, results that are not very reliable affect the degree of validity. Unlike validity, reliability is a *strictly statistical concept* and is expressed by means of a reliability coefficient or through the
standard error of the measurements made.

Reliability can therefore be defined as the degree of confidence that can be placed in the results of an examination. It is the consistency with which a test gives the results expected.

2.3 Objectivity: this is the extent to which several independent and competent examiners agree on what constitutes an acceptable level of performance.

2.4 Practicability depends upon the time required to construct an examination, to administer and score it, and to interpret the results, and on its overall simplicity of use. It should never take precedence over the validity of the test.

3. Other qualities of a measuring instrument

3.1 Relevance: this is the degree to which the criteria established for selecting questions (items) so that they conform to the aims of the measuring instrument are respected. This notion is almost identical to the one of content validity; and the two qualities are established in a similar manner.

3.2 Equilibrium: achievement of the correct proportion among questions allocated to each of the objectives.

3.3 Equity: extent to which the questions set in the examination correspond to the teaching content.

3.4 Specificity: quality of a measuring instrument whereby an intelligent student who has not followed the teaching on the basis of which the instrument has been constructed will obtain a result equivalent to that expected by pure chance.

3.5 Discrimination: quality of each element of a measuring instrument which makes it possible to distinguish between good and poor students in relation to a given variable.

3.6 Efficiency: quality of a measuring instrument which ensures the greatest possible number of independent answers per unit of time.

\[1\] This definition of efficiency has a narrower meaning than the one given in the glossary (p. 6.05); it applies only to evaluation instruments (pp. 2.33 - 2.37).

3.7 Time: it is well known that a measuring instrument will be less reliable if it leads to the introduction of non-relevant factors (guessing, taking risks or chances, etc.) because the time allowed is too short.

3.8 Length: the reliability of a measuring instrument can be increased almost indefinitely (Spearman-Brown formula) by the addition of new questions equivalent to those constituting the original instrument.

validity The extent to which the instrument really measures what it is intended to measure.

reliability The consistency with which an instrument measures a given variable.

objectivity The extent to which several independent and competent examiners agree on what constitutes an acceptable level of performance.
practicability  The overall simplicity of use of a test, both for test constructor and for students.

2.35

Relationships between the characteristics of an examination

2.36

The diagram on the next page, suggested by G. Cormier, represents an attempt to sum up the concepts of testing worked out by a number of authors. However, no diagram can give a perfect representation of reality and the purpose of the following lines is to explain rather than justify the diagram.

A very good treatment of all these concepts will be found in the book by Robert Ebel entitled *Measuring Educational Achievement* (Prentice Hall, 1965).

Validity and reliability

Ebel shows that to be valid a measuring instrument (test) must be both relevant and reliable. This assertion justifies the initial dichotomy of the diagram. It is, moreover, generally agreed that a test can often, if not always, be made more valid if its reliability is increased.

Validity and relevance

According to Ebel’s comments, it seems that the concept of relevance corresponds more or less to that of validity of content. In any case, both are established in a similar manner (by consensus).

By definition, a question is relevant if it adds to the validity of the instrument, and an instrument is relevant if it respects the specifications (objectives and taxonomic levels) established during its preparation.

Relevance and equilibrium

It seems, moreover, that the concept of equilibrium is only a sub-category of the concept of relevance and that is why the diagram shows it as such.

Relevance and equity

It seems evident that if the instrument is constructed on the basis of a content itself determined by objectives, then it will be relevant by definition. If this is not done, then the instrument will not be relevant and consequently not valid. It is equitable in the first case and non-equitable in the second. However, an examination can be equitable without being relevant (or valid) when, although it corresponds well to the teaching content, the latter is not adequately derived from the objectives.

Equity, specificity and reliability

The diagram reflects the following implicit relationship: a test cannot be equitable if it is not first specific. Specificity, just like equity and for similar reasons, will affect the reliability of the results.

Reliability, discrimination, length, homogeneity (of questions) and heterogeneity (of students)

According to Ebel, reliability is influenced by the extent to which the questions (items) clearly distinguish competent from incompetent students, the number of items, the similarity of the items as regards their power to measure a given skill and the extent to which students are dissimilar with respect to that skill. The discriminating power of a question is directly influenced (see pages 4.73 -
4.75) by its level of difficulty. The mean discrimination index of an instrument will also be affected by the homogeneity of the questions and the heterogeneity of the students. From the comments made above it can be seen how equity and specificity will also influence the discriminating power of the instrument.

**EXERCISE**

*Try to answer questions 22 - 25 on p. 2.47 and check your answers on p. 2.48.*

**Relationships between characteristics of an examination**

1. As proposed by G. Cormier, Université Laval, Quebec.

**N.B.** Additional relationships to those suggested in this diagram can be established. The number of links has been kept to a minimum for the sake of clarity and to give a basic idea of the concept as a whole.

2.37

**EXERCISE**

2.38

For each of the educational objectives you defined on page 1.68, describe two methods of evaluation that seem suitable to you for informing yourself and the student on the extent to which that objective has been achieved. Compare the two methods on the basis of the three criteria shown in the table below.

**Examples of methods of evaluation for a class of 200 students**

<table>
<thead>
<tr>
<th>OBJ</th>
<th>Make a differential diagnosis of anaemia based on the detailed haematological picture described in the patient’s medical record.</th>
<th>Validity</th>
<th>Objectivity</th>
<th>Practicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Modified essay question. A series of 10 short questions based on patient’s record as supplied to student (1 hour).</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>II</td>
<td>Student given patient’s record (10 mins.) followed by 15 min. oral examination.</td>
<td>+++</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**Methods of evaluation for a class of... students**

1. Choose a number of students that is realistic in your situation.

<table>
<thead>
<tr>
<th>OBJ</th>
<th>The student should be able to:</th>
<th>Validity</th>
<th>Objectivity</th>
<th>Practicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Check the meaning of the words validity, objectivity and practicability in the glossary, page 6.01.

For evaluation the essential quality is **validity**

*but* don’t forget that for an educational system considered as a whole it is its **relevance** that is of primary importance.

2.39
Evaluation is a matter for teamwork

2.40

The planning of an evaluation system is obviously not simple. It is a serious matter, for the quality of health care will partly depend on it. It has been stressed many times, moreover, that it should be a group activity. We have stated in the preceding pages that evaluation must be planned jointly; that implementation of any evaluation programme is the responsibility of the teachers, in collaboration with students and the administration; that evaluation carried out jointly by a group of teachers is less likely to be erroneous than when carried out by one person; and, finally, that critical analysis of a test by colleagues is essential to its sound construction.

This work performed jointly by a group of teachers calls for a coordinating mechanism. The terms of reference of each group and group member must be defined explicitly and known to all. The institution’s higher authorities must provide the working groups and their members with the powers corresponding to the task to be accomplished.

The diagram on page 2.44 shows one type of organization and meets the needs of a given institution. Other types of organization can be envisaged, according to existing structures and local traditions. Now construct the type of organization that will be needed by your institution.

It will obviously be best if you can discuss the following exercises (pp. 2.41 and 2.42) with some of your colleagues. To help you to complete these exercises, take them in the following stages:

1. Read the instructions on objectives 8 and 9 on page 2.02. Then study pages 2.02 to 2.16. If you are taking part in a training workshop, ask the facilitator for some explanations, if necessary.

2. Do the exercise on page 2.09:
   - if possible, exchange your proposals with some of your colleagues.

3. For each decision, select the most appropriate means of obtaining the information you need to make your decision:
   - make a list of these means (page 2.41);
   - if possible, exchange your proposals with some of your colleagues;
   - if you are taking part in a workshop, draw up a joint list of means.

4. Specify the type of human resources needed to prepare and use these means:
   - read pages 2.17 to 2.19;
   - if possible, exchange your proposals with some of your colleagues;
   - draw a diagram (page 2.42) which includes the terms of reference for each component element (who does what);
   - do the exercise on page 2.43, on the basis of your diagram.
5. If possible, discuss your diagram with a few colleagues to make sure it has every chance of being suitable for use and used in your institution.

EXERCISE

2.41

1. Draw up a list of the *means* which you think should be included in an evaluation system.

2. Show which of these are *in practice already* included in the evaluation of the educational programme in which you are involved.

<table>
<thead>
<tr>
<th>Evaluation system</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of elements</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Do not change anything that works satisfactorily .... what is satisfactory to some, however, is not necessarily good enough for others. Teaching is a matter for teamwork.

EXERCISE

2.42

Taking the list of *means* you have drawn up on the previous page for an evaluation system, draw a diagram to show the type of organization (commissions, committees, boards, etc., *with a description of their functions*) which would seem desirable (in the establishment where you are working) for introducing (or improving) an evaluation system capable of providing the data needed to assure you that the training establishment in which you are working is functioning efficiently.

**Diagram**

Compare your diagram with the diagram on page 2.44.

EXERCISE

2.43

Describe the obstacles you are liable to encounter in applying the organizational plan you have imagined on the previous page and indicate tactics for overcoming each of these obstacles.

<table>
<thead>
<tr>
<th>Obstacles</th>
<th>Tactics</th>
</tr>
</thead>
</table>

Organizational diagram showing relationships between curriculum committee, evaluation committee and teaching units

2.44

EXERCISE

2.45

(Check your answers on p. 2.48.)

**Question 1**
The main role of evaluation is: ________________

Question 2

The purpose of evaluation is to make a value judgement concerning:

A. Students and programmes.
B. Students and teachers.
C. Programmes and teachers.
D. Students.
E. None of the above.

Question 3

Thorndike’s Law of Effect is based on the fact that:

A. Students learn better when they are motivated.
B. Students learn better when they play an active role.
C. Students are receptive when they understand the educational objectives which have been defined.
D. Students tend to engage in activities which have success associated with their results.
E. Students work better if the teacher makes an impression on them.

Questions 4 to 8

Indicate to which of the following each question refers:

A. Formative evaluation
B. Certifying evaluation
C. Both
D. Neither

Question 4

Its main aim is to inform the student on his/her progress.

Question 5

Does not preserve anonymity.

Question 6

Enables the teacher to decide to replace one programme by another.

Question 7

Justifies the decision to let a student move up from the second to the third year.

Question 8

Permits rank-ordering of students.

Questions 9 to 16

For each of the aims of student evaluation (list numbered 9 to 16, p. 2.18), indicate whether the appropriate measuring instrument will be of the certifying evaluation type (C) or both certifying and formative evaluation (CF).

Question 17
The four steps of the process of student evaluation are as follows:

1. ___________________________________
2. ___________________________________
3. ___________________________________
4. ___________________________________

**Question 18**

All the following steps except one are essential in constructing any measuring instrument.

- A. Precise definition of all aspects of the type of competence to be measured.
- B. Obtaining reliability and validity indices for the proposed instrument.
- C. Making sure that the type of instrument chosen corresponds to the type of competence to be measured.
- D. Making sure, by an explicit description of the acceptable level of performance, that the use of the measuring instrument will ensure objectivity.
- E. Determination of the particular behaviour expected from individuals who have or have not acquired the specified competence.

**Question 19**

When evaluating communication skills (domain of interpersonal relationships), all the following steps should be taken except one:

- A. Describe specific types of behaviour showing a given affective level.
- B. Describe explicit types of behaviour showing the absence of a given affective level.
- C. Observe students in real situations enabling them to manifest the types of behaviour envisaged.
- D. Obtain the agreement of a group of experts on the relationship between explicit types of behaviour and the affective level envisaged.
- E. Obtain the students’ opinions on the way in which they would behave in specific situations.

**Question 20**

The essential variable to be considered in evaluating the results of teaching is:

- A. The student’s performance.
- B. The opinion of the teacher and his colleagues.
- C. The opinion of the student regarding his performance.
- D. The satisfaction of the teacher and the students.
- E. The teacher’s performance.
Question 21
Which of the following is not suitable for measurement by written examinations of the objective type:

A. Ability to recall precise facts.
B. Ability to solve problems.
C. Ability to make decisions.
D. Ability to communicate with the patient.
E. Ability to interpret data.

Questions 22 and 23
If the following qualities can be attributed to an examination:

A = Validity        B = Objectivity        C = Reliability        D = Specificity        E = Relevance

Question 22
What quality is obtained if a group of experts agree on what constitute good answers to a test?

Question 23
What quality implies that a test consistently measures the same thing?

Question 24
The following factors, except one, generally affect the reliability of a test:

A. Its objectivity.
B. The mean discrimination index of the test questions.
C. The homogeneity of the test.
D. The relevance of the test questions.
E. The number of questions in the test.

Question 25
Which of the following test criteria is influenced by all the others?

A. Reliability.
B. Validity.
C. Objectivity.
D. Specificity.
E. Relevance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Suggested answer</th>
<th>If you did not find the correct answer, consult the following pages again</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>?</td>
<td>2.02, 2.06</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>2.08</td>
</tr>
<tr>
<td>3</td>
<td>D</td>
<td>2.13</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>2.15 to 2.19</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>2.15 to 2.19</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td>2.15 to 2.19</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>2.15 to 2.19</td>
</tr>
<tr>
<td>8</td>
<td>C</td>
<td>2.15 to 2.19</td>
</tr>
<tr>
<td>9</td>
<td>CF</td>
<td>2.15 to 2.19</td>
</tr>
<tr>
<td>10</td>
<td>CF</td>
<td>2.15 to 2.19</td>
</tr>
</tbody>
</table>
Chapter 3: The teaching-learning concept and programme construction

3.01

The teaching-learning concept and programme construction

3.02

This third chapter deals with the planning of educational programmes and learning activities. It attempts to bring out the change which is now taking place, i.e. the tendency to be interested more in what the student receives, perceives and assimilates than in what the teacher presents, gives or does. It shows that this change can be of benefit to all (the teacher continuing to learn and the student taking over part of the teacher’s role).

It deals with the teaching-learning process as part of a teaching-learning system. It stresses the effectiveness of methods which place the student in an active situation and more specifically the problem-based learning (PBL) approach. It proposes a relevant and student-oriented plan of action taking into account the (traditional) obstacles to change.

Those with a deeper interest in these problems are strongly advised to consult the following WHO publications:

- Public Health Paper No. 61, Educational strategies for the health professions, 1974.


After having studied this chapter and the references mentioned, you should be able to:

1. Explain the differences between education, teaching and learning, and describe the new trends in the teaching/learning system and the various learning situations.

2. Define the concept of relevance and list the stages in the construction of a programme.

3. Indicate the aims and general methods of teaching; list 10 conditions that facilitate learning on the basis of the list and evaluate a specific learning activity.

4. Specify at least two advantages and two disadvantages for each technique and medium used in teaching.

5. Select a teaching method that will make an educational objective easier to achieve. Compare the alternatives in a specification table.

6. Construct a programme, using a specification table, or decide whether a programme or course needs revision.


8. Define the role which, as a teacher, you would like to assume in order to motivate and facilitate the learning of students for whom you are responsible.

9. Identify the obstacles liable to be encountered in setting up a curriculum for problem-based education that is geared to the acquisition of skills and the health needs of the community, and describe strategies for overcoming them.

1 Work in small groups is recommended for these objectives. Individual work will usually be appropriate for the others.

The educational planning spiral

3.03

It was felt useful at this mid-point of the Educational Handbook to attempt to **summarize the major concepts presented so far** and place in perspective the two following chapters. We felt the following article would very well serve this purpose.

You will find later the name of the author and, what is more significant, **when it was written**.
Planning and conducting an educational programme

3.05

The tasks involved in planning and conducting an educational programme can be classified into four major types, namely:

- deciding on the objectives;
- selecting learning experiences that will contribute to the objectives;
- organizing the learning experiences to maximize their cumulative effect; and
- evaluating the effectiveness of the educational programme in attaining its objectives through appraising the educational progress of the students.

Education is a process for changing the behaviour of students in desired directions. The term 'behaviour' is used in the broad sense and includes thinking, feeling, and acting. When a student is educated he has acquired ideas, habits, attitudes, interests, ways of thinking, and professional skills which he did not have before he went to school; his behaviour has changed.

From this definition of education it is clear that the educational objectives are the behaviour patterns that the school tries to develop in the student. The knowledge, the skills, and the ways of thinking that the student is expected to acquire are examples of these objectives. The task of deciding on objectives is an important one because these are the aims and purposes which can and should be used to guide the entire educational programme. The only rational basis for selecting learning experiences and devising evaluation procedures is in terms of their relation to the educational objectives.

The second major task of education is to select learning experiences that will contribute to the objectives. This raises a previous question: how do people acquire these desired changes in behaviour patterns? People acquire them by practising them is a simple but fairly accurate answer. Getting students to practise the desired behaviour, however, is not the easiest thing in the world.

A student develops understanding by recalling ideas, by explaining them in his own words, and by finding illustrations of them. Skill in ways of thinking is developed by practising problem-solving again and again. Manual skills and habits are also acquired by practice. An attitude is acquired as the student looks repeatedly at the phenomenon from a new perspective. Interests are acquired by getting satisfaction from certain kinds of experiences so that the experiences become increasingly satisfying. For all of these kinds of behaviour, students acquire new behaviour patterns by practising them.

One fact clearly emerges from this analysis - the teacher cannot learn for the student. Whether or not the student develops an understanding will depend upon what is going on in his mind, not what is going on in the teacher’s mind. To plan learning experiences is to outline the activities that will give the students a chance to practise the behaviour implied by the objectives. Thus, planning a particular course will mean providing situations in which students will encounter problems to solve so that they can gain understanding and develop critical thinking. Planning may also involve providing tasks which require the students to practise manual and intellectual skills and habits, and so on.

The third major task in education is to organize the learning experiences to maximize their cumulative effect. We can increase the cumulative effect of learning experiences in two ways: through sequential organization and through
integration. When learning experiences are arranged so that the students begin with simpler concepts and skills and go on to broader and deeper applications, far greater learning results than with a random arrangement of learning. This is sequential organization. Integration involves relating what is taught in one part of the educational programme to what is taught in another part. Effective organization of learning experiences involves planning both for sequence and for integration.

The fourth major task in education is to evaluate the effectiveness of the educational programme in attaining its objectives, through appraising the educational progress of the students. This requires evidence of changes in students’ behaviour during the time they are taking part in the educational programme. It means appraisal early in the course as well as near the end. It involves evidence relating to all of the important objectives which will help us to identify those aspects of the curriculum that are effective and those that need improving.

With this brief review of the essential characteristics of a profession and the major tasks in planning and conducting an educational programme, we can identify more easily the distinctive attributes of education for the professions.

Objectives of professional education

The existence of principles and of a code of ethics in a profession points to several kinds of educational objectives which are important in educating for a profession. The development of an ethical practitioner who has an adequate understanding of the ethical code of the profession, who applies the ethical principles intelligently to the varied particular instances that arise, and who is sincerely committed to the highest ends of the profession, requires an education programme which consciously aims at several major types of objectives.

In terms of knowledge and understanding, a programme of professional education needs to develop in students a broad and clear concept of the social role of their profession. This includes understanding of the social functions the profession serves and how these functions are related to the total functioning of society and to the functions of other major specialized groups. It also includes an understanding of the various kinds of relations which exist between the profession and society at large and between the profession and other specialized groups, including the expectations which these groups hold regarding the members of the profession.

Also, in terms of knowledge and understanding, professional education aims at developing a deep understanding of the persons to whom the professional service is rendered, including particularly insight into personal motivations, feelings, needs, and the interrelation of physical, psychological, social, and emotional aspects of human behaviour. Furthermore, professional education needs to include among its objectives the development of self-understanding in the students. Obviously, in no sense can complete self-understanding be attained by the time of graduation from the professional school, but a sufficient beginning can have been achieved to provide for continued development as he pursues his professional career.

In terms of effective thinking or problem-solving, the objectives of professional education which are derived from the importance of ethics include the ability to recognize ethical problems, the ability to identify the ethical principles at issue, and the ability to work out appropriate courses of action in terms of ethical principles.

In terms of attitudes, education for the professions aims at developing loyalty to the social well-being of the persons who are served by the profession, concern for a truly social role on the part of the profession, a sense of self-respect for the social contributions of his profession and of his own work, and a warm,
accepting, yet objective attitude towards his clients. This involves developing in professional students a considerable degree of emotional maturity so that they are free to express and receive emotionally charged communication and at the same time can act intelligently as new problems arise.

The foregoing objectives clearly represent a large task for professional education, but these are not all the important objectives. The requirement that the professional practitioner operate on the basis of principles rather than rules implies certain additional objectives if the educational programme is to aim consciously to develop students who can operate in this fashion. Some of the purposes outlined above contribute to the performance of professional duties in terms of principles. In addition, in terms of knowledge and understanding there is need to understand the structure and functioning of the institution in which the profession operates, whether this be a school, church, hospital, court, or other institution. Only with such a broad view can a professional practitioner operate with intelligence and on the basis of principles adequate to produce desired consequences.

Finally, of course, every professional school needs to aim consciously to develop any understanding of those principles, concepts, facts, and procedures which are basic to professional operations. In medicine these include principles of physiology, anatomy, chemistry, physics, bacteriology, and psychology. The tendency, however, is to limit these basic principles too narrowly. In a very real sense, doctors deal with problems in their normal professional work which are psychological and require an understanding of relevant psychological principles if they are to operate intelligently.

In terms of effective thinking and problem-solving, it is clear that the foregoing objectives involving knowledge imply the development of some skill in recognizing professional problems, in analysing the problems in terms of the relevant principles, and in working out courses of action by applying these principles.

In terms of attitudes, the use of principles, rather than rules, in a profession requires as objectives in professional education the development of broad, rather than narrow interests in the fields on which the profession draws, and the development of the student’s interest in continuing his own learning long after graduation from a professional school.

Planning learning experiences

The previous section outlines characteristic objectives of professional education. What about the learning experiences which the professional may use to attain these objectives?

The most common problems in professional schools in connection with the learning experiences used are:

- the failure to select learning experiences in terms of the objectives to be attained;
- the failure to utilize consciously appropriate learning procedures for developing problem-solving skills, attitudes, and interests; and
- the failure to develop effective motivation for learning.

These are serious deficiencies.

Since learning is an active process, in which the learner himself is definitively involved, motivation is essential. Since the learner learns more than knowledge of content, and he actually learns what he is doing, what he is feeling, what he is thinking, it is important to make conscious plans for students to learn to
solve problems, to develop attitudes and interests. Since objectives represent the aims of the professional school and learning experiences are the means of reaching educational aims, the latter should be planned in terms of these aims.

An essential factor in planning learning experiences in terms of the objectives sought is to have clearly in mind what the objectives imply, both as regards behaviour to be developed and content involved. For example, if the objective understanding the social functions the profession serves and how these functions are related to the total functioning of society and to the functions of other major specialized groups is to serve as a guide for planning learning, we must have a clear idea of what is meant by understanding as a type of behaviour to be developed and what content is included in the phrase beginning the social functions the profession serves. Most instructors who have sought to define understanding indicate that it is a mental process that is more active than memorization, since it involves not only remembering but also the ability to explain the concept or principle in one’s own words, the ability to interpret, to illustrate, and to compare and contrast it to related ideas. Such a definition clarifies the behaviour that the student is expected to develop and, as pointed out earlier, it suggests the kind of learning experiences that are required to attain the objective. These would be learning experiences which give the student opportunity to explain, to interpret, to illustrate, and to compare and contrast it to related ideas. By defining the content implied by the phrase beginning the social functions the profession serves, we are able to identify what the principles and concepts are which the students will be given opportunity to explain, to interpret, to illustrate and to compare and contrast with related ideas.

Correspondingly, as we define each objective in terms of the behaviour and content implied, it is a much easier step to select learning experiences that give students a chance to practise the behaviour involved and to utilize the relevant content. In this way, learning experiences are planned in terms of the objectives sought.

The fairly common practice in professional schools of giving almost exclusive attention to knowledge and to technical skills may be partly due to the failure to recognize that effective thinking, attitudes and interests are also learned and can be consciously developed in programmes of professional education. Skills in ways of thinking are acquired by practice in solving problems. A new attitude is acquired by repeatedly observing and reacting to certain phenomena from a new perspective. Interests in certain kinds of activities are developed as the student gains satisfaction from participating in these activities. For each of these types of objectives, definite learning experience can be provided so that students are practising problem-solving, they are projected into situations from a new perspective, they are able to gain satisfaction from certain kinds of activities. In short, professional schools can plan learning experiences for developing effective thinking, attitudes and interests.

This leads to consideration of the primary significance of motivation. Since the learner learns through his reactions, unless he can be involved in the situation, unless he can be guided to think, feel, and act in ways appropriate to the situation, it is not possible for him to learn. Practice alone, even when carried to unusual limits, does not take the place of the learner's being involved in what he is doing.

Organizing learning experiences

There are not only problems involved in the selection of learning experiences but also in their organisation. As the programmes of professional education have become more complex and involved larger staffs, they have become more disintegrated. Yet significant changes in behaviour, that is, fundamental learnings, require a long time to develop. It is necessary that what is learned this term builds upon what was learned last term, that what will be learned next
year builds upon what is learned this year. This is sequence learning.

However, effective sequence is not simply a series of repetitions from one year to another. Rather, it includes variety in the learning experiences, so that each subsequent term emphasises the main things to be learned, but in varied contexts. In this way, ever broader and deeper learnings are achieved.

Furthermore, effective organization provides for relating one course to another and one field to another, which reinforces the learning in each course or field. This is done both by helping the student to use things learned in one course or field in another, and by helping him to perceive differences as well as similarities in the concepts, principles, attitudes and skills utilized in the various courses and fields. This is called curriculum integration.

Sequence and integration are essential to programmes of professional education, but because of the tendency towards specialization and separation, conscious efforts are required to plan for and develop effective organization.

One significant development in working out a better-organized curriculum is the building of a closer and more appropriate connection between theory and practice, between the art and the science of the profession. Many institutions are not only teaching general principles but also helping students to apply these principles to particular cases so that it is possible for them in practice to use the principles as they deal with particular cases. Effective professional education requires this close connection between theory and practice. Without theory, practice becomes chaotic, merely a collection of isolated, individual cases. Theory gives meaning and unity to what would otherwise be specific and isolated cases.

On the other hand, without practice, theory becomes mere speculation. The realities of practice provide a check upon pure speculation, a test of the adequacy of theory; and practice provides the problems which must be dealt with by any comprehensive theory. Hence these efforts to connect theory and practice more closely are important contributions to professional education.

Another illustration of this development is the increasing use of the case method. The case method involves the student in the study of a concrete and particular case. However, for him to understand this case and deal with it effectively, he must bring to bear the theory, the concepts and the principles that are basic to the issues raised by the case. The internship provides concrete experiences which are interpreted in terms of basic theory in the accompanying seminars. This shuttling back and forth between general and specific aspects of a profession helps to build an increasingly adequate context of concepts and principles by which a member of the profession can understand the operations to be performed in relation to the values to be attained. An adequate theory helps him to relate particular activities in an individual case to the larger social issues, to see the connection between the activities of the daily operations of the profession and the welfare of society generally.

However, for these types of educational programmes to be effective, more than superficial experience and explanation must be provided. The student needs many opportunities to deal with situations on the basis of a careful analysis of them, to identify the values and principles involved, and through practice to develop artistry in devising means to deal with the situation in order to preserve these values. This is the aim of efforts to knit theory and practice more closely together.

Another effort at extending the sequential organization of professional education is the working out of definite plans for continuing education after the member of the profession has completed pre-service training and has been inducted into the initial activities of his work. Fifty years ago medical schools felt that their work had been done when their graduates had been admitted to initial professional
activity. As the years went by it became increasingly clear that many members of the profession did not grow after they began their work and that in some cases the older practitioner was much less competent than those currently beginning their profession. Few doctors made any effort to continue their education after graduation.

Now there is a marked tendency for professional schools to develop programmes of continuing education, in some cases bringing the work of the school to the practitioner in the field, in other cases setting up short courses, institutes, or long-term seminars for practitioners to take on the campus.

**Evaluating effectiveness of educational programmes**

The final attributes of professional education are those involved in the task of **evaluating the effectiveness of the educational programme in attaining its objectives, through appraising the educational progress of the students**. Four important attributes are too often neglected in current educational programmes.

The first of these is **conducting an appraisal in terms of all of the important educational objectives of the professional school**. The common practice is to appraise the knowledge of the students and certain of their technical skills. In addition, many professional schools appraise the students’ ability to solve problems as these are presented in verbal form. Few institutions provide for careful, systematic appraisal of problem-solving in the professional situation, and appraisal of professional interests and attitudes. Hence the school does not have a comprehensive picture of the achievements of its students in terms of its own purposes.

A second attribute, often neglected, may partly account for the shortcomings in the first. A comprehensive programme of evaluation uses **varied devices** for obtaining evidence regarding the educational progress of students. These devices include not only written tests and examinations, useful as they are, but also observations, interviews, questionnaires, reports from the field and samples of the students’ work; in short, any device which gives valid evidence regarding the significant behaviour of the students. Few professional schools consistently evaluate their effectiveness in such varied ways. They tend to limit their appraisal to written examinations and to rating forms. This does not provide adequate means for comprehensive evaluation.

Appraisal of the progress of students toward the objectives of professional education requires evaluation at several points in their career. This is a third essential attribute. To get evidence of progress requires at least three appraisals, **one early in attendance at the professional school, one near graduation, and one after several years of service in the profession**. Some schools attempt annual appraisals during the students’ enrolment. The changes made while in the school throw light on the immediate effectiveness of the school’s educational programme, while the appraisal after the students have spent several years in the profession provides evidence of the permanence of learning and the extent to which it has achieved some continuity with professional experience. Unfortunately these studies of progress are quite rare. This may be partly due to the lack of appreciation of the way in which systematic sampling of students and alumni is small enough to permit the use of individual interviews yet at the same time sufficiently representative to permit valid generalizations regarding the populations from which the samples were drawn.

The last attribute to be mentioned here is **the use of evaluation in improving the educational programme as well as in providing information to guide work with individual students**. Too often, what little appraisal of student achievement is conducted results only in grades for the students. Actually an evaluation programme can serve as a helpful means for continued improvement and development of the professional school. The results of appraisal indicate the respects in which students are making substantial progress and the respects in which expected
development is not taking place. These suggest aspects of the educational programme which need re-thinking and re-planning to provide for improvement. Furthermore, as revisions are made in the programme, subsequent evaluation indicates the relative effectiveness of these revisions. Hence, appraisal provides a sound basis for planning.

The evaluation data also indicate the progress made by individual students and bring to attention both their strength and their difficulties. This information thus provides a sound basis for the guidance of individuals and gives a more substantial foundation for the individual student’s continued planning of his own education.

In summary, the distinctive characteristics of a profession, namely its ethical code and its operating basis on principles, suggest the distinctive attributes of education for the profession. From these characteristics, important educational objectives can be derived. Because these objectives are complex and involve understanding, problem-solving, attitudes and skills, they require clear definition in order to develop effective methods for their attainment. The difficulty of attaining the goals of professional education makes motivation of prime importance and effective organization of learning experience a necessity. Finally, a comprehensive evaluation programme is required to guide the continued development and improvement of the educational programme and to provide information for constructive work with individual students. The building of an effective programme of education for a profession is not easy but when attacked intelligently, systematically, and enthusiastically, it can be done.

The author of the preceding pages* is Ralph W. Tyler. He obtained his doctor’s degree from the University of Chicago in 1927... over 60 years ago! He wrote these lines in 1951... nearly half a century ago! yet his vision is still valid today and still remains to be acted upon.

For those concerned in curriculum planning this clearly means that the order of the day is patience and perseverance.


A programme describes

3.11

a series of planned educational activities a student is to go through with the assistance of teachers

Integration (of a curriculum)

coordination of different teaching/learning activities to ensure the harmonious functioning of the educational process for more effective training

The four c's of curriculum planning

3.12

cooperative A programme prepared jointly by a group of persons will be less liable to error than one prepared by a single person.

continuous The preparation of a programme is not a one-shot operation. In planning it, provision should be made for its continuing revision.

comprehensive
In an approach which accepts the interaction of all the programme components, each must be defined with the requisite precision.

concrete General and abstract considerations are not a sufficient basis for drawing up a programme. Concrete professional tasks must constitute the essential structure of a relevant programme.

adapted from E. Krug

**Plan of action for preparation of an educational programme**

3.13

<table>
<thead>
<tr>
<th>Chronological order</th>
<th>Definition of objective</th>
<th>Executing body</th>
<th>Advisory body</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prospective study to evaluate the country’s requirements (quantitative and qualitative) in respect of health personnel, taking into account what is available and can be absorbed</td>
<td>Ministries of Planning, Health, Education, etc.</td>
<td>University staff, national and international experts</td>
</tr>
<tr>
<td>2</td>
<td>Definition of the educational objectives of the school of health sciences in accordance with the tasks to be accomplished by each professional health worker (professional profile)</td>
<td>Ministries of Education and Health</td>
<td>Special commission of educators and practitioners</td>
</tr>
<tr>
<td>3</td>
<td>Organization of an information group on education planning for health sciences</td>
<td>Faculty staff</td>
<td>Faculty of Education, education consultant</td>
</tr>
<tr>
<td>4</td>
<td>Acceptance by the faculty staff of the goals established in the light of the country’s requirements; training of teachers in education planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Development of a system of evaluation: formative and certifying evaluation; programme evaluation; evaluation of human resources and learning materials.</td>
<td>Evaluation committee</td>
<td>Department of Education, education consultant</td>
</tr>
<tr>
<td>6</td>
<td>Modification of programme and selection of methods by which to attain the goals</td>
<td>Programme committee</td>
<td>Faculty of Education, education consultant</td>
</tr>
<tr>
<td>7</td>
<td>Organization of a group for research in education</td>
<td>Faculty staff</td>
<td>Faculty of Education</td>
</tr>
<tr>
<td>8</td>
<td>Periodic re-evaluation of goals and methods in response to changes in the country’s needs and in the light of evaluation</td>
<td>Ministries of Planning, Health, Education, etc.</td>
<td>University staff, national and international experts</td>
</tr>
</tbody>
</table>

**Personal notes**

3.14

**Diagram showing factors influencing curriculum design**
The purpose of teaching is to facilitate learning


The literature on the philosophy of education is rich in theories, which tell a story of timid steps forward, backward leaps and rediscoveries. It would be very gratifying to have a reliable general theory, firmly seated on a scientific basis and making proper allowance for social variables, which could serve as a guide for every teacher and enable him to resolve the real problems of teaching the health professions. Unfortunately, such a universally satisfactory general theory does not exist. On the other hand, by means of the systematic approach suggested, hypotheses can be formulated regarding the process of acquiring a satisfactory level of performance that can be evaluated empirically and the choice of learning activities facilitated.

The contemporary trend is to stress the teaching-learning system as opposed to the preponderance previously given to teaching alone. There is a tendency to be interested less in teaching than in learning, less in what the teacher presents and more in what the student learns. Lawrence M. Stolurow has criticized what he calls the communication-learning fallacy which assumes that the information transmitted to the student is always learned. This is obviously fallacious, and known to be so when it is expressed so crudely, but discussions of teaching methods are often still inspired by it and it has even been carried over into the initial stages of research into new methods. Much of this research, by concentrating on problems of the presentation of stimulating materials and utilizing some of the more rudimentary concepts of communications theory, dealt too much with the manner in which information was transmitted to the student without investigating very closely what was learned and by whom, at what speed and, in particular, for what purpose. Understandably, this approach led to a passive attitude towards students’ response; the student was seen in a dependent situation, relying upon information directed at him, whether through modern audiovisual communication techniques or the more traditional forms of the lecture and the textbook.

Learning, however, is a dynamic and interactive process in which the behaviour and experience of the student are vital components; the student must not only receive but also contribute; his perception of what is happening is just as important as the perception of his teachers and the assessment he makes of the value of a learning activity may be more relevant than that of his examiners. Good conventional teaching, of course, has always sought to take account of the learner, but its structure and methods have greatly inhibited it. The rigid style imposed by large numbers, timetable requirements and the availability of teaching space, by the conventional practices in designing courses and by teaching conforming to an accepted academic discipline, have led to the teaching aspect again dominating over the learning aspect. If it is accepted that the starting-point must be the acquisition of knowledge rather than its communication then we must ask some different questions and intensify our investigation of non-directive methods. Using the same approach as Jerome S. Bruner we can consider what experiences will motivate the student and enable him to learn, in what ways knowledge can best be structured for a given student or group of students, what sequence and in what form the material can be presented most effectively, what should be the nature and the frequency of rewards or penalties, and how we can gradually lead a student to give less thought to extrinsic rewards than to the personal satisfaction of having achieved a desired degree of skill.
The body of knowledge possessed by a group of teachers or set out in a series of authoritative volumes is the fruit of intense intellectual activity. Teaching a so-called basic science is not a matter of getting the student to memorize it, but rather of helping him to participate in a process that renders the acquisition of a body of knowledge possible. A subject is taught not to produce little living libraries on that subject but rather to get the student to think for himself in accordance with the laws of physics, to consider problems from the same angle as the biologist and to assimilate the process of acquiring knowledge. Knowing is a process, not a product.

If the revision and renewal of the programme are regarded as part of the teaching-learning process, a change must also occur in the roles and interrelationships of teachers, students and others who are concerned. The system becomes much more complex than the conventional linear model and it demands much more from those who have to design, manage and operate it. To put it epigrammatically, the teacher becomes a learner himself, and the learner undertakes some part of the teaching role. This is because the teacher learns more about teaching and the student begins to assume a greater responsibility for his own progress. The roles of other participants also change and new roles must be added to the old. Some of the new methods at present under trial, for instance, not only require librarians to emerge from their traditional sphere into a more dynamic type of activity; they also call for the services of highly qualified personnel, such as artists, photographers and technicians, as well as educational technologists and psychologists. In fact, the ecology of a teaching institution changes once its primary function is redefined, namely to facilitate the acquisition of competence by the student.

In the following pages a certain number of definitions, epigrams and lists are proposed whose aim is to serve, where appropriate, as a starting-point for reflections or discussions on the methodology of education. These elementary concepts are derived from various systems, and none of them is regarded as embodying an absolute and final truth.

Always assume that a teaching activity is ineffective unless there is evidence to the contrary.

Adapted from A.L. Cochrane

Teaching

3.18

Interactions between teacher and student under the teacher’s responsibility in order to bring about expected changes in the student’s behaviour.

Purposes of teaching

3.19

to help students to

- acquire, retain and be able to use knowledge
- understand, analyse, synthesize and evaluate
- achieve skills
- establish habits
- develop attitudes

all of which correspond to the Professional Profile

teaching approaches
3.20

talk to students
talk with students
have them talk together
show students how
supervise them
provide opportunities for practice

S. Abrahamson

Teaching methods which place the student in an active situation for learning are more likely to be effective than those which do not.

G.E. Miller

3.21

The activities composing a training programme must be organized so that students can acquire their professional skills under conditions similar to those in which they will later practise.

3.22

If only ideal or model learning situations are used, the student will be deprived of the stimulus of having to face realities and will have less opportunity to propose improvements with the help of his fellow students and his teachers.

Learning is both an emotional and an intellectual process.

Learning

A process resulting in some modification, relatively permanent, of the way of thinking, feeling, doing, of the learner.

3.23

The characteristics of learning

3.24

learning is

- producing a behavioural change in the learner
- leading to a relatively permanent change that is also gradual, adaptable and selective
- resulting from practice, repetitions and experience
- not directly observable

Some principles of learning

3.25

learning is individual
motivation is the key
relevance of learning experience should be clear to the student
feedback to learner is important

1 See paragraph 2, page 2.13.

Conditions to facilitate learning

3.26

An atmosphere which
encourages people to be active
emphasizes the personal nature of learning
accepts that difference is desirable
recognizes people’s right to make mistakes
tolerates imperfection
encourages openness of mind and trust in self
makes people feel respected and accepted
facilitates discovery
puts emphasis on self-evaluation in cooperation
permits confrontation of ideas


Learning

3.27

is primarily controlled by the learner  
is unique and individual
is affected by the total state of the learner
is cooperative and collaborative
is an evolutionary process
is a consequence of experience
is not directly observable

1 Teachers are sometimes heard to say that young students lack the necessary maturity to take on this responsibility. They might be reminded that these young students are legally adults, even if many adults lack the necessary maturity.

Pine, G.J. & Home, P.J. (ibid.)

They might also be reminded of article 12 of the United Nations Convention on the Rights of the Child: States Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child... [and]... the opportunity to be heard in any judicial and administrative proceedings affecting the child.

... so, why should a student be treated less well?

Personal notes

3.28

Almost everything that any health professional will have to learn in the forty years or more of professional life after initial training will be learned by self-learning.

EXERCISE

3.29

1. Complete in less than five lines the following sentence:

I learn best when I ______________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

2. Ask several of your colleagues to do the same exercise; make a list of all the situations.

1
1 Compare your list with the list on the next page.

3. Note the diversity of situations and compare it with those provided for students by the educational institution to which you belong.

*In the educational institution to which I belong, the following learning situations are provided for students:*

[Blank lines]

4. If the comparison shows that changes are needed in your institution, read the following pages which describe the teacher’s functions, and do the exercise on page 3.37.

**I learn best when I...**

3.30

- know what my goals are
- am motivated by the relevance of these goals to my personal/professional needs
- work in a small tutorial group
- can alternate between personal study and work in a small tutorial group
- am in an active situation, with responsibility and a specific objective
- am in a good environment (calm, good staff/student relations, competent teaching staff, lively atmosphere)
- am able to work at my own pace
- am able to put what I have just learned into practice (repetition)
- team by the problem-based method
- have opportunities for formative self-evaluation and critical review by others (peer criticism)
- am exposed to different types of stimulation (visual, extended listening summary review)
- face the challenge of (valid) certifying evaluation
- know that I shall have to inform/instruct others
- am able to have outside contacts (travel, congresses, etc.)

List made by participants in workshops.
Teaching: a complex but challenging task

3.31

The teaching of health personnel has become more complex than it used to be, especially if it is accepted that the teacher should consider the benefit of the learner and not only his own satisfaction. More than a dozen of the teacher’s functions are described below. A teacher should feel satisfied if he fulfils only a few of them, because the present educational environment does not greatly help him along this road. Nevertheless, he will do well to improve his performance by training as an educator.

It is sometimes thought that a teacher’s activities are so intricately related to the local culture in which he functions that the description of his tasks should differ if he teaches in Antwerp, Dar-es-Salaam or Moscow. However, there is no support for this concept in reality. Data concerning teachers’ behaviour during teacher training workshops organized by the World Health Organization over the last 10 years with participants from a great variety of geographical or sociopolitical backgrounds clearly indicate that teachers are more like each other than they are like the people of the community to which they belong. The worldwide academic community seems to be one cohesive entity modelled on nineteenth century western European concepts of academic freedom, exclusiveness and detachment.

Most teachers in schools for health personnel conduct scientific research, write reports and articles, plan and supervise laboratory or clinical units and, finally, teach, in that order of priority. To teach means, in most instances, to prepare and deliver lectures, to supervise students during laboratory and clinical work, to decide which questions should be asked at examinations, and to score papers and oral examinations. Added to all this is attendance at numerous scientific or administrative meetings.

Instructional duties are sometimes called teaching load, an expression which clearly conveys the attitude to that function. Teaching staff are jokingly depicted as secretly believing that academic life would be much easier if there were no students. As in all jokes, there is much truth in this.

Some teachers are seldom seen by students while others spend many pleasant hours in stimulating discussion with their students.

Rather than pursue this description, in which no teacher would ever want to recognize himself, let us consider what are the teacher’s functions in the light of present-day educational concepts.

1. To be available

The teacher should be available to give students constructive criticism of their working objectives and methods. The key-word here is available. It constrasts sharply with the habit of the traditional academician who proclaims I am always happy to meet students ... my door is always open, but who, in fact, is so rarely in his office that only very stubborn and highly motivated students manage to catch him once he has left the lecture hall. Really available is the professor who has a notice on his office door saying I am at the disposal of students in this office every Tuesday and Friday from 10 a.m. to 12 a.m., and who is actually there at those times.

2. To provide constructive criticism of the student’s learning objectives and working methods

It is of the utmost importance that the student’s working objectives and methods should be exposed to constructive criticism as, after training, health personnel should be able to relate their own professional goals to the organized system of
health care, and to develop their own tactics for achieving those goals.

It is also important to develop the student's desire to seek criticism, supervision and advice from teachers and fellow-students.

3. To analyse and evaluate health problems

Generally speaking, clinical teachers are able to guide students in solving patients' particular problems, but students should also collect and use relevant information for the solution of community health problems. It is less certain that all teachers have enough understanding of epidemiology and of health manpower planning principles and methods to assist students in that respect. This is especially true of teachers of the so-called basic science subjects.

It would be an advantage if all teachers had sufficient competence to ensure that whatever they teach is relevant to the community. The teacher should be able to analyse and evaluate health problems raised by students, as well as proposed solutions.

4. To define learning objectives

The teacher should be able to define the abilities that students need to acquire in order to solve a given health problem. For example, a teacher should be able to define explicit and relevant learning objectives so as to help students to understand a problem. Moreover, when programmes are being constructed, it is preferable to indicate clearly the standard of performance to be acquired by students than to state only the amount of time to be spent teaching the subject. It is well known that the time needed to master a subject varies from student to student depending on ability, motivation and drive, and on the availability of teachers and educational facilities. What is important for the average person is not the length of time during which teachers teach or students learn, but the ability of the person providing health care to perform a given task. If my son needs a hernia operation, I do not wish to be told that the surgeon has graduated from a six-year course in an institution in the World Directory of Medical Schools. What I want to know is whether he is competent to perform that operation in the best and safest way. As for the nurse who will comfort him in this strange and frightening hospital world, I do not care whether she has had 72 hours in a psychology course as long as she is able to give him the reassurance he may need.

5. To assess students’ work

The teacher should be able to define criteria for assessing students' work and measuring their abilities. Such criteria need to be carefully drawn up, and teachers should share the task of preparing them with their students. The sad state of most examination systems in faculties and schools is largely the result of the absence of such criteria, which could serve not only for certification purposes but also in guiding the students' learning, a point that is certainly no less important. Everybody in the health professions should cultivate this ability to define criteria, as it is essential that they should be able to audit their own performance and that of their colleagues.

6. To prepare learning aids

The teacher should prepare learning aids and materials, provide information that will facilitate students’ independent work, and evaluate the usefulness of such materials. Most of what is usually transmitted by traditional lecture courses could be better acquired by students working independently and studying books, scientific journals and duplicated texts in self-learning format, with or without audiovisual aids. In such cases, students should be aware of related learning objectives, and feedback evaluation exercises, based on those objectives, should be available.
The preparation of such materials may well be a joint effort among colleagues from several faculties. It calls for a lot of work, but may be considered as an investment that will pay off during several years through setting up banks. It should help to eliminate passive learning which is often all that is required of students. The assessment of the usefulness of such materials, which requires a level of educational competence some teachers do not yet have, may call for the collaboration of specialists in education.

7. To select professional activities for students

The teacher should select professional activities of graded difficulty appropriate to the student’s level of progress during the whole of his learning curriculum. There is agreement among professional educators that students should acquire professional competence through the practice of real (or, if that is not possible, simulated) professional activities. Even students fresh from secondary school are perfectly capable of drawing valuable lessons from the study of real cases.

8. To confront students with new problems

The teacher should confront students with a diversity of new problems in order to help them define the terms of the problems and find solutions to them. If it is true that the estimated half-life of medical knowledge is about five years, and it is slowly but constantly shrinking, it is essential that today’s graduates, among whom are tomorrow’s leaders of health services, should be able to solve the new problems that arise in new situations. It is here that the basic sciences have an important role to play as they can help the student to acquire a scientific method of inquiry. Such an approach is essential to keep knowledge and skills up to date. The fact that the graduate will have to replace much of what he knows is the least part of the problem; the main difficulty is that we, the teachers, do not know which half.

9. To develop problem-solving skills

The teacher should facilitate students’ learning by asking questions requiring problem-solving skills rather than simple recall of facts. Even the most traditional teacher will agree that students must acquire basic skills, either manual (e.g. inserting an intravenous drip) or intellectual (e.g. taking a history), should behave in an appropriate manner with the patient and his family, and should not merely possess theoretical knowledge.

In spite of this, whenever the final examinations used in faculties and schools are analysed, it is found that a majority of the questions test only simple recall and not the intellectual skill of interpreting data and solving problems. No attempt is made to measure practical skills and attitudes. The fact that most examinations require students to recall facts without recourse to books is highly significant. Of course, health personnel must possess a large amount of knowledge that they can call upon without reference to books, otherwise their usefulness in an emergency situation would be seriously impaired.

Teachers should therefore test students on their ability to recall those facts that will be needed immediately in emergencies and have been clearly specified as such from the start. Apart from this, examinations should confront students with typical individual or community health problems and allow them access to books, in accordance with the sound practice adopted in everyday professional life.

10. To aid the understanding of basic scientific principles

The teacher should endeavour to ensure that students understand the basic principles underlying the activities and tasks they are learning to master. Factual details can be readily added to an understanding of basic principles and concepts, but such principles are not easily derived from a mass of facts.
Students usually learn the so-called basic sciences early in the curriculum before they have met the real-life problems which require an understanding of those subjects. They are thus poorly motivated and soon forget what they have learned. It has repeatedly been found that students tested 18 to 24 months after having followed a basic sciences course answered at random, just as if they had never studied the subject.

11. To supervise the student’s progress

The teacher should check each step the student takes in solving health problems in order to discover the areas where he fails to take account of the relevant basic scientific principles. This role follows naturally from the previous one. As mentioned above, in the traditional curriculum, students are taught basic sciences in the first two or three years. Ideally, a student should be helped to reach an acceptable solution to problems through his understanding of the principles of the basic sciences and by adopting a scientific approach. One of the persons best qualified to judge whether the student is thinking in a scientific manner is the basic sciences teacher. In the training of a nurse or of a general practitioner, for example, the role of the basic sciences teacher is not to instruct in a given subject but to ensure that the nurse and the physician are capable of applying basic scientific principles in their daily work.

A physiologist could spend two hours a week in a ward or an outpatient clinic with his students, going through the medical records of current patients to check whether basic principles had been adhered to, and draw the students’ attention to unsatisfactory examples. Such an association between basic sciences and clinical activities would be of greater value than the present so-called integrated forms of teaching in which teams or panels of teachers endeavour to teach in a coordinated manner.

12. To identify the factors underlying health problems

The teacher should make sure that the student identifies and takes account of the psychological, cultural and socioeconomic factors underlying the health problems with which he deals.

In practice, there is no natural frontier between the physical sciences and the humanities, nor between sciences and art in the broadest sense of the words. Giving courses in the humanities and the behavioural sciences does not automatically ensure that future health workers will be able to relate their daily activity to the culture to which they belong. They are more likely to do so if they are required in practice to define the patient’s social and psychological problems in relation to his health problems, and to seek solutions, with the help of suitable specialists.

13. To encourage intellectual discipline

The teacher should encourage intellectual discipline by observing students’ work and evaluating their activities in relation to defined standards of quality of care.

Both teachers and students pass much time, more or less usefully, in large lecture halls. A better distribution and use of teachers’ time, and the practice of peer-teaching to enliven the course, could improve both the quantity and the quality of the instruction given and allow for more individualized supervision.

The quality and satisfactory performance of learning should be the only yardstick or criterion used by the teacher, to the exclusion of the time constant (the duration of the curriculum is six academic years). What should vary is the number of different types of task that any given kind of health professional can perform. Every member of the health team, and the physician most of all, is a potent therapeutic agent but a poorly tested one. The least toxic medication
listed in *The International Pharmacopoeia* has undergone more thorough
double-blind testing than any health professional anywhere, at any time.
Cigarettes are sold with a printed health warning. Does not the university have a
social duty to protect all citizens from the potential danger that physicians and
the other members of the health team may represent?

14. To set an example

Finally, the teacher should serve as a model of professional conscientiousness,
reliability, analytical sense and efficiency. We have all met such people in the
course of our studies. We have also met the other kind. We tried to imitate the
former and sometimes despised the latter. In connection with students’ values and
personality, the following quotation from the American Association of Medical
Colleges Longitudinal Study, reported by E.B. Hutchins (1964), should be
remembered. Describing the effects on students of their years of study, Hutchins
says ... the interest in *understanding how others feel* about problems or the
need to place one’s self in another’s shoes ... has, on the average, decreased.
To a potential patient, this statement is very disturbing. If it reflects a
widespread reality, the cause could lie in the example that has been set.

Conclusions

Nostalgic remarks are often heard about the good old days before professional
educators had begun to invade the educational black box. One could then lecture
and enjoy the feeling of satisfaction any good teacher has the right to expect.
Nowadays, teaching is somewhat more complex, especially if the idea is accepted
that it should be for the benefit of the learner and not only for the
satisfaction of the teacher. Some teachers have already undertaken some of the
functions described in this paper. They may feel satisfied even if they fulfil
only a few, as the present educational environment is of no great help to their
efforts in that direction. The conclusion must be that, despite all that has been
achieved in the field of teacher training, much still remains to be done. Some
have more gift for teaching than others, but all have the possibility of
improving their performance by training as educators, even though such courses
are still too seldom sought after and too seldom available.

How many teachers are really prepared to have students reach conclusions
different from their own, giving first consideration to the logic of reasoning
rather than the ability to arrive at a predetermined solution?

The student body represents the largest untapped educational resource in most
schools.

G.E. Miller (1977)

Personal notes

EXERCISE

3.37

Read, or reread, carefully the description of the teacher’s function (pp.
3.31-3.35) and circle the numbers of those that you believe yourself able to
perform in your present situation taking into account the university regulations
and any other local constraints. For each function, describe the precise
activities that you **personally** will be able to start or continue during the 12
months to come.

<table>
<thead>
<tr>
<th>Function no.</th>
<th>Description of precise activities for each function</th>
</tr>
</thead>
</table>
Teaching techniques

3.39

The Handbook does not give detailed descriptions of the different teaching techniques employed in centres for training health personnel. This is intentional, for an abundant literature is available on these subjects to which the reader is referred (see references). Another reason is that the main purpose has been to stress the relevant aim of the teaching (whence the almost obsessional insistence on the need to define relevant educational objectives-) (chapter 1) and on the means for checking if and how these aims have been achieved (chapters 2 and 4). The problem is not merely one of communicating better (this is the subject of chapter 3) but of better communicating a relevant message.

For details concerning teaching techniques, lectures, seminars, tutorials, practicals, programmed learning, etc., the reader should refer to the specialized publications (see bibliography, page 7.01). The following are also suggested as useful reference documents:


Audiovisual media in medical teaching - M.A.C. Dowling, Public Health Papers No. 47, WHO, pp. 53 - 78.


As a teaching technique workshops are certainly very useful and efficient. For details see chapter 5.

The teacher’s role is to encourage the desire to learn rather than the desire to know.

Advantages and disadvantages of certain teaching methods and of different educational media

3.40

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lectures</td>
<td>1. Keeps the student in a passive situation.</td>
</tr>
<tr>
<td>1. Apparent saving of time (for the teacher) and resources.</td>
<td>2. Does not facilitate learning how to solve problems.</td>
</tr>
<tr>
<td>3. Covers a large group of students.</td>
<td>4. Does not allow for individual pace of learning.</td>
</tr>
<tr>
<td>4. Gives a feeling of security.</td>
<td>5. Low receptivity.</td>
</tr>
</tbody>
</table>

2. Small group activities and workshops (see also Chapter 5)

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Permits a teacher/student dialogue (thanks to the availability of the teacher).</td>
<td>1. High costs in personnel and time (unless peer-teaching is used).</td>
</tr>
<tr>
<td>2. Facilitates evaluation.</td>
<td></td>
</tr>
</tbody>
</table>
### 3. Demonstrations

1. The teacher is present (showmanship).
2. Gives a feeling of security.
3. Develops the quality of observation.
4. Ensures closer contact with concrete problems.
5. Facilitates the acquisition of practical, intellectual and communication skills.
6. Presents reality, not substitutes.
8. Is attention-catching.
9. Demonstrates the right way of doing a (complex) task.
10. Presented facing the audience.
11. Allows students to ask questions.
12. Limits damage to equipment and material when students do practical work afterwards.

#### Limitations

1. Number of students is limited.
2. Keeps the students in a passive situation (except for observation).
3. Offers little possibility of checking the learning process.
4. Does not allow for individual paces of learning.
5. High cost in personnel and time.
6. Difficulty in repeating the demonstration in order to acquire competence.

### 4. Practical work

1. Puts the student in an active situation.
2. Permits evaluation of degree to which educational objectives (practical and communication skills) have been attained.
3. Develops qualities of observation and decision-taking.
4. Ensures closer contact with reality (professional, health situation of country, colleagues and teachers).
5. Permits comparison between practice and theory.
6. Enables student to develop self-confidence.
7. Increases diversity.

#### Limitations

1. High personnel, transport and material costs.
2. Covers a limited group of students.
3. Sometimes puts the patient in a difficult situation.
4. Poor standardization.
5. Narrow limits of utilization, therefore requiring careful planning.

### 5. Bedside teaching

1. Enables student to work at his own pace.
2. Facilitates self-evaluation.
3. Makes mass teaching possible with high efficiency.
4. High availability.
5. Facilitates decision-taking (solution of complex problems).
6. Reduces risks (for patient or society).
7. Avoids bias transmitted by bad teachers.
8. Allows a good teacher to save time that can then be spent on more complex activities such as interpersonal relations.
9. Can be kept up to date with new scientific developments and contain references to other documents.

#### Limitations

1. Necessitates special educational competence.
2. High additional investment costs (in teachers' time and money).
3. No group dynamics.

### 6. Field work

1. Students have an opportunity, in a controlled situation, to develop real communication skills and obtain constructive feedback from peers and teachers.
2. Helps students through emotion-laden situations. Provides them with opportunity to be in somebody else's role and develop empathy and understanding.

#### Limitations

1. Time-consuming and strongly dependent on student’s imagination.

### 7. Books, handouts, programmed learning from books, and simulation (self-learning packages)

1. Enables student to work at his own pace.
2. Facilitates self-evaluation.
3. Makes mass teaching possible with high efficiency.
4. High availability.
5. Facilitates decision-taking (solution of complex problems).
6. Reduces risks (for patient or society).
7. Avoids bias transmitted by bad teachers.
8. Allows a good teacher to save time that can then be spent on more complex activities such as interpersonal relations.
9. Can be kept up to date with new scientific developments and contain references to other documents.

#### Limitations

1. Necessitates special educational competence.
2. High additional investment costs (in teachers’ time and money).
3. No group dynamics.

### 8. Role playing

1. Real objects and specimens

1. Presents reality, not substitutes.
2. Three-dimensional.

#### Limitations

1. May not be easily obtainable.
3. Permits use of all senses in study.  
2. Inconvenience of size - danger in use.  
3. Costly or not expendable.  
4. Usually only usable in small groups.  
5. Sometimes easily damaged.  
6. Problems of storage.

2. Size allows close examination.  
3. Good for magnified situation. (e.g. middle ear mechanism).  
4. Can be used to demonstrate function as well as construction.  
5. Can permit learning and practice of different technique.  
6. Some can be made with local material. | 1. Craftsmanship required for local construction.  
2. Simulation models often expensive.  
3. Usable for small groups.  
4. Models often easily damaged.  

2. Assists organization of material.  
3. Photographs nearer to reality than drawings, but association often valuable.  
4. Usually easily produced and duplicated (black and white photos).  
5. Easy to store, catalogue and retrieve. | 1. For small audiences only (unless projected with epidiascope).  
2. For effective use, good duplicating equipment and trained staff needed. |

| 12. Blackboard or flipchart | 1. Inexpensive, can be made locally.  
2. Usable for wide range of graphic representation.  
3. Allows step-by-step build up, or organization of structure or concept. | 1. Back to audience.  
2. Audience limited to 50 or so.  
3. Careful drawings erased, not preserved for future use, except in the case of flipcharts.  
4. Considerable skill required for effective use (rarely taught to teachers). |

| 13. Flannelboard (flannelgraph) and magnetic board | 1. May be used repeatedly.  
2. Usually preparable from locally available materials.  
3. Good for showing changing relationships.  
4. Holds attention if well used.  
5. Very suitable for group participation. | 1. For limited audience only (25).  
2. The instructor needs good skills to use this technique convincingly. |

| 14. Visualized discussion (on cards) | 1. Helps to visualize the opinions of a large group of persons.  
2. Gives everyone an equal chance to present a point of view.  
3. Provides anonymity and is democratic.  
4. Facilitates the grouping together of opinions.  
5. Encourages explicitness and conciseness. | 1. Requires specific equipment.  
2. Considerable skills required from instructor for effective use. |

| 15. Still pictures - opaque projection (epidiascope) | 1. Enlargement of drawn or printed materials for large audiences.  
2. No need for producing slides and transparencies. | 1. Demands total darkness for clear projection (except with very expensive models).  
2. Bulky machine, difficult to |
3. Enlarged image may be transferred to chart or blackboard for copying.
4. Small objects and specimens may be projected.

3. Electricity required.

<table>
<thead>
<tr>
<th><strong>16. Transparencies for overhead projection</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Projectable in full daylight to large audiences.</td>
</tr>
<tr>
<td>2. Presented facing audience.</td>
</tr>
<tr>
<td>3. Relatively easy to prepare with local materials.</td>
</tr>
<tr>
<td>4. Subjects can be drawn in advance or developed by stages with the group.</td>
</tr>
<tr>
<td>5. Can demonstrate movements, processes, etc. with transparent or coloured perspex models.</td>
</tr>
<tr>
<td>1. Electricity required.</td>
</tr>
<tr>
<td>2. Equipment and materials for making sophisticated transparencies expensive.</td>
</tr>
<tr>
<td>3. Not usually suitable for photographic material due to cost (although adaptor available to take 35 mm slides).</td>
</tr>
<tr>
<td>4. Usually restricted to teacher use, as it is not easy to adapt for the learner to use.</td>
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<table>
<thead>
<tr>
<th><strong>17. Slides and Filmstrips</strong></th>
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</thead>
<tbody>
<tr>
<td>1. Suitable for large audiences.</td>
</tr>
<tr>
<td>2. Relatively easy production and (in black and white) reproduction.</td>
</tr>
<tr>
<td>3. Cheapest current forms of visual medium.</td>
</tr>
<tr>
<td>4. Easily adaptable to self-learning packages.</td>
</tr>
<tr>
<td>5. Equipment available for viewing or projection without electricity source (battery only).</td>
</tr>
<tr>
<td>1. Fixed order of frames in filmstrip restrictive in use.</td>
</tr>
<tr>
<td>2. Need partial darkness for viewing unless rear screen or daylight screen used.</td>
</tr>
<tr>
<td>3. Duplication of colour slides expensive (even impossible in many countries).</td>
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</table>

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<tr>
<th><strong>18. Microfiches</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Easy storage and cataloguing of large numbers of visuals.</td>
</tr>
<tr>
<td>2. Exchange of information on available collections.</td>
</tr>
<tr>
<td>3. Very cheap per image if projection can be assured for large groups.</td>
</tr>
<tr>
<td>4. Small and light for easy despatch.</td>
</tr>
<tr>
<td>1. Too small for clear naked-eye viewing.</td>
</tr>
<tr>
<td>2. Although inexpensive equipment available for individual use, large group projection equipment not readily available.</td>
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<table>
<thead>
<tr>
<th><strong>19. Films (8 mm and 16 mm)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Close to reality with movement and sound.</td>
</tr>
<tr>
<td>2. Suitable for large audiences (16 mm); for small groups only (8 mm).</td>
</tr>
<tr>
<td>3. Compression of time and space.</td>
</tr>
<tr>
<td>4. Emotive, can develop attitudes, pose problems, demonstrate skills.</td>
</tr>
<tr>
<td>5. 8 mm loops useful for individual instruction.</td>
</tr>
<tr>
<td>6. Good learning source if preceded by teacher’s introduction and followed by discussion.</td>
</tr>
<tr>
<td>1. Does not permit self-pacing.</td>
</tr>
<tr>
<td>2. Films costly and difficult to produce.</td>
</tr>
<tr>
<td>3. Individual films relatively expensive.</td>
</tr>
<tr>
<td>4. Electricity required.</td>
</tr>
<tr>
<td>5. Equipment difficult to transport.</td>
</tr>
<tr>
<td>6. Darkness needed for viewing (except rear screen use).</td>
</tr>
<tr>
<td>7. Imported film may contain inappropriate information (see item in advantage 6).</td>
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<tr>
<th><strong>20. Open-circuit television</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adaptable to large and small audiences in widely distributed area.</td>
</tr>
<tr>
<td>2. Capable of gaining and maintaining attention.</td>
</tr>
<tr>
<td>3. Can stimulate emotions, build attitudes and develop problems.</td>
</tr>
<tr>
<td>4. Can conserve resources of instructors by simultaneous broadcast to many classes.</td>
</tr>
<tr>
<td>1. Programme expensive to produce and demands highly skilled staff.</td>
</tr>
<tr>
<td>2. Receiving equipment expensive and difficult to maintain.</td>
</tr>
<tr>
<td>3. Electricity required.</td>
</tr>
<tr>
<td>4. No immediate interaction or feedback.</td>
</tr>
<tr>
<td>5. Learner must adapt to a set</td>
</tr>
</tbody>
</table>
### 21. Closed-circuit television and videotapes (including videocassettes and videodiscs)

1. Adaptable to medium and small audiences.
2. Videotape repeatable to fit learning schedules.
3. Film advantages 1, 3 and 4 apply (see above).
4. Valuable for magnification of image, recording intimate situations, micro-teaching, recording of developments in clinical syndromes or in scientific experiments bringing the village into the classroom, recording emergencies, etc.
5. Portable equipment can function on battery for field recording.

<table>
<thead>
<tr>
<th>Programme with no possibility of repeats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High initial cost of production equipment, and requirement of trained staff.</td>
</tr>
<tr>
<td>2. Electricity required. Although portable equipment works off battery, this needs charging from power source.</td>
</tr>
<tr>
<td>3. Receivers are expensive and require maintenance.</td>
</tr>
</tbody>
</table>

### Sound media

#### 22. Radio broadcasts

1. Adaptable to large and small audiences in widely separated areas.
2. Conserves resources of instructors by broadcasting simultaneously to many classes.
3. Capable of gaining and maintaining attention.
4. Reception equipment relatively cheap and will function on batteries.
5. If combined with prepared materials (radiovision) can be improved learning tool.

1. Special studio facilities and staff required for broadcast (less expensive and complex than television).
2. Learners must adapt to fixed schedule, not other way round.
3. No immediate feedback and no audience interaction.

#### 23. Sound recordings

1. Adaptable to any size of audience.
2. Especially suited to individual and small group learning.
3. Because of stop and playback facilities of tape, can be student-paced.
4. Cheap, battery-operated cassette players available, and cassettes relatively cheap.
5. Many uses - to provide sound for slide sequences, for micro-teaching, heart sounds, for posing problems, etc.

| Use for individual learning demands many playback units. |
| Good quality recording demands studio facilities. |

#### Computers

1. Large amounts of educational materials can be stored in a highly concentrated form.
2. Interactive retrieval and use of information.
4. Allows students to learn at their own pace.
5. May be adapted for both individual and group learning.

| Preparation of the programme is time-consuming and sometimes expensive. |
| Microcomputers are expensive to buy, use and maintain. |
| Electricity required. |

... and do not forget that formative evaluation is also a teaching method.

... and of course the INTERNET! (Unfortunately the author is of the wrong age group to help you with this; better ask your children.)

---

Certain pages of the Handbook are printed in large type and can be used as matrices if you should wish to make your own transparencies for projection using an overhead projector. There are different methods, depending on the photocopying equipment available. In general, all you need to do is to place a sheet of transparent, thermosensitive acetate film on top of the Handbook matrix and put the whole in the photocopying machine. In a few seconds you will have a transparency ready to be projected on your overhead projector.
Why problem-based learning (PBL)?

3.47

If we look at what happens in most of the institutions that train health personnel, the main feature seems to be large groups of students (more than 30 and sometimes several hundred) under the authority of a teacher who transmits information to them orally on a particular discipline; the students are in a passive situation, their only activity being to take notes, the quality of which is only indirectly verified by the teachers through examinations where the students are usually required to set down in writing, for each different discipline, the information that has been transmitted to them by the teachers.

If we look at the health professions, however, they are characterized by their complexity and require practical skills, dialogue in a climate of confidence and respect, and the integrated application of different types of information and knowledge from many different disciplines, while all health professionals often have to find solutions to health problems that require the collaboration of other health personnel.

We also know that advances in science are expanding the scope of knowledge at an ever-increasing pace, so that it is no longer possible to teach everything or learn everything; we therefore need to learn how to learn what we need in order to deal with each problem as it appears.

Society thus needs to be able to count on successive generations of graduates who have acquired the skills to find and implement solutions to unforeseen and often complex problems with which they are not familiar, and are able to assemble and make effective use of the resources that are needed to resolve them.

*Throughout the educational programme, the role of teachers must therefore be to encourage students to find and make effective use of the resources they need to carry out their professional tasks, in order to resolve the health problems of the individuals and groups of the community they will be serving as members of the health professions.*

The aim to be achieved is to help students in the course of their studies to become the architects of their own education, which will enable them to go on learning through out the 30 or 40 years of their professional life so as to continue to be able to resolve health problems effectively.

A problem to be resolved is not really a problem until a health worker does not have the competence to cope with it, starting with the ability to formulate the problem; formulation is the first and fundamental step in the overall process of problem-solving.

The role of teachers is therefore to plan learning activities so as to give students the opportunity and desire to formulate the problems identified from different health situations.

Thus it will not suffice to give students pre-constructed problems and/or problems selected by the teachers and to ask them to solve them with the help of whatever basic sciences have been judged to be important and taught by the teachers of the various disciplines. But this is what is being done in most
establishments. One reason for this is that the new approach advocated would be too time-consuming, eludes any traditional form of control and raises all the worries of uncertainty: God only knows what kind of problems students would formulate if left to themselves.

But there is no question of students being *left to themselves during* the period of their training, even though they are indeed going to be *left to themselves afterwards*, and for very much longer.

The argument that *it would take too long* would be true if every student were to formulate *all* the problems it is possible to formulate today. But as it is not possible to teach *everything* (which is admitted by teachers, even though they regret this so much that they still try to do so), teachers must help students to master the ability to *formulate a problem*. This is a *constant* among the aims to be achieved, whereas the timing and content of knowledge can only be *variables*.

We must once again stress that it is the role of teachers to ensure that students are given the opportunities to identify the health problems that are important, to develop explicit objectives (professional profile), and to formulate problems and resolve them successfully.

Programmes of study should therefore set aside sufficient time for personal study to enable students to prepare themselves through observation, reflection and reading to meet with tutors in small groups to continue their analysis of problems of common interest. The role of the tutor is not then to be an expert on the problem of the day, but to facilitate discussion and promote interaction within the group. At the outset of their studies, as students have been conditioned by the traditional approach to wait upon the wisdom of their teachers, the tutor’s role will be to ensure, by asking questions and not by giving answers, that the students explore the areas of knowledge *relevant to the problem* selected. As the programme proceeds (and experience shows that this stage is soon reached), the students become capable of identifying the information they need more or less unaided. The evaluation process allows this to be verified.

With the help of the teachers and a method of work that teaches them to *learn how to learn*, the students thus arrive at an *active and responsible* attitude based on the confidence that they will be able to rely on their own resources to resolve the health problems they will encounter in the course of their professional life.

There are certain fundamental principles that are essential to this approach.

One of these principles is learner-centred education (refer back to definition on page 1.79).

**Learner-centred education**


According to this principle, although teachers still have considerable responsibility at the outset for helping students to acquire the experience they need, *students are ultimately expected to assume the entire responsibility for what they learn*. The emphasis is on the *active acquisition by students of information and skills*, and this will depend on their ability to determine their own educational needs, the best ways to set about learning, the speed at which they are able to work and their ability to evaluate their own knowledge. The teachers are there to give them the advice they need until they have learned to work completely independently. The teachers still retain full responsibility for certifying evaluation.
In the methods in which the emphasis is on learning, as in those where the stress is on teaching, teachers should define what they consider to be appropriate learning objectives, identify relevant sources of information and develop means of evaluation that will not only reflect their own experience and knowledge, but more specifically the health needs of the community. With the teaching-centred approach, these materials will result in rigid prescription of what the student is supposed to learn. With the learner-centred approach, these materials will serve both as guidelines and as resources to be used and adapted as the students find appropriate to take responsibility for their own education.

The students thus learn how to learn so that they are able to adapt to the problems they will encounter throughout their future lives. Thus they become the architects of their own education.

Teachers play a critical facilitating role as catalysts of learning, but their main task is to eventually make themselves redundant as their students progress to the stage where they can dispense with their help.

---

The only way to discover what you already know, what you have stored in your memory banks, is to work with a problem.

H.S. Barrows, 1984

It is more important to consider how much the learner learns than how much the teacher teaches.

H.S. Barrows & R.M. Tamblyn, 1980

**Discovery learning and the case study method**

3.50

The concept of discovery learning is based on the idea that when people try to interpret any aspect of reality or to understand new information, they do so by formulating hypotheses based on prior knowledge which facilitate the process of understanding.

In summary, it can be said that discovery learning confronts students with problems which they clarify through discussion with their colleagues. Discovery learning is supposed to stimulate deeper insight into reality; to develop the capacity for thinking; and to encourage the innate desire to learn, facilitating the assimilation and memorization of what is learned, because that information has significance for the learner.

The case study method, originally devised at Harvard University in the United States, is essentially based on practical experience, leading to the conclusion that graduates are often very poorly equipped to apply much of the knowledge they have acquired during their formative years and that the curriculum should provide learning environments that enable students to learn how to use the information acquired.

The case study method can be outlined briefly as follows: students are offered a concrete description of a situation or problem encountered in professional practice containing all the facts and opinions they will need to initiate and feed a process of decision-making. The relevant information is usually accompanied by some irrelevant material so that the solution is not too obviously suggested. Students may be offered a set of facts about symptoms, for example, and asked to imagine that they are responsible for the management of a patient, and must decide what clinical tests are needed. The students must take all these conditions into account and outline a differential diagnosis, putting forward good reasons to justify their choice.

The case study method is supposed to allow students to develop a number of mental
habits, namely:

- to learn to analyse a problem critically;
- to recognize complex relationships between different elements;
- to reinforce prior knowledge by applying it in practice;
- to learn to collect information that is relevant to a particular problem in order to resolve it.

Research has shown that this approach is preferred to other methods of study by students as it makes them feel more involved in the problem in question.

The definition of problem-based learning

This method is now fairly widely used in medical education, in particular, to quote the most well known examples, at the Faculty of Health Sciences at McMaster University, Hamilton, Canada; the Faculty of Medicine of the Suez Canal University at Ismailia, Egypt (Nooman et al., 1982); at Newcastle, in Australia (Engel & Clarke, 1979); at Maastricht, in the Netherlands (Majoort & Schmidt, 1990); and at the Faculty of Medicine at Sherbrooke, Quebec, Canada. Other examples have been mentioned by Katz & Flp, 1980, 1981.

Problem-based learning is a process whereby a student learns by using a problem as a stimulus to discover what information is needed to understand and facilitate the resolution of the problem. The problem is encountered right at the beginning of the learning process.

What is a problem?

A problem for the purposes of learning is the (more or less neutral) description of a certain number of phenomena or events which appear to be related in certain ways. The students must first learn to account for these phenomena, and then gradually work out a plan of action to resolve the problem and acquire the necessary skills to implement it.

The term problem must be viewed in a fairly broad perspective, as it covers more than just the concrete tasks that will have to be carried out in practice by a health professional. The learners may be required to lead a discussion on a particular topic, examine a theory with a precise end in view, or give a concrete description of certain phenomena.

Problems may be constructed to cover several topics and presented in various different formats, but the basic principle is always the same: these are phenomena or situations for which the students must produce one or more explanations and/or propose and implement the relevant solutions.

The aims of problem-based learning

The students for whose training we are responsible must acquire:

1. A fund of essential skills and knowledge which they can easily retain and retrieve later in the course of their professional work.

2. The ability to make use of their skills and knowledge to evaluate and manage the health problems of individuals and the community.

3. The ability to extend or improve these skills and this knowledge, and to take appropriate action in the face of any problems they may encounter in the future.
Problem-based learning sets out to accomplish all three of these aims simultaneously.

**Construction of self-learning packages and problems**

3.52

The construction of an educational programme using the problem-based learning approach requires a different and more flexible way of thinking than is generally found today in the world of higher education. The basic elements of this kind of programme are the health problems prevailing in the community. The programme must be entirely learner-centred - but this does not mean that the learners must do everything by themselves. Teachers or instructors and the entire faculty must be actively involved at the planning stage, devise learning materials and units, draw up lists of fundamental concepts and perfect their skills at tutoring small groups of students, devising systems of evaluation, etc. In other words, the teachers must ensure that the programme has all the features of problem-based learning.

The backbone of the programme will consist of sets of learning materials or *didactic problems*. Each set may be composed of several learning units.

The *didactic problems* presented to students from the start of the course must meet one or preferably several of the following *criteria*:

1. **Prevalence** - the health problem (or disease state) is frequently encountered in the community.

2. **Gravity** - the problem is important, life-threatening or urgent and requires immediate and effective intervention.

3. **Possibility of treatment** - it must be clearly evident that intervention for prevention, treatment or rehabilitation will do more good than harm.

4. **Clinical logic** - the problem lends itself to the development of clinical reasoning, history-taking, physical examination and diagnostic tests and will furnish the opportunity for differential diagnosis.

5. **Prototype value** - even a rare disease or problem may be an excellent model for study if it facilitates understanding of other, more common problems.

6. **Interdisciplinary aspect** - the case lends itself to theoretical study involving several disciplines (contributing basic sciences).

   1 Adapted from the criteria used by McMaster University, Hamilton, Canada.

**Educational approach**

In addition to the concept of *relevance*, there are certain educational criteria that need to be taken into account in selecting didactic problems. Priority problems and diseases should also serve the following *educational functions*:

1. Provide clear guidance to students for self-directed learning and reinforce their motivation to learn.

2. Guide the selection of patients to offer specific illustrations in small tutorial study groups.
3. Facilitate the selection of learning sites.

4. Determine the assignment of patients to students in their periods of clinical practice.

5. Form the basis for the evaluation of the students' performance, stating what is required of them, since it is *what is going to be evaluated that will determine what they learn and how they learn.*

6. Permit the construction of self-evaluation materials to provide students with feedback on their strengths and weaknesses.

7. Identify resources for programme review and a critical evaluation.

**The ten stages of problem-based learning in small tutorial groups**

3.53

(sessions of 2-3 hours, roughly twice a week)

1. Clarify terms and concepts.

2. Formulate problem and identify its components.

3. Suggest possible explanations.

4. Schematize and classify these hypotheses.

5. Identify learning issues (formulate enabling educational objectives).

6. a Acquire information relevant to the problem.

7. Synthesize and check the newly acquired information.

   7.1 Formulate the most likely explanation.
   7.2 Propose what action should be taken.
   7.3 Carry out the action.
   7.4 Verify the effectiveness of the action.

8. Formulate research questions.

9. Assess the process of work in the group.

10. a Assess one's own work.

   a Individual work.

**Choice of format for the presentation of problems**

3.54

Problems should be presented in a variety of formats, not only to exploit their particular educational value in promoting problem-based learning, the handling of clinical problems and the stimulation of critical thinking, but also to sustain interest and motivation among students in tutorial groups.

Several different formats are possible:

(a) Simple didactic problems stated in written form.
(b) Problems stated in writing, with a file of supporting documentation.

The file contains additional documentation such as photographs, radiographs, laboratory reports, etc., which illustrate the problem or which the students are asked to interpret.

In a urology unit, for example, the health problem selected concerns a 67-year-old man, Mr John Smith, who has cancer of the bladder. The problem is described giving all aspects of normal and abnormal morphology and details of the diagnosis and management of bladder cancer. A set of learning materials would include a slide tape show with spoken commentary illustrating the normal morphology of the urinary tract, some X-rays, some normal and some pathological samples from the urinary system, photographs and a three-dimensional ileostomy model (adapted from H. Barrows).

(c) The programmed patient.

The programmed patient (or P-4 packs, as used by H. Barrows) consists of a set of cards describing the various aspects of a patient’s problem (verso) under the following headings (recto): presentation, history-taking, physical examination, laboratory tests, consultations and initiation of treatment. The students decide for themselves the order in which they take these headings to elucidate and deal with the patient’s problem.

(d) Simulated patients.

Simulated patients are actors who have learned how to simulate a real patient (they are able to respond to history-taking questions, describe pain and symptoms, present sensory and motor deficiencies, appear depressed or hysterical, etc.) and are also able to provide feedback on the behaviour of the students in their interaction with them.

(e) Videocassettes.

(f) Computer presentation.

In a computer presentation, the text is stored in a computer. The students work at terminals with the help of an instruction manual.

The students choose one of five possible patients (all complaining of the same abdominal pain) and then select the information they wish to obtain from the options offered under the headings of case history, physical examination and investigation. Depending on which patient they choose, the answers lead to one of the five following diagnoses: acute pancreatitis, acute cholecystitis, renal colic, acute appendicitis or Crohn disease. The students may then move on to initial case management, and finally to complete case management if they so wish. Feedback is provided in the form of scores for each item requested and a summary of the treatment issues involved in the case in question (adapted from H. Barrows).
Definition of objectives
Selection of health problems corresponding to the professional profile
Designation of people to devise didactic problems

Conception stage
Selection of problem format
First draft (on word processor)
Inventory of materials needed for illustration
First draft of list of resource materials
First search for references by the library

Review of problem content by experts
Preparation of questions on the topic/content
Verification of the list of resource materials
Inventory of existing resource materials
Preparation of resource materials needed

Production stage
Preparation of final draft
Printing and distribution (including resource materials)

Operational stage
Provide students with didactic problems as and when required
Catalogue of resource materials
Periodic evaluation and review

Initiation of the learning process

3.56
There is no standard procedure for initiating a process of learning. It all depends on the overall educational method that has been chosen, your own inclinations and your attitude towards your students. Most authors stress that it is important that students should be exposed to the problems of professional practice right from the start. When students are confronted with problems which they are not able to cope with fully - or perhaps at all - they are stimulated and encouraged to learn and to work to acquire the knowledge and skills needed to deal with the problem. They very quickly take over and abandon the passivity of students who are accustomed to waiting for ready-made solutions from their teachers.

The following is an illustration of what might take place in the first few weeks of this type of programme:

(a) Before the students are exposed to any problem, they should first be asked what they expect to gain from their future training, what they plan to do later, what they are hoping to learn, and how they feel that their studies should proceed, etc. The answers should be collected for analysis and feedback to the students.

(b) All the faculty staff (including tutors and administrative staff) should be introduced to the students and the types of educational and research activities proposed should be outlined; the students should be encouraged to ask questions and given a guide to the facilities and staff.
(c) The methods of teaching and learning used by the institution should then be described and discussed. The principles and procedures involved in the chosen approach, including the respective responsibilities of the faculty staff, tutors and students, should be clearly specified.

(d) The students should also be introduced to the material and other learning resources available (library, laboratory, etc.).

(e) The hopes and expectations of the students should then be summarized and discussed.

(f) The general learning objectives should also be presented and discussed in terms of the students’ expectations (see (a)).

(g) The overall plan of the curriculum should be presented and discussed.

(h) The students should be divided into small groups (4-6 participants) which will work together under the supervision of a tutor.

(i) The students should then be asked to carry out a survey, partly in the field, to identify the priority health problems in the population; the students should present the results of their surveys and the methodological, practical and other difficulties encountered at a plenary session.

1 This plan is partly based on the approach used in the first two terms at the School of Nutrition of Oslo University.

From this point on, the way in which you continue will depend on the educational approach you have chosen, and the time and resources available. But one thing is certain - experience has shown that the students will then be highly motivated and keen to learn more. The question of method will have become an important concern and communication skills will also be highly important in their eyes. If you have opted for a problem-based learning approach, it will now be time to give your students some guidance in formulating their own short-term learning objectives, before they start to choose learning modules, embark on further field work, or meet with future colleagues and put questions to them about their work.

The tutor’s role

3.57

In addition to the didactic problems constructed for (or by) the students, guidelines also need to be drawn up for tutors, stressing the fact that the tutor’s role is to give guidance and not to direct; to facilitate learning and not to give lectures or factual information; to organize work in small groups; to help the groups progressively to take charge of their own activities; to coordinate evaluation that is effective and useful; and to set a personal example of self-directed problem-based learning.

EXERCISE

Describe the role played by the teaching staff in the programme to which you belong; list the activities they carry out when they are in contact with the students;
Describe the role that could be played by the teaching staff in a problem-based learning programme; list the activities they ought to carry out:

---

**The tutor’s role: primum non nocere**

**3.58**

The tutor’s role is to be continuously attentive to the discussion and only to intervene if the discussion no longer seems productive for the members of the group.

More specifically, this will involve:

- demonstrating motivation, always being on time and capable of prompting the students by asking questions that will help to clarify objectives;

- taking an interest in the educational sciences (especially problem-based learning, community-based learning, etc.), concentrating attention on the students and on the group learning process so as to be able to give the right advice at the right moment to help the group to work as effectively as possible;

- controlling the group learning process and taking a personal interest in students when they find it difficult to work with the group;

- having an overall view of the problem and being able to tackle problems by the ten stage method or any other method whereby the problems that arise are systematically tackled in stages;

- being familiar with the concept of problem-based learning and favourably disposed to the objectives of group work;

- highlighting in a stimulating manner at the end of each session any aspects of the problem that have been overlooked and being able to make constructive criticism of the students;

- asking thought-provoking questions without directly supplying the answers;

- at the end of each session, giving students some comments on their own performance and on the work of the group as a whole, e.g. general comments to the student acting as the facilitator of the discussion and to the other participants; suggestions for reading; checking on their learning objectives; checking factual information (right or wrong); developing the students’ background knowledge; any other comments to make for effectiveness in the group’s discussions;

- allowing students to take responsibility for their work and not acting as an inspector;

- allowing the group to find its own way (not talking too much - nodding or a few short words should suffice) and sticking as far as possible to the role of a concerned observer;

- taking note where necessary of the observations made by the students;
- especially in the first years, not acting like an expert in the topic under study in the tutorial group, but concentrating instead on the structure of the discussion, the manner in which the problem is approached and the behaviour of the students, e.g. by offering to play the role of patient when necessary and thereby giving the students the benefit of his experience;

- in the final years of the course, it is sometimes useful for the tutor to be a specialist in the problem under study, but he must not give too much background information on the subject, allowing the students to learn from their own mistakes;

- not acting as a (second) leader of the discussion (or as a specialist in any discipline), not being dominating, and acting more as a constructive supervisor;

- not directing the discussions by attempting to apply rigidly the instructions for tutors prepared by the planners of the course or by imposing their own conception of the problem, but letting the discussion follow the lines of the students’ own analysis;

- letting one of the students direct the discussion, only intervening if a difficulty arises, commenting on the work of the group but not of the individual student in question, and giving the students the necessary guidance and information.

Tutors should rotate between the groups during the course, but should not change in the middle of a period reserved for any particular problem.

EXERCISE

Check whether your second list on page 3.57 coincides with this.

The action and concept tree

3.59

This is a useful tool for establishing what knowledge is needed for solving a health problem (stage 5 of problem-based learning, p. 3.53).

For each priority health problem selected, a list should be compiled of the actions to be undertaken and the concepts regarded as essential for understanding and solving the problem.

The tree is a diagrammatic representation of the relationships between the various concepts, starting with the concept or concepts that need to be understood in order to understand the others. The aim is to identify the concepts to be understood (at the end of the branches of the tree) for each of the actions to be undertaken (main branches). The end result is a set of actions for solving health problems corresponding to the functions of a professional profile: for the general practitioner, these actions are treatment, prevention, management (planning, implementing and evaluating), health education, training, research, multiprofessional collaboration.

The student should then identify the documentary sources corresponding to each concept (book, article, duplicated handout) and study them (stage 6 of problem-based learning).

Construction of the tree is not a familiar task for either teacher or student; so it seems advisable for the teaching team to supervise the student closely before and during this process, which constitutes the basic process for all
problem-solving. The students encounter two difficulties: (1) in differentiating between \textit{actions} and \textit{concepts}; one way of overcoming this difficulty is to use a verb in the imperative mood for each action; (2) in establishing a hierarchy of concepts; here the student is helped to specify the precise nature of the relationship between two concepts by using expressions such as \textit{based on}; \textit{requiring}; \textit{conditioned by}; \textit{dependent on}; etc.

The example given on the following page is complex (perhaps too much so). The problem selected is the one faced by a student of public health who wants to plan his own training. The actions are readily distinguished from the concepts because they start with a verb in the imperative mood.

\textbf{Exercise}

Select a health problem and construct the corresponding tree. Show it to a colleague and discuss it with him. You will find that the tree is a tool that facilitates exchange of ideas.

Bibliography: see Chapter 7.

\textbf{Figure 1: Actions and concepts tree}

\begin{center}
prepared by P. CHASTONAY (1995)
\end{center}

3.60

\textbf{Self-learning packages}

3.61

If you agree that one of your functions as a teacher is to prepare learning aids for your students and to help them obtain the information they need for independent learning, then read the following pages which explain what self-learning packages are and give an example of this learning technique.

We have seen that a professional task derived from an intermediate objective may serve one or more specific objectives, either final or enabling. The task must be broken down to the level of the specific objective, which must have two characteristics: it calls for a single activity; and it can be satisfactorily evaluated by applying one criterion or a group of criteria measuring a given domain.

Such a specific objective, or task, constitutes the basis for constructing packages designed to facilitate self-learning.

Each self-learning package will comprise:

1. The statement of the specific objective.

2. The full documentation needed to achieve the objective. This may include references to any of the following: existing papers, tape recordings, slide sequences, places, persons, and so forth.

3. A formative evaluation instrument to enable the student to assess the extent of his success in reaching the objective.

In some cases, several closely linked specific objectives are related to the same learning activity. It is then advisable to avoid too detailed a breakdown, and to combine the different packages for such a learning activity into one super-package.
A self-learning package is a document containing all that is necessary for a student to attain one or more educational objectives independently of the teacher. Using these packages, the student can take over a large part of his training, while the teacher remains available when needed.

The technique of self-learning packages is similar to that of the Keller plan (see Bibliography), but the latter also includes the coordination and supervision of the student's activity by monitors, and group work sessions to stimulate students' motivation.

A simple example of a self-learning package is given in the following pages. More complex examples would also include: slides and transparencies, X-ray photographs, loop films, laboratory and field work, and so forth.

Self-learning package

3.62

WHO-sponsored Training Course in Epidemiology

Main topic: Sampling
Sub-topic: Sampling techniques (Prepared by Mr. T.K. Sundaresan)

Relations to the functions of the epidemiologist.

Sample surveys are an efficient and economical means for obtaining information on matters of epidemiological importance, e.g. prevalence of specific diseases. There are several sampling techniques available to suit different practical situations and specific objectives of the investigation. For a given situation one technique can be more efficient and economical than another. A knowledge of these techniques, their advantages and disadvantages greatly helps in choosing the most appropriate technique for that situation.

Educational objective (Ref. No. 5.6)

After studying this document and doing the exercises listed at the end you should be able to suggest the appropriate sampling technique for most epidemiological investigations.

Prerequisites to understanding this section

1. Understanding the concept of random sampling (Educ. Obj. No. 5.2)
2. Understanding the terms precision and accuracy (Educ. Obj. No. 5.3)
3. Understanding the concept of confidence intervals (Educ. Obj. No. 5.4)

Note: These references are to a document distributed to participants at the WHO Training Course.

Preamble

The epidemiologist, wishing to carry out a sampling investigation, has often to choose one of several techniques of sampling. Some of the considerations that play a role in the choice of the most appropriate technique are: availability of a suitable frame, facility of the field operations, acceptable precision of the estimates, the sub-categories of the population for which separate estimates are required, etc. There are many techniques available but in this package only the following will be considered:

1. Simple random sampling
2. Stratified sampling
3. Two-stage sampling, and
4. Cluster sampling

1. Simple random sampling
Definition: A sample of size \( n \), drawn from a population of size \( N \) in such a way that every possible sample of size \( n \) has the same chance of being selected, is called a *simple random sample*.

Example: It is desired to determine the prevalence of a certain infectious disease among the 1000 people in a village \( (N = 1000) \). The desired accuracy of the estimate dictates that 100 people from the village must be examined for the disease \( (n = 100) \). A list of all inhabitants is obtained (the population frame). Then, using a table of random numbers, a sample of 100 persons is selected in such a way that each person in the village (i.e., each entry in the list) has a 10% \( (n/N) \) chance of being selected for the examination.

**Advantages:**

1. Simple design.
2. Requires no knowledge of the distribution of the study variable in the population.

**Disadvantages:**

1. Requires a population frame which can be expensive or simply not available.
2. Travel expenses could be high if the population is spread over a large area.

2. **Stratified random sampling**

Definition: A *stratified random sample* is one obtained by first separating the population into non-overlapping groups, called *strata*, and then selecting a simple random sample from each stratum.

Example: Continuing with the example given above for simple random sampling, before selecting the random sample of 100 the entire population is divided into age groups (stratified on age). Then a simple random sample is taken from within each age group (stratum). The total number of examinations is still 100, but now the prevalence is available by age group and the precision of the overall prevalence estimate is improved. This improved precision is due to the fact that sampling is now done within more homogeneous groups (under the assumption that prevalence is correlated with age).

**Advantages:**

1. Estimates are available for each stratum of the population and not just one overall estimate, as in simple random sampling.
2. Some gain in the precision of the overall population estimate, with an appropriate method of stratification.

**Disadvantages:**

1. A population frame is required.
2. Certain preliminary information is required on the variable(s) to be used for stratification. This may be expensive or simply not available.
3. While stratifications on certain variables may improve the precision of the estimate of one parameter (prevalence of a disease, in the above example), it may give rather poor estimates for other characteristics to be studied at the same time (e.g. fertility).
3. Cluster sampling

Definition: A cluster sample is a simple random sample in which each sampling unit is a collection, or cluster of elements.

Example: Continuing with the above example, if a population frame is not available, then the sampling may be done as follows: a list of dwelling units is drawn up; this is much easier than a complete list of individuals. A simple random sample of dwelling units is selected and all individuals in each selected unit are examined.

Advantages:

1. Reduction in travel costs.
2. Complete population frame not necessary.

Disadvantages:

1. The variability within and between clusters must be considered. If the variability within a cluster is low, this could lead to unnecessary within-cluster precision, using the same number of examinations, while insufficient precision is obtained for the overall estimate.

4. Two-stage or sub-sampling

Definition: A two-stage sample is obtained by first selecting a sample of groups and then selecting a (sub)sample of elements from within each of the sampled groups.

Example: Continuing with the previous example, the investigators decide to use the list of dwelling units, as the population frame is not available, but wish to cover more dwelling units with the same number of examinations. A simple random sample of dwelling units is selected, then, as the second stage, a simple random sample of the individuals within each of the selected dwelling units is chosen.

Advantages:

1. Wider coverage. If it is believed that individuals within the same dwelling unit are similar with respect to the quantity measured, then it makes little sense to measure the same thing so many times.
2. Does not require a complete population frame.
3. Reduction of travel costs.

Disadvantages:

1. It can sometimes cause difficulties to include in the sample only a portion of a household or group.
2. Incomplete information concerning the distribution of the quantities measured at the various stages can lead to poor results.

Self-testing exercises

3.64

^ For answers see answers.
A. A survey is planned to determine fertility rates in a large geographical area for which no accurate lists of individuals exist; however the villages and towns are well documented.

1. Suggest two possible sampling schemes.
2. State two advantages that each has over the other.

B. It is desired to know the morbidity rate among the population of a city. The results of a recent census, including age and sex, are available.

1. Suggest two possible sampling schemes.
2. State two advantages that each has over the other.

C. It is desired to estimate the prevalence of tuberculosis in a country. The population census is at least 10 years old and it is known that movements of population may have taken place. It is also suspected that the prevalence in urban areas is likely to be different from that in rural areas. Make any assumptions, relevant to your country context, on operational factors and suggest a sampling scheme.

answers

3.65

A. 1. Cluster and two-stage.

A.2. Cluster over two-stage:

- reduced travel cost (must visit fewer villages)
- simplified design
- requires less knowledge of the distribution of the variables measured

Two-stage over cluster:

- wider coverage (provides estimates for more towns and villages)
- more flexible, one can alter sampling fractions to attain increased economy if there is some preliminary knowledge about the variability among villages.

B. 1. Simple random and stratified random

B.2. Simple over stratified:

- simplified design
- no prior knowledge of the distribution is necessary

Stratified over simple:

- estimates by age and/or sex may be obtained
- more precise overall estimates may be obtained

C. Suppose it is most efficient operationally

1. to examine all members of the household once a household is selected, and.
2. to station the mobile X-ray van and the team in one area for at least one week.

And suppose that 50 individuals can be examined in one day, and further that at least 20,000 individuals have to be examined to yield an estimate with
acceptable precision.

The following can be recommended as one possible procedure.

Because of the operational factors outlined it would be best to adopt a multi-stage cluster sampling, stratified into rural and urban areas. Suppose it is decided to examine 10,000 individuals in the rural and 10,000 in the urban areas. Taking as an example the rural areas: the 10,000 individuals could be considered as the population of 40 clusters consisting of 250 individuals in each cluster (50 individuals per day) for five days a week. If the average household size is 5 this would mean 50 households in each cluster.

Based on the old census, the country can be divided into its major administrative divisions, and the 40 clusters allocated to these divisions, in proportion to their population. Within each major administrative division, minor divisions where the cluster should be located may be selected at random at the second stage. Further stages may be introduced if the divisions are large.

Once the last stage, say a sub-division with a population of around 1000 is reached, a complete census of this sub-division is made and a household selected at random. Fifty consecutive households in a predetermined order will give the required cluster.

**Criteria for priorities in selecting packages**

3.66

1. They should deal with an educational problem of major importance for the majority of students.

2. They should be directed to the solution of a health problem of major importance for the people.

3. They should make good a deficiency in the existing teaching system or in existing educational tools.

4. They should not needlessly be superimposed on another package dealing with the same problem.

5. They should allow for the possibility of prompt updating when required.

6. They should be more effective and economical than any other educational tool serving the same purpose.

**Educational concepts that are useful in weighing the advantages and disadvantages of self-learning packages or other teaching methods**

1. Educational activities should be directly related to the tasks to be performed by the trainees (relevance).

2. Tasks should be explicitly defined and should correspond to community health needs.

3. Educational activities should be designed to meet students’ needs, with emphasis on individual training and the possibility for each student to work at his own pace, even in mass teaching situations.

4. The educational system should provide the student with the work tools he needs for his continuing education.

5. Educational activities should if possible take place in the same sociocultural environment as that in which the professional tasks will be performed. They should include the practice of the same skills as will be required in real
problem-solving situations.

6. All training activities must be accompanied by formative evaluation.

7. Learning techniques must also undergo evaluation during use in order to ensure that they really correspond to the students' needs and are in accordance with the sociocultural environment; they must also be practicable in use for both students and teachers.

8. The overall evaluation of the programme must be incorporated in the system.

How to use the packages

3.67

Some introductory remarks on the construction of a student-oriented programme

3.68

It has already been said that the educational spiral should be taken into account in constructing a programme (see p. 3.03).

Other major considerations are:

The student should be motivated. Learning is not only an intellectual but also an emotional process. The student's motivation will be all the greater if he takes part in preparing his own learning programme. This is a fundamental consideration, and will be dealt with later (p. 3.75).

The student should be able to see the links between his different learning activities. However, the health professions have become more and more complex and teaching institutions have had to use an ever greater number of teachers in a growing variety of subjects. The result has been a disintegration of programmes. It is therefore important to ensure that the programme is not itself constructed in such a way as to be a source of disintegration. The student should be enabled to participate in a large number of learning activities, either simulated or real, which should constitute true exercises in integration.

The student should be able to connect practice with theory.

In most teaching institutions, this connection is rarely close. Very often, the emphasis on theory in examinations has an unbalancing effect. The learning programme should be oriented to the real-life situations that will be met in the course of future professional activity. As he tackles each health problem the student should become gradually more proficient in analysing a situation, gathering the necessary data, perceiving the relevant theoretical bases, perhaps through the use of self-learning packages, and profiting from a self-evaluation test that keeps him informed of his progress.

If the above elements are kept in mind, the learning programme will leave room for individual training and enable the student to develop a method of work that will serve for his effective continuing education.

The role of the teacher is of prime importance for the proper implementation of such a programme. It was described on pp. 3.31-3.35.

The essential point in constructing a student-oriented programme is to organize the rotation of students from different years in the different places of learning activity (professional sites) in small groups under the responsibility of teacher-coordinators; in that way students are progressively confronted with health problems according to their level of abilities.  

They have at their
disposal a variety of self-learning packages and other sources of information and experience such as workrooms, library and laboratories, while their efforts are guided and their progress is measured by a system of formative evaluation based on pertinent educational objectives

A more detailed description of the advantages and limitations of this concept, called community-based education, can be found in WHO Technical Report Series, No. 746, 1987 (Community-based education of health personnel: report of a WHO Study Group).

The scheme outlined above is oriented to students’ learning needs, and is a far cry from a teaching programme conditioned by the competency and availability of the teachers.

After doing some of the exercises in selecting teaching methods (pp. 3.69 and 3.70), you could refresh your memory on integrated teaching (pp. 3.71 and 3.72) and also on integrated learning (p. 3.73), before going on to consider how to plan programme reforms (pp. 3.78 - 3.89) with all that implies in the way of constraints and obstacles to innovation and change.

EXERCISE

3.69

Do the following exercise if you wish to gain practice in selecting appropriate teaching methods and/or educational media to help students attain a given educational objective.

Look at the specific educational objectives on page 1.64 or take any other specific objective you may prefer, and select the appropriate method(s) or media (indicating the number, from 1 to 20, for each given on pp. 3.40 - 3.46), and describe the constraints likely to be encountered in your institution.

<table>
<thead>
<tr>
<th>Objective no.</th>
<th>Method or media</th>
<th>Constraints to be overcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (p. 1.64)</td>
<td>handouts (7)</td>
<td>requires the duplicating of patients’ histories, with no budget provision up to now for paper or machine; peer-teaching is not customary and will need a trial period.</td>
</tr>
<tr>
<td></td>
<td>work in small groups (2)</td>
<td></td>
</tr>
<tr>
<td>2 (p. 1.64)</td>
<td>field work (6)</td>
<td>requires long preparation including the prior selection of families to be visited in collaboration with a social worker.</td>
</tr>
<tr>
<td></td>
<td>work in small groups (2)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
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<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Check whether your choice is consistent with the educational concepts on p. 3.65.

EXERCISE

3.70

Look at the educational objectives on page 1.64, or take any other specific objective you may prefer, and describe two teaching methods that will enable a
class of 200 students of the same year to attain the objectives. Compare the two methods using the criteria appearing in the following specification table, according to the following code:

- **Effectiveness** (the capacity of a teaching method to help a learner to reach a given objective) is either high (8), average (6), or low (2). For example, a method is all the more effective if it encourages the student to be active, emphasizes the personal nature of learning, highlights self-evaluation, permits confrontation of ideas, facilitates discovery.

- **Cost** (the resources expended in carrying out a teaching method; resources *largo sensu*: salaries, time spent by teachers and students, including transportation time, etc.). Cost may be high (2), average (4), or low (5).

This code extends from 4 (low effectiveness and high cost) to 40 (high effectiveness and low cost). To be acceptable for use a method’s index should rate at least 24.

- **Feasibility** (see definition under practicability page 2.34) should be considered as can be done immediately but also could be done soon. In the following example the hand-out may not be immediately available but its cost/effectiveness index is high enough to warrant its preparation as soon as possible.

1 This code was prepared in collaboration with T. Freyvogel (Basle) and L. Roy (Geneva).

**Examples of Teaching Methods for a class of 200 students**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Establish the differential diagnosis of a case of anaemia on the basis of the haematological data in the patient’s records.</th>
<th>Effectiveness</th>
<th>Cost</th>
<th>Cost Effectiveness Index</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Lecture on the differential diagnosis of anaemias-1 hour</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>** **</td>
</tr>
<tr>
<td>II</td>
<td>Handout giving book references on anaemias, patient histories, and a self-testing exercise</td>
<td>6</td>
<td>4</td>
<td>24</td>
<td>0 ***</td>
</tr>
</tbody>
</table>

**Examples of Teaching Methods for a class of... students**

<table>
<thead>
<tr>
<th>Objective</th>
<th>The student should be able to</th>
<th>Effectiveness</th>
<th>Cost</th>
<th>Cost Effectiveness Index</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Immediate</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Soon</td>
</tr>
</tbody>
</table>

2 Choose a number of students corresponding to your own situation.

**The concept of integrated teaching**

3.71
1. Definition

Integration (from the Latin *integer* = whole) means coordination of different activities to ensure harmonious functioning.

This definition suggests that the result of harmonious functioning will be greater efficiency. In our materialistic world efficiency is a dogma. In the developing countries it is the key to survival. Neither the idea nor the word is new. At present both are fashionable and, as is often the case in such situations, infatuation and passion are more in evidence than logical analysis and objective appraisal. Such things are used, abused, transformed and deformed.

The password is integration. What is integration?

We are concerned here with the meaning of integration in the field of professional education and training. To paraphrase the definition given above, integration in this field is the coordination of different teaching activities to ensure the harmonious functioning of the educational process for more effective health manpower development.

2. The purpose of integration

Before the era of the mega-universities with thousands of students and before the era of specializations stemming from a technology ramifying in all directions, the health professions were learned in the presence of the patient and in direct contact with the professor - a natural source of integration. During training, there were of course several professors and the student - second natural source of integration - assimilated, analysed and synthesized the information.

Since the beginning of the twentieth century, the university-factory, the numbered and card-indexed student, and the super-specialist have made their appearance. Fundamental and staggering scientific discoveries are being made faster than textbooks are revised and reissued. Research laboratories are draining away and absorbing funds intended for training centres. Teachers engage in research since their future depends on the results they obtain in their field. Without organized teacher-training, they are entrusted with students who are not supposed to appraise their performance. Reputation depends on the number of publications rather than the quality of the health personnel trained.

Theoretically, the health worker, once trained, is a complete and integrated element. In practice, he is the outcome of a non-integrated training lacking in human feeling.

Human feeling, the concept which should inspire students and teachers, implies concern for improving the health of the people and should be the basis of the educational objectives of the university centres for health sciences. These objectives, shared by teachers and students alike, will be more easily attained if the various teaching activities function harmoniously; hence the concept of integrated teaching.

3. The advantages of integrated teaching and its limitations

The advantages attributed to integrated teaching are many and attractive. They include the synthesized presentation of important health problems, the avoidance of contradictions and pointless repetition, the respect for a logical order and the pruning of non-essential details, the improvement of the quality of teaching and teachers through emulation and of the relations between departments, and a better utilization of teachers.

Yet some faculties that have tried it have given it up. A much larger number claim to use it but, in fact, do not do so or do so only partially.
Why is it then, that in spite of so many advantages, this method has met with more failures than successes after a very large number of trials over the last 35 years?

We do not pretend to give here a reasoned answer to this question, or statistical data for or against the method. The facts can be found in the literature dealing with the question.

We are deeply convinced, however, that the concept of integrated teaching suffers from a basic defect: as its name indicates, it is teacher-oriented. All educational theories have emphasized the efficiency of student-oriented methods.

If you turn back to the principles stated on pages 3.16 - 3.35, you will see that very few of them have really been put into practice in the various trials of integrated teaching. Integrated teaching certainly has advantages over any type of non-coordinated teaching of separate subjects, but it remains a form of traditional teaching in which the teacher is predominant, and is less conducive to efficient learning than educational activities designed to help the student and lead him to achieve the necessary integration by his own efforts.

A programme composed of such educational activities, oriented to the student and not to the teacher, is suggested for your attention in the following pages. It is the concept of integrated learning.

The concept of integrated learning

3.73

A learner-oriented programme with built-in relevance and based on the acquisition of problem-solving skills

In teaching the health sciences, educators have, up to the present, more often failed than succeeded in incorporating that essential quality of any programme - its relevance. The relevance of a programme is the extent to which it facilitates the acquisition by the student of all the skills necessary for the practice of his profession, whose purpose is to raise community levels of health.

In chapter 1, the basic elements necessary for formulating relevant educational objectives were indicated. It was then stressed that the health needs of populations, taking into account their available resources, should serve as a basis for such formulation. A further point made was that health planners should define the type of health service organization most suitable for solving the health problems of a given population, as it is within the framework of these services that the individual members of the health team will play their roles, fulfil their functions and accomplish their special tasks. It was also pointed out that, in defining these roles, functions and tasks, account should be taken, as far as possible, of what would be expected of members of the health team in their future work.

Consequently prospective definitions are required, such forecasts being dependent on the complexity of the skills to be acquired and the consequent duration of the training programme. For those professions requiring high levels of competence (physicians, sanitary engineers, etc.) it has not been possible to define the tasks they will have to carry out in 10 years’ time, other than in the form of assumptions which have variable degrees of reliability. Perhaps the developments in the science of futurology will ultimately make it possible to find solutions to this problem.

Until this is possible, however, other solutions should be envisaged.
A few years ago Laurence Weed suggested a new programme of medical education which attempts to resolve the notorious and difficult problem of relevance. The originality of Weed's proposal is that it seems to solve this problem while remaining within the strict framework of training (refer once more to the diagram on page 1.20). Its main point is that the students should acquire a method of working and thinking, based on a problem-solving approach, that allows them to adapt to a rapidly changing situation while at the same time acquiring the skills they need to practise their chosen profession.


A type of educational programme, inspired largely by that of Weed, is proposed in the following pages. Additionally it comprises an orientation closely linked to community rather than individual health problems, and it allows the student himself to make a free and enlightened choice of the role he wishes to play in society.

The programme is based on a certain number of Weed’s premises which must be stated first of all, since any disagreement with these premises would probably lead to a rejection of the proposed programme. On the other hand, the mere fact of agreement with the premises would not, for most teachers, be a sufficient reason for accepting the new programme, and certainly not for using it to replace a traditional programme. This new approach is, to say the least, revolutionary; it requires replacing a whole programme and not merely changing parts of it; or starting a separate experimental track.


The catch is that, at first sight, the premises seem relatively harmless and so inoffensive that the most traditional educator is ready not only to agree with them but even to claim that they are nothing new and that he himself adopted them long ago (if, indeed, he did not think of them himself).

**Weed’s premises**

3.74

1. **General educational objectives**

A health professional should be able:

1.1 to set his personal *goals related to his work* within the organized system of health services, and to develop his own approaches to the achievement of these goals; he must also seek criticism from teachers and fellow students.

1.2 to define health *problems* and to collect relevant data and utilize them for solving the problems.

1.3 to *audit* his own performance or that of a colleague using carefully established criteria.

1.4 to demonstrate the *qualities* of professional thoroughness, reliability, sense of analysis and efficiency.

2. **Teaching and learning techniques**

The programme must make it possible for the student:
2.1 to acquire basic *skills*, and not merely basic knowledge; practical and communication skills and not only intellectual ones; the preponderant role of recall must be reconsidered, the lasting ability to recall must be based on repeated use.

2.2 to learn and think *independently* and to learn from his experience. Every patient will be a source of data, while the teachers should ensure intellectual discipline and encourage value judgements.

2.3 to acquire *independently*, by the study of documents and information prepared for the purpose (books, scientific journals, duplicated texts, audiovisual aids, etc.), everything that is usually transmitted by traditional lecture-courses, provided that the educational objectives are known to him and that he performs formative evaluation exercises constructed on the basis of the objectives.

2.4 to acquire his professional skills through the *practice of real professional acts* of increasing difficulty, compatible with his level of achievement.

2.5 to practise professional acts under control and supervision, leading him to *understand the underlying basic principles*.

2.6 to find solutions to a diversity of new problems, thus developing his ability to carry on by himself once the problem to be solved has been defined.

3. In the organization of studies the following points should be considered:

3.1 The quality of achievement and acceptable performance for a given task should be regarded as a constant. *What can vary is the number of types of tasks* that a given health professional should be able to accomplish.

3.2 The length of study programmes should *not* be regarded as a constant. It is preferable to have a clear definition of the skills to be acquired, and for *the time necessary* to master them to *vary* for different students, depending on their ability and drive and on the availability of teachers and educational facilities.

3.3 There is no natural frontier in the practice of health care between the physical sciences and the humanities, or between science and culture in the broadest sense of the word. Students should be enabled to define the patient’s social and psychological problems in addition to his medical ones, and to look for a logical solution, either by themselves or with the aid of specialists, for each such problem. Simply to organize courses in the social and behavioural sciences does not automatically ensure that future physicians will be able to relate their daily practice to the culture to which they belong.

3.4 The main educative role of the basic scientist is not to train health personnel in his special subject but to audit their performance to ensure the correct application, or to detect any violation, of the basic scientific principles of that subject.

---

A problem-based learning competency-based programme/contract an excursion into the future 1

3.75

139
The programme includes four phases at the end of which the student is awarded a degree certifying he has reached a satisfactory level for certain specified skills.

The total duration of each phase may vary for each student and is determined by the achievement of an acceptable level of performance for a given number of educational objectives, which together constitute the basis of a contract between the student and the teaching institution. Depending on the terms of the contract, the degree may be that of doctor of medicine, nurse, medical assistant or, for example, specialist in cardiology or in stomatology.

**Description of the programme/contract**

*First phase (very approximate length - one to three months). Goal: to learn how to learn.*

1. At the end of the first phase, the student should be able to:
   
   1.1 show competence in planning education at initiation level;
   
   1.1.1 define educational objectives on the basis of tasks;
   1.1.2 plan a learning programme, *and*
   1.1.3 construct tests and other formative measuring systems;

   1.2 utilize the resources of the institution, such as microscopes, slides, library, computers, or members of the health team; *and*

   1.3 describe the concept of the (health) team approach.

*Second phase (approximate length 12-18 months). Goal: to identify his professional role in society.*

2. By the end of the second phase, the student should be able to:

   2.1 prepare a list of what he considers the ten *main* health problems of the community;

   2.2 collect a database on the community and interpret these data in order to:

   2.3 identify its priority health problems;

   2.4 describe the health activities (services) that would enable the community health problems to be solved, and compare these activities with those usually undertaken;

   2.5 *identify the professional role* which he (the student) wishes to assume at the end of his training;

   2.6 describe the functions, activities and tasks corresponding to that role; *and*

   2.7 prepare a set of educational objectives *(with evaluation criteria)* and indicate the acceptable level of performance for each such task.

   1 It should also be borne in mind that the definition, at the most general level, of educational objectives for the higher levels of professional staff must include the following objective: To be capable of finding solutions
to problems arising from new situations. From that
general objective, a whole series of more specific
objectives will be derived, including the acquisition of
a scientific manner of thinking, for which the teaching
of the basic sciences will have a large responsibility,
and of a method of work essential for the continuing
updating of professional skills.

At the end of the second phase, a contract is signed between the student and the
teachers (Faculty, School or other institution). The contract provides, on the
one hand, that the student undertakes to achieve the educational objectives
(described under 2.7 above) within a given period (e.g. three, four or five
years), and, on the other hand, that the teachers undertake to facilitate the
student’s work (see the teacher’s functions, pp. 3.31 -3.35). It is understood
that the teaching staff has full responsibility for certifying the abilities of
the student before he is authorized to practise without supervision. The contract
may be revised from time to time if the result of the evaluation procedures
justify that course.

Once the contract is signed, the student really begins to learn his profession.

Third phase  1 (very approximate length - 1 year). Goal: to learn basic techniques.

1 The third and fourth phases correspond to the programme in the form
proposed by L. Weed in The New Curriculum, the problem-oriented
system, Medcom. 1972, pp. 95 - 104.

3. At the end of the third phase, the student should be able to:

3.1 collect the database on the members of the community, both sick
and healthy (the basic data, such as chief complaint, patient
profile, systems review, physical examination, laboratory data, etc.)
are clearly defined by Weed; the reader is advised to consult his
works and make sure that students collect all the necessary data;

3.2 audit the database for a given patient collected by another
student; and

3.3 carry out clinical techniques (such as phlebotomy, sutures,
lumbar puncture, funduscopy or auscultation) corresponding to the
educational objectives described under 2.7.

Fourth phase (very approximate length - 3 years). Goal: to acquire professional
skills.

4. At the end of the fourth phase, the student should be able to:

carry out (together with other members of the health team) all tasks
involved in the health promotion/rehabilitation of the community in
which he is living, and perform the role he has chosen for himself
(see above 2.5 to 2.7).

Throughout these four phases, a series of formative tests are provided to enable
the student to form an idea of what remains for him to do to attain the
objectives he has set himself. The degree, or authorization to practise his
profession, is awarded by the teaching institution only when the student has
demonstrated, by passing the certification tests, that he is capable of an
acceptable level of performance for the objectives of the contract.

Unfortunately, it very often happens that, when the reader reaches this point,
he decides that the programme is too Utopian ever to be put into practice
without a cultural revolution. He is therefore urged to reread carefully the
brief description of the various functions of the teacher given on pages 3.31 - 3.35 which are much more attainable within the limits of a certain evolution. He should then do the exercise on page 3.37. Perhaps a little day-dreaming was not such a bad idea, it can be valuable to set oneself an ideal.

Some universities and schools are already applying a good number of these principles. In WHO Public Health Papers No. 70 (1978) and No. 71 (1980), you will find descriptions of the programmes of the McMaster University, Ontario, Canada, the Maastricht University, Netherlands, the University of Newcastle, N.S.W., Australia, and the Xochimilco University, Mexico, a description of the nursing training programme at the Mahidol University, Thailand, and accounts of training programmes for other health workers at Madang, Papua New Guinea.

It is true that all these institutions adopted these innovative methods at the time of their foundation, which no doubt helped to facilitate this pioneering spirit. Nevertheless, there are some older-established institutions that have also successfully introduced the innovative tracks described in WHO Offset Publication No. 101 (1987): the National Autonomous University of Mexico; Michigan State University, the Harvard Medical School and the University of New Mexico in the United States of America; and the University of Chulalongkorn in Thailand. In WHO Offset Publication No. 102 (1987) you will see that the outcome of these innovative changes has been positive. These schools belong to the Network of Community-Oriented Educational Institutions for Health Sciences, which has its secretariat at the University of Maastricht, P.O. Box 616, 62000 MD Maastricht, Netherlands

Briefly then, this programme

is oriented to the needs of society

ensures the continuous supervision of the student and protects society against incompetent health personnel

provides a basis for continuing training

concentrates on the interests of the student and encourages individual learning

allows each student to work at his own level and at his own pace within a prescribed period

keeps students in an active situation and gives a leading role to experience

leads the student to discover and understand the why and wherefore of his learning experience

accepts the idea that it is all right to be different

increases the student’s sense of responsibility and his control over his own learning

encourages students to collect, analyse, evaluate and interpret data and solve problems related to their professional profile

emphasizes the importance of cooperative self-evaluation

confronts students with real-life situations

introduces students to team work

allows students to practise what they have learnt
enables students to acquire their professional skills under conditions similar to those in which they will later practise (community-based education)

**Planning the changes required to bring about programme reform**

3.78

A key component of educational reform and innovation is the organizational modification needed to plan and implement the desired changes. In other words, how will the organization be modified to facilitate change? Who is to do what and in what sequence? Is the completion of some tasks prerequisite to beginning others? What supporting actions need to be taken and what resources need to be made available in order for the change to take place in an orderly and effective fashion?

In order to illustrate some of the planning principles which need attention, the attached planning schedule has been prepared as an example.

Why a planning schedule?

It is designed to help to answer the following questions:

- If a curriculum is designed on the basis of professional skills to be acquired or priority health problems to be solved rather than time distribution, how should this affect the planning process?
- How can a faculty be organized with a view to introducing a new programme?

**Planning schedule concepts**

The concepts - both explicit and implied - in this plan represent a radical departure from traditional practice in schools of health sciences. If a school is to shift to the type of system described here, the transition must be regarded as a long-term (perhaps four or five years) project. This suggests that:

- A plan for phasing from the old system to the new one should be developed.
- A series of intermediate objectives should be set with time deadlines.
- The objectives should indicate which parts of the old system should be improved, which elements of the new system should be introduced, and in what sequence.
- The plan should be discussed with the teacher and appropriately revised before becoming institutional policy.

**Sequence of steps (see pages 3.79)**

The system proposed is hypothetical and should be used only as a means for beginning work on a system appropriate for any given school.

Adapted from a document by Dr J. Hess, Wayne State University School of Medicine, Detroit, Michigan, USA, (1971).

**A representative sequence of steps for planning and implementing a new programme**

3.79
<table>
<thead>
<tr>
<th>Action</th>
<th>Taken by</th>
<th>Obtain agreement from</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Set up a working group (Programme Committee) with authority and responsibility to plan and coordinate a new programme. Faculty members should be selected for their creative abilities as well as for distribution among disciplines. In addition, students, practitioners and health administrators (central level) should be included.</td>
<td>Faculty Council</td>
<td>University administration; major power centres in the Faculty or School.</td>
</tr>
<tr>
<td>2. Prepare a written statement of overall objectives in terms of the functions that graduates should be able to perform, and a statement of the general philosophy of the programme.</td>
<td>Programme Committee</td>
<td></td>
</tr>
<tr>
<td>3. Obtain approval of the written overall objectives and the programme philosophy. Revise as needed to obtain agreement with the plan in principle.</td>
<td>Approval to be given jointly by the Faculty Council and the Programme Committee</td>
<td>University authorities; major power centres in the School; Ministry of Health</td>
</tr>
<tr>
<td>4. Select the organizing principles that will be used for planning the new programme. Examples are: community problem orientation learner-centred approach problem-based learning active learning situation programme with contract a preventive model</td>
<td>Programme Committee</td>
<td></td>
</tr>
<tr>
<td>5. Lay out a general sequence of programme phases in block diagrams or outline form based on: 5.1 Organizing principles and philosophy of the programme; 5.2 Assumptions and data concerning capabilities of incoming students; 5.3 Professional profiles 5.4 Available teaching resources, including the teaching premises</td>
<td>Programme Committee</td>
<td>Faculty Council</td>
</tr>
</tbody>
</table>
### 6. Organize committees of teachers for the main programme phases.

**Critical factors:**

6.1 Those responsible for each phase should:

(a) be able to advance convincing arguments in support of the programme philosophy, and

(b) have demonstrated ability to get things done in committee.

6.2 Most committee members must be open-minded and ready to break with tradition.

### 7. Begin training sessions for committee members and the teacher-tutors of student groups.

**General subjects:**

7.1 Educational philosophy and professional profiles;

7.2 Teaching concepts and methodology; problem construction;

7.3 Fundamental principles essential for the success of the teaching programme;

7.4 Evaluation process.

### 8. Select teachers to lead student groups.

### 9. Select experts to review the content of each discipline in each phase of the programme and identify the concepts that are essential.

### 10. The requisite level (for students) and the intermediate educational objectives for each phase are prepared or reviewed by the Committee of Teachers.

<table>
<thead>
<tr>
<th>Step</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Organize committees of teachers for the main programme phases.</td>
<td>Programme Committee</td>
</tr>
<tr>
<td>6.1 Critical factors:</td>
<td></td>
</tr>
<tr>
<td>6.1.1 Those responsible for each phase should:</td>
<td></td>
</tr>
<tr>
<td>6.2 Most committee members must be open-minded and ready to break with tradition.</td>
<td></td>
</tr>
<tr>
<td>7. Begin training sessions for committee members and the teacher-tutors of student groups.</td>
<td>Programme Committee with assistance from education consultants from:</td>
</tr>
<tr>
<td>7.1 Educational philosophy and professional profiles;</td>
<td>(a) the University itself; and</td>
</tr>
<tr>
<td>7.2 Teaching concepts and methodology; problem construction;</td>
<td>(b) other organizations,</td>
</tr>
<tr>
<td>7.3 Fundamental principles essential for the success of the teaching programme;</td>
<td></td>
</tr>
<tr>
<td>7.4 Evaluation process.</td>
<td></td>
</tr>
<tr>
<td>8. Select teachers to lead student groups.</td>
<td>Programme Committee</td>
</tr>
<tr>
<td>9. Select experts to review the content of each discipline in each phase of the programme and identify the concepts that are essential.</td>
<td>Programme Committee</td>
</tr>
<tr>
<td>10. The requisite level (for students) and the intermediate educational objectives for each phase are prepared or reviewed by the Committee of Teachers.</td>
<td>Committee of Teachers following guidelines from the Programme Committee and education specialists</td>
</tr>
</tbody>
</table>
Preferred sequence: Begin with last phase prior to graduation and work back to entry point of programme.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Responsible Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>The objectives, problems or plans for each programme phase are revised as necessary.</td>
<td>Teachers of the corresponding programme phase</td>
</tr>
<tr>
<td>12.</td>
<td>Construction and/or revision of priority health problems; selection and preparation of learning sites to fulfil their educational role as appropriate.</td>
<td>Teachers of the programme phase; Programme Committee Heads of the Departments concerned; health service administrators, etc.</td>
</tr>
<tr>
<td>13.</td>
<td>Learning materials (books, slides, software, videos, etc.) are assembled and made ready for use as required.</td>
<td>Teachers of the programme phase; librarians and education specialists</td>
</tr>
<tr>
<td>14.</td>
<td>Evaluation methods (immediate and long-term) are selected and the required administrative support is planned and organized.</td>
<td>Teachers of the programme phase with the help of the Evaluation Committee and education specialists Programme Committee</td>
</tr>
<tr>
<td>15.</td>
<td>Teaching and evaluation methods are implemented and periodically reviewed.</td>
<td>Teachers of the phase with the help of the Programme Committee and the Evaluation Committee Heads of Departments</td>
</tr>
<tr>
<td>16.</td>
<td>Evaluation results are collected. Data pertaining to individual student evaluation and evaluation of the teaching given are handled and interpreted separately through appropriate channels.</td>
<td>Evaluation Committee (education specialists, including a specialist in test and measurement methods)</td>
</tr>
<tr>
<td>17.</td>
<td>Recommendations for improving the programme are developed. They are based on the evaluation data and other sources of information and advice.</td>
<td>Programme Committee, Evaluation Committee, School Administration, External Audit Appropriate individuals and groups</td>
</tr>
<tr>
<td>18.</td>
<td>The necessary changes are implemented.</td>
<td>Programme Committee, Evaluation Committee Faculty Council</td>
</tr>
</tbody>
</table>

1 The term teacher should be understood in its new sense, which includes senior students.

**Qualities of a programme committee coordinator**

3.82

He need not necessarily always have all the following qualities, but if you had to choose at some time or another between two colleagues it is suggested that you choose the one most resembling this description.

He should be:

- available
- motivated
- have the support of the school administration
- accepted by the students

and also have as many as possible of the following qualities:
Vast knowledge and wide professional experience
Recognized skill in educational planning
The personality of a leader
A reputation as a research worker
Years of experience as a faculty member
A reputation as an author

P.S. If you know such a person please telephone immediately to WHO.

Thank you.

Feasibility study for the construction of an educational programme

3.83

This section is partly based on the method described by Romiszowski (see footnote to page 1.72).

Planning an educational programme is a complex task that involves definition of learning objectives (on the basis of analysis of the health problems and needs of the community and the professional profiles of the personnel to be trained - see chapter 1), decisions on the strategies, sequence, content and methods of implementation and evaluation (chapter 2), and examination of the resources available and needed.

There are many possible approaches. We shall take here the example of a standard method (not much used in the planning of educational programmes for health personnel) that can be applied in greater or lesser detail in the light of the type of educational objectives (general, intermediate, particular) specified by those in charge of the programme, the extent of student participation in the identification and specification of objectives, and the stage of planning that has been reached.

Although it is essential for the students to participate in the formulation of problems and the specification of their learning objectives, the teaching staff, resource persons and tutors obviously have the responsibility for ensuring that a careful analysis is made of professional profiles.

A whole hierarchy of intermediate objectives will guide decisions on learning units and a plan to cover the overall structure of the programme.

This plan will highlight the important instructional decisions that need to be taken before the students arrive and help to ensure that they are made.

There are a number of other points of detail that are often overlooked.

Material and human resources are often a serious constraint for the implementation of planned programmes. Before deciding what strategies and methods are appropriate and viable, it is absolutely essential to evaluate human and material resources. A strategy involving a substantial amount of field work requiring vehicles and/or expensive equipment may be fully appropriate to certain learning objectives but will be impossible to implement if the necessary funds have not been obtained before the start of the programme (which means that any expensive field work planned for the second year must be funded before the start of the first year). Requirements for auxiliary teaching staff, materials and premises must therefore be carefully examined.

A programme cannot be carried out without human resources (teachers, resource people, tutors, laboratory staff, field assistants, office staff, etc.). This is true in terms both of numbers (quantity) and skills (quality). The human resources required must therefore be specified for the entire programme at the
planning stage, and included in the budget.

The attitudes and inclinations of the teaching staff (conservatism, fear of novelty, the low priority accorded to educational tasks, concepts of time constraints and other obstacles, etc.), political decisions and social pressures, and situations where there are not enough problems for case studies in appropriate settings are all important factors.

The time factor is often neglected in the early stages of programme planning. The teaching staff often become discouraged when they are confronted with reality and realize how much time they need. Teachers must estimate the approximate time they will require to plan the programme, prepare and search out learning materials, construct instruments of evaluation, etc. In a learner-centred system it is the actual delivery of the programme that usually takes up least of the teachers’ time.

Some teachers may feel that this approach is rigid. The figure on page 3.85 is intended to serve as a tool. The number of components may be altered depending on the programme. The diagram can be viewed as a useful map for the proposed programme.

It enables the planner (or planning group) to proceed systematically, identifying the decisions that are too ambitious in terms of the time and resources available or that will require extra staff with special skills, or the organization of courses to increase the skills of the staff. It may be possible to make better use of resources by doing things in a different order. It may also be possible to spread the objectives among the learning units more logically or to find other learning activities. Implementation may be simplified by choosing a wider variety of strategies and methods. A better overall view of the programme is obtained and it can therefore be subjected to more critical scrutiny.

This map is especially useful in team work. Any changes suggested by members of the team can be noted on the map before detailed planning and development are begun. The map can be devised by the members of the team who will bring together the ideas that have been written up on wall panels or flip charts that can be moved about at any time.

This approach also makes for a flexible process of decision-making while communicating progress clearly to all participants and reducing the number of official reports which tend to slow down the process and make it more difficult to review earlier decisions.

EXERCISE

3.85

Mapping the educational programme: feasibility study

Write down each of the learning objectives you have defined on a large sheet of paper and indicate the field(s) to which they apply. On separate sheets, specify the enabling learning objectives (knowledge), learning and teaching methods, instruments of evaluation and resources required in respect of each of these objectives. Also write down the time required and the obstacles you might encounter. Stick all these pages up on the wall. This will give you an overall view of the work so far and of what remains to be done.

When the map is more or less complete it may be used for more detailed analysis, provided this is first of all of a general nature. It may be used to help select and prepare the activities for which the problem-solving approach will be used, the training of tutors, preparation of applications for additional resources, etc.
In other words, it is flexible and may be used for many purposes in the preparation of an educational programme. If it proves to be rigid, this is the fault of the user and not of the instrument.

**Advantages and limitations of a systematic approach**

3.86

**Possible advantages of a systematic approach**

- It provides a mechanism making possible a study planned and organized in advance.

- When it becomes really operational it should be more effective than the traditional approach since it can be improved by the feedback.

  - If it is well organized, it may permit greater flexibility in organizing the use of time of students and teachers.

  - Allowance can be made for certain individual variations in students' rate and mode of progress throughout the teaching programme.

  - It may prove possible to train more students at the same cost if the system is carefully structured.

**Possible disadvantages**

- Teachers must spend more time on planning and evaluation, especially during the first years following the adoption of the system. In many respects it is more expensive at the outset to try to construct a new system rather than to keep to the old one, but this is an investment and not a waste of time.

**Necessary supporting elements**

- A school administration and departmental heads willing to delegate some of their responsibility and authority to a new programme planning and management system.

- A nucleus of teachers prepared to spend a greater part of their time in planning, managing and evaluating the programme. These activities could be organized using a rotation system covering three or four years, so as to distribute the work and give teachers an opportunity to become familiar with the teaching methodology.

- Budgeting of funds in a manner consistent with the teaching programme and the distribution of decision-making authority.

- A review and, where necessary, a revision of academic regulations concerning the hierarchical system in operation and the promotion of teaching staff so that teachers' contributions in planning and implementing the teaching system will be duly recognized when decisions are taken on salary increments and academic rewards.

- A faculty council and a programme committee that are skilled in arranging to co-opt, neutralize or remove (by promoting, but elsewhere) key opponents to the plan.

- A teacher training programme.
To train large numbers without loss of educational quality

Promote and develop the use of self-learning methods and material and have students share teaching responsibilities

The key to effective learning is to adapt learning activities to the needs of individual learners


3.87

Specification tables

3.88

A specification table, or double-entry table, is a kind of check list enabling you, when you prepare a programme or an examination, for example, to make sure that the appropriate parameters have been taken into account. It sometimes happens that even the best-intentioned teachers who have made an effort to define educational objectives go on to prepare a programme or an examination which, when analysed, appears to neglect them completely. In order to force yourself to bear these objectives in mind, you would be well advised to make use of specification tables; they will help you to relate each part of the programme directly to a given objective. In other words, every part of a programme or an examination should correspond to an objective, and every objective should have a corresponding element in the programme or examination. That is the price of relevance.

How to use a Specification Table

One example of a specification table (p. 1.39) has enabled you to have a brief overview of both a teaching programme and a series of examinations.

A second example (p. 2.38) showed you how to compare different evaluation methods using selected criteria.

A third example (in this chapter, p. 3.70) has helped you to compare two teaching methods, using other selected criteria.

A fourth example will be given in the next chapter (pp. 4.70 - 4.72). By means of another exercise, you will be able to make a qualitative analysis of a series of tests (the exercises in the Handbook).

These four exercises will have allowed you to see what an extremely useful tool a specification table may be in educational decision-making.

Remember to construct one whenever that seems advisable.

EXERCISE

3.89

Describe in chart form the type of organization (commissions, committee, councils etc, with a list of the functions of each) which you think could be set up in the institution where you are teaching with a view to introducing (or improving) a relevant programme. Compare your chart with that on page 3.92.
The classically rigid, inflexible departmentalization of faculties of medicine is probably the greatest single obstacle to educational reform.

D. Maddison  
Dean, Fac. of Med.  
University of Newcastle, N.S.W., Australia

EXERCISE

3.90

Describe the obstacles you are likely to meet in setting up the type of organization that you described on the preceding page, and the tactics you could use to overcome them.

<table>
<thead>
<tr>
<th>Obstacles</th>
<th>Tactics</th>
</tr>
</thead>
</table>

An educational system will never achieve its full potential in the preparation of health professionals if it continues to guard jealously individual and departmental autonomy and to maintain a lofty aloofness from the health care system.

G.E. Miller 1977

Obstacles to change

3.91

Dynamic conservatism  
Institutional bureaucracy’s built-in resistance to change  
Complexity of programme change  
Lack of institutional resources  
Lack of model upon which to base changes

J. Bryant

Example of organizational chart of an integrated programme planning mechanism

3.92

Key:  
Solid lines represent direct lines of administrative decision-making.  
Shaded lines represent advisory functions.

EXERCISE

3.93

(Check your answers on page 3.98)

Important: Select only one reply to each question.

Question 1

According to present educational trends, all the following statements are true, except one. Which one is false?

A. A systematic approach facilitates the choice of learning situations and evaluation methods.
B. The modern trend in educational practice is to transfer part of the teacher’s role to the student.

C. Present educational trends seem to lay more stress on the student than on the teacher.

D. The student’s judgement of the value of an educational programme is perhaps more valid than that of the teachers.

E. The primary role of the teacher is to transmit knowledge in the field of his specialty.

Question 2

Learning is made easier by an educational situation in which the teacher does all the following things except one. Which is inappropriate?

A. The teacher encourages the student to be active.

B. The teacher helps the student to discover concepts.

C. The teacher makes frequent checks of the student’s level.

D. The teacher encourages individual learning.

E. The teacher gets the student to participate in educational decision-making.

Question 3

The many definitions of learning include all the following characteristics except one. State which.

A. A more or less permanent change occurs in the student’s behaviour.

B. It is not directly observable.

C. Repetition by the student is a favourable factor.

D. The role of the teacher is primordial.

E. Motivation is an essential element.

Questions 4 to 7

Indicate for each of the following questions whether reference is made to:

A. an epidiascope
B. an overhead projector
C. a slide projector

Question 4

Can project outlined figures (or letters) on a transparent support (25 × 25 cm) so that they can be read in a lighted room.

Question 5

Can project outlined figures (or letters) on opaque paper so that they can be read in a darkened room.

Question 6
Is also called a diascopic.

**Question 7**

Can project outlined figures (or letters) on a transparent support (50 × 50 mm; 24 × 36 mm) so that they can be read in a darkened room.

**Question 8**

A self-learning package must include at least three of the following elements. Indicate which:

1. A short statement of the subject.
2. The statement of the educational objectives.
3. A definition of the required level.
4. The full documentation needed.
5. Diagrams, photographs or slides.
6. A formative measuring device.

*Reply:*

A *if the elements are* 1, 2 and 6
B *if the elements are* 1, 3 and 5
C *if the elements are* 2, 4 and 6
D *if the elements are* 3, 4 and 5
E *if the elements are any other choice*

**Question 9**

Upon which of the following criteria for the choice of teaching material does the quality of relevance depend?

The material should:

A. be appropriate to educational objectives;
B. promote active student involvement;
C. be appropriate to the students;
D. be of good technical quality;
E. be very cheap.

**Questions 10 to 16**

If a lecture course is denoted by X, and a self-learning package by Y.

*Reply:*

A *if the method described is consistent only with* X
B *if the method described is consistent only with* Y
C *if the method described is consistent only with both* X and Y
D *if the method described is consistent only neither* X nor Y

**Question 10**

A method which places the student in an active situation.

**Question 11**

A method which allows the student to attain a given educational objective.

**Question 12**

A method which provides the student with feedback on his progress.
Question 13
A method which requires the student to work in a team.

Question 14
A method which allows the student to work at his own pace.

Question 15
A method which appears to be economical in time and in means.

Question 16
A method which emphasizes self-measurement.

Question 17
Among the educational objectives to be reached by a class of 250 students of the same year is the following: to be able to measure the height when lying down of a newborn baby using a portable scale. Criteria: maximum error of – 0,5 cm in 90% of measurements.

Supposing that each student has to spend eight weeks in an MCH (Maternal and Child Health) centre in the course of his training, list in order of decreasing efficiency the following four teaching methods:

1. A 30 minute lecture to the 250 students in a lecture room, followed by a demonstration by the instructor.
2. A 30 minute lecture followed by practical exercises of the technique by the students in groups of 25, each group spending two hours with the instructor in rotation.
3. A demonstration of the technique by an instructor followed by practical exercises by the students in groups of 25, each group spending two hours with the instructor in rotation.
4. Each student receives a handout with diagrams during the training period; valid certifying tests are checked by the instructor on request by the student.

Reply:

A. if the order of decreasing efficiency is 1234
B. if the order of decreasing efficiency is 2413
C. if the order of decreasing efficiency is 3142
D. if the order of decreasing efficiency is 4321

Question 18
When preparing a part of the programme whose aim is to stimulate the student’s originality in looking for solutions to problems, the most suitable group of learning activities is:

A. The students participate in courses and demonstrations by teachers with a very creative attitude who are themselves excellent research workers.

B. The students participate in laboratory and field exercises during which they reproduce basic experiments.
C. The students participate in a series of hospital, field and laboratory activities, and must present the solutions arrived at in clear terms.

D. The students participate in hospital, field and laboratory activities and must write a report describing the experiments in which they have participated.

**Question 19**

According to L. Weed, all the following statements are true except one. Which is untrue?

A. Length of training should be fixed in advance for a given group of students depending on the type of degree.

B. The student should be able to define his own work objectives within an organized system of medical care.

C. An understanding of basic principles should result from the students’ confrontation with practical problems.

D. The lasting ability to recall depends for the most part on repeated use.

**Question 20**

A programme specification table (double-entry table):

A. Is a table giving details of a teaching programme (timetable, premises, etc.).

B. Is a list of contents giving detailed instructions concerning programmed learning.

C. Is a control sheet for checking the specificity of the educational objectives.

D. Is a control sheet for checking whether the elements of the programme are related to the educational objectives.

Congratulations! You have attempted to work out a programme corresponding to your subject.

3.97

But be careful

Make sure once more that it agrees with the functions and tasks in your professional profile

Pay unfailing attention to relevance

Effective teaching can be more dangerous than no teaching at all if it is not really relevant

**Suggested answers for the exercise on pages 3.93 - 3.97**

3.98

<table>
<thead>
<tr>
<th>Questions</th>
<th>Suggested Answers</th>
<th>If you did not give the right answer, reread the following pages.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

155
Chapter 4: Test and measurement techniques

4.01

The practice of test and measurement techniques

4.02

This fourth chapter reviews a certain number of measuring instruments, their advantages and limitations, and how they should be used. It shows the wide range of such instruments and the importance of choosing them in accordance with the educational objectives to be measured. It is stressed that every teacher should make a certain minimum of statistical calculations when he carries out an item analysis of a test.

Those with a deeper interest in these problems are strongly advised to consult the following publications:

Public Health Papers - WHO

No. 36 A review of the nature and uses of examinations in medical education, 1968.

No. 52 Development of educational programmes for the health professions, 1973.


After having studied this chapter and the references indicated, you should be able to:

1. Indicate the different elements that should be considered in the evaluation of a teaching programme.
2. Indicate the different elements that should be considered in the evaluation of the educational objectives, learning materials and human resources for a teaching programme.

3. Define the advantages and limitations of a system of evaluation of teaching by the students.

4. Construct an observational rating scale and/or a practical test to evaluate the behaviour of a student in the domain of communication and/or practical skills.

5. Propose a question for a written (open-book) examination of the essay type or a series of six short, open-answer questions and indicate the norms of performance permitting objective marking (marking table).

6. Draw up three multiple-choice questions (MCQ) in the domain of intellectual skills - at least two of the objectives must measure an intellectual process superior to level 1 simple recall (either level 2 interpretation of data or level 3 problem-solving).

7. Indicate the advantages and limitations of a programmed examination.

8. Define the following terms: prerequisite level test, pre-test, interval test, comprehensive, pre-final; indicate their purpose and the stages at which they are set.

9. Explain the difference between a relative and an absolute criteria test.

10. Calculate the acceptable pass level for an MCQ examination and establish the scoring criteria and norms which permit determination of the passing grade of a mini-test (made up of the questions mentioned in objectives 5 and 6).

11. Do an item analysis of a question (calculate the difficulty index and the discrimination index) and draw the relevant conclusions.

Work in small groups is recommended for these objectives. Individual work will usually be appropriate for the others.

The educational planning spiral

Why evaluate?

Society, which finally pays the bill for health activities, relies on us to train health personnel to perform a social function corresponding to the health needs and demands of the community they are to serve.

Training centres for health personnel form an integral part of society, and must be prepared to operate within and for that society.

Health activities are of a nature to stimulate social awareness and to provide leverage for social development. The following are some of the questions that
must be asked in any attempt to discover whether training centres go to sufficient lengths in preparing the different kinds of health personnel and giving them a training that is pitched to meet the health needs of our societies.

Do the graduates think and behave in terms of health rather than of disease? That is to say, do they apply techniques of prevention and health promotion and not only those of cure and rehabilitation?

Do the graduates think and behave in terms of family and community, rather than in terms of the individual sick patient?

Do the graduates think and behave in terms of membership of a health team consisting of doctors, nurses and other health workers as well as social scientists and others?

Do the graduates think and behave in terms of making the best and most effective use of the financial and material resources available?

Do the graduates think and behave in terms of their country's patterns of health and disease, and the relevant priorities?

Consider the institution where you are working - and reflect on the above questions. If you can reply yes to all of them, then the essential has been achieved.

If, on the other hand, you cannot unreservedly say yes to certain of them, it is urgent for you to reconsider the orientation and the training programme of the school concerned.

To that end, several steps can be suggested:

1. Evaluate the programme as a whole.
2. Evaluate the general and intermediate educational objectives.
3. Have the students evaluate certain aspects of the curriculum.
4. Evaluate the students' level of performance.

Guidelines for evaluating a health personnel training programme - summary description

4.05

The following guidelines are meant to be both general and comprehensive. The evaluator must adopt a realistic approach and decide in each case what is essential in any particular situation.

The guidelines take the form of a series of operations but, obviously, in practice these will often be carried out in a different order. What is essential, in any evaluation study, is for the evaluator to be constantly re-examining the information obtained, reformulating his questions and, even more important, revising his judgements. He is thus often obliged to retrace his steps and, ideally, should review his whole orientation.

The guidelines are presented under four main headings corresponding to the four phases of the evaluation:

I Orientation
II Design of the evaluation
III Gathering information on the programme and its effects
IV Analysis and reporting
Guidelines

Phase I - Orientation

1. Determine the general characteristics of the teaching programme.

2. Ascertain the general characteristics of the administrators, teachers and students.

3. Determine the financial resources available for the programme and its physical facilities.

4. Clarify the aims of the proposed evaluation.

5. Make an inventory of what information is readily available about the teaching programme.

6. Determine the resources available for the evaluation and fix a time limit for its completion.

7. Clarify the evaluator’s role and that of the other persons taking part in the evaluation.

8. Make a preliminary appraisal of the nature and the feasibility of the proposed evaluation.

Phase II - Design of the evaluation

9. List the questions and issues to be considered.

10. Determine the appropriate sources of information and the procedures for its collection.

11. Design the evaluation.

12. Draw up an evaluation schedule.

13. Draw up an evaluation budget.

14. Obtain feedback check on the evaluation design, schedule and budget.

Phase III - Gathering information on the programme and its effects

A. Context and objectives

15. Describe briefly the context in which the programme operates.

16. Define the objectives by drawing up a list:

   (a) of the future functions, taking account of the main health problems and the tasks and responsibilities deriving from each, and

   (b) of the training objectives, taking account of the principal tasks the student should be able to perform satisfactorily at the end of his training.

B. The characteristics of the students on enrolment

17. Ascertain the students’ characteristics that are likely to affect their performance as learners and subsequently as health workers.

18. Gather information about the students at the beginning of their training.
19. Make a summary of the characteristics of the student group(s).

C. Resources and training processes

20. Make an inventory of the resources available for the programme and describe how they are allocated.

21. Examine and record the training processes used in the programme.

22. Make a summary of information relating to students’ experience, using as themes the principal tasks and role models.

D. Effects and impact of the programme

23. Ascertain the effects of the programme that are to be evaluated.

24. Describe and make a critical examination of the assessment procedures already in use in the programme.

25. If those methods are not adequate for the purposes of the present evaluation, develop and apply others.

26. Work out a set of procedures for observing and describing the long-term impact of the programme, if that is to be evaluated.

Phase IV - Analysis and reporting

27. Prepare a concise description of the programme using the information gathered in the course of Phase III.

28. Analyse the relationship between the various aspects of the programme.

29. Prepare an evaluation report recapitulating the qualities and achievements of the programme, the problems and difficulties encountered in carrying it out, and the available options or courses of action for its improvement.

For further details you are advised to read WHO Offset Publication No. 38, *Guidelines for Evaluating A Training Programme For Health Personnel* by F.M. Katz (WHO, Geneva, 1978)

or


Points to consider in assessing the extent to which programme changes foster closer relationships between schools for health personnel and the wider society

4.07

1. Are changes in the government’s priorities concerning health care more clearly understood by the programme planners inside the school?

2. Does the school now respond more swiftly and appropriately to any changes in national planning and priorities?

3. Does the school now work more harmoniously with the consumers of the trained personnel, i.e. with the relevant government agencies and the population?

4. Is direct feedback from (recent) graduates’ on-site performance used as a criterion in assessing the strengths and weaknesses of the (new) curriculum? Is the school responsive to this type of feedback?
5. Are the various schools for health personnel within the whole national system learning from one another and assisting each other to replicate successful changes and progressively eliminate those that do not seem so successful?

6. Is the course content of the (new) programme really relevant to the common health problems of the country? How could it be made more relevant?

7. What observable changes have taken place in
   
   (i) patterns of mortality and morbidity

   or

   (ii) the responsiveness of people to the prevention of disease and disability?

Could such changes be the result of the programme changes?

8. Are consumers more satisfied with the quality of health care delivered by the health personnel trained according to the (new) programme?

9. What are the principal forces that have accelerated the processes of realistic, valuable programme change and development? What have been the major restraining forces on development? How might accelerating forces be strengthened and restraining forces altered?

Based on a paper by P. Blizard, WHO, New Delhi.

For each main question try to reply in one of the following ways

Yes - I have good reason to believe so, and I have even obtained some evidence to that effect.

No - I do not think that it is true.

+/- - It is very possible but I have no facts to prove it.

? - I am unable to reply to the question.

Points to consider in assessing the effectiveness of programme changes

4.08

- in terms of improvement in the administration and functioning of schools for health personnel

1. Has the (new) programme been based on a careful study of the skills needed (list of tasks) by health personnel in the community they are destined to serve?

2. Have student failure rates and drop-out rates been reduced? To what extent?

3. Has the time from initial enrolment to final graduation been reduced? To what extent?

4. Has the volume of content in the (new) programme been reduced in comparison with what it was previously? To what extent?

5. Have there been reductions in the financial and economic cost per graduate? To what extent?

6. Are scarce teaching staff and associated facilities more effectively and efficiently used? In which particular respects?

7. Is the content of the various subject areas vertically and horizontally integrated? What are the costs and benefits of that integration?
8. Are collaboration and cooperation between the various departments seen as an easier, simpler process than before the programme changes were made?

9. Have positive (or negative) effects been observed in the allocation of resources between teaching, research and administration?

10. Have changes taken place in the teachers’ conditions of work so that they can now spend more time and energy on their teaching and related responsibilities? Have such changes been an improvement? If so, why?

11. Have locally organized teacher education programmes had some effect? If so, which?

12. Has the local education bureau (if one exists) contributed to the changes that have taken place? In what ways could the functioning of the bureau be improved?

13. Have administrative tasks become simpler and easier or have they become more difficult, time-consuming and complex?

14. Are the roles of the chief administrator (Director, Dean, etc.) and other senior administrators now clearer, easier and more precise or have they become less precise and more difficult?

Based on a paper by P. Blizard, WHO, New Delhi.

For each main question try to reply in one of the following ways

Yes - I have good reason to believe so, and I have even obtained some evidence to that effect.

No - I do not think that it is true.

+/- - It is very possible, but I have no facts to prove it.

? - I am unable to reply to the question.

- in terms of improvements in teachers’ performance

1. Are the tasks involved in teaching the new programme seen by teachers as more interesting, relevant and rewarding?

2. Is the preparation of course content seen as a clearer and easier task, notwithstanding the possibility that it may be more time-consuming?

3. Have teachers improved their capacity to facilitate students’ learning, i.e. have they developed the skills necessary to help students learn effectively?

4. Have there been demonstrable improvements in the programme for training new teachers to teach more effectively?

5. Do teachers now spend more time, effort and energy (in productive ways) on their tasks as teachers?

6. Do teachers actually use the skills they have acquired during training programmes when they are working with students?

7. Have there been any negative effects on teachers’ other roles?

- and in terms of students’ performance

1. Are students provided, during their studies, with a greater volume of information and variety of learning activities?
2. Do students retain a greater proportion of the information and skills they have acquired?

3. Do students show an improvement in their ability to use these skills in practical health care situations?

4. Do students now show more initiative and independence in their learning habits, during their time in school, and in the later practice of their profession?

5. Do students show an improvement in their willingness and ability to keep up to date as regards their professional competence (and under adverse conditions)?

6. Are students now more actively involved in the tasks and processes of learning within the new programme?

7. Do students now spend more time, energy and effort in their learning activities, and generally work harder?

8. Does the working (and content) of the new programme provide a more interesting, exciting and rewarding experience for students?

9. Do students play a fuller, more active, more rewarding and more useful role in programme planning, implementation and evaluation?

Based on a paper by P. Blizard, WHO, New Delhi.

**Guidelines for evaluating general and intermediate educational objectives**

4.10

How can a training school for health personnel make sure that the teaching provided meets the needs and expectations of the population that the future graduates will have to serve? One of the best, but underused, tools to ensure such relevance in teaching is the educational objective.

A WHO Study Group met in 1976 to consider the place of educational objectives in the training of the different categories of health personnel, and in particular to devise guidelines for evaluating such objectives.

The guidelines given below are concerned not only with the way in which the objectives are stated but also with the process by which they were developed. Were the objectives defined so as to reflect, for instance, the needs of health workers and the consumers of their services? Does the statement of each objective contain an action verb clearly indicating what the student must do to show that he has attained the objective? Are the proposed objectives consistent with one another?

The guidelines are arranged under 20 headings. In most cases, the user can simply check one of the answers indicated. A space has been left at the end of each item for the user’s remarks.

The report of the Study Group, and especially the proposed guidelines, should be useful to administrators and teachers of schools for health personnel by helping them to define and evaluate educational objectives for their own use and for the benefit of their students.

1 Criteria for the evaluation of learning objectives in the education of health personnel. Report of a WHO Study Group. WHO Technical
A. Persons involved in drawing up the objectives

1. Which of the following persons were involved in either developing or reviewing the objectives?

- Teachers (if so please state what disciplines or specialties)
- Practitioners (if so, please state what disciplines or specialties)
- Education specialists
- Students
- Administrators (education, health, economy)
- Consumers of health care (i.e. patients)
- Other (please specify)

2. How was the final decision made concerning the adoption of the objectives?

- By me alone (if so, please explain why)
- By my administrative supervisor (if so, please explain why)
- By the chief institutional administrator (if so, please explain why)
- By an interdepartmental committee (if so, please explain why)
- Jointly (if so, please indicate who was involved)
- Other (please specify)

(Circle the answer(s) you wish to give, and add any remarks.)

3. Please describe any steps taken to avoid the objectives being distorted as a result of pressure exerted by certain interested groups (specialties, teaching disciplines, or others to be specified).

Remarks:

B. Basic data and other reference information

4. Given that the objectives should reflect the actual health needs of the community, which of the following needs are reflected?

- Present and future health problems
- Present and future functions of this category of health worker
- Functions of other health workers
- Expectations of health care consumers
- Expectations of health care workers
- Interrelationship between health needs and other needs of society
- Official government health policies
- Structure of the existing and future health care system
- Available data and research on health care and health manpower
- Current health manpower planning

5. When the objectives were developed, which of the following factors were considered? (In each case, please explain how.)

- Cost to the community (in relation to community resources)
- Characteristics of students
- Available teaching facilities
- Cultural setting of the educational institution
- Existing educational system(s) and philosophies
- Orientation of political and professional organizations
- Other (please specify)

6. Does each objective describe a specific competence that is significantly related to the performance of one or more of the tasks of that health worker?
Yes or No
If yes, please give one or more examples.

Examples:

7. Do the objectives represent an adequate sample of the expected professional competences?

Yes or No
If yes, please indicate how the sample was derived.

Remarks:
Circle the answer(s) you wish to give, and add any remarks.

C. Characteristics of the objectives

8. Given that the educational objectives are by definition student-oriented:

   Do they relate to the actual work the student is going to do after graduation?
   Yes or No

   Do they describe what the graduate will be able to do *(using an action verb)*?
   Yes or No

9. Given that the objectives should be consistent with one another:

   Do some objectives contradict others?
   Yes or No

   If yes, please give an example.

   Do some objectives support others?
   Yes or No

   If yes, please give an example.

Remarks:

10. Are the objectives realistic with regard to:

    Characteristics of students?
    Yes or No

    Characteristics of teachers?
    Yes or No

    Facilities available?
    Yes or No

    Time available for learning?
11. Given that the objectives should be directed towards significant results of learning in all domains (i.e. intellectual, practical, and communication skills):

Are some of them specifically designed to facilitate personal affective development?

Yes or No

Are some of them specifically designed to facilitate the development of intellectual enquiry?

Yes or No

Are some of them specifically designed to facilitate development of the total person?

Yes or No

Are some of them specifically designed to promote the development of competence (and, where appropriate, leadership competence) for team work?

Yes or No

Do some refer to development of research skills?

Yes or No

Does the set of objectives refer to the need for life-long self-learning?

Yes or No

Does the set of objectives refer to the need for life-long (continuous) self-assessment?

Yes or No

Does the set of objectives reflect the scientific base for problem-solving needed by that category of health worker?

Yes or No

Does the set of objectives reflect adequately the range of technical skills required from that category of health worker?

Yes or No

Do some objectives reflect the importance of the health worker’s responsibility to society?

Yes or No

Do some objectives recognize the need to prepare the health worker to be responsive to new methods?

Yes or No

If yes, please give examples.
D. Intended use of the objectives

12. Has consideration been given to how the objectives will be used in your institution?

   Yes or No

   If yes, please indicate what plans were made for their use.

Remarks:

13. If so, how was the final decision made concerning the use of the objectives?

   By me alone (if so, please explain why)
   By my administrative supervisor (if so, please explain why)
   By the chief institutional administrator (if so, please explain why)
   By an interdepartmental committee (if so, please explain why)
   Jointly (if so, please indicate who was involved)
   Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.

14. Are students informed about the objectives?

   Students were given copies of the objectives.

   Yes or No

   Students have discussed them.

   Yes or No

   If so, under what circumstances?

   Students have not seen them.

   Yes or No

   If not, why not?

   Some of the students have probably seen them.

   Yes or No

   If so, why only some of the students?

Remarks:

15. Are teachers informed about the objectives?

   All teachers were given copies of the objectives.

   Yes or No

   Teachers have discussed them.

   Yes or No

   If so, under what circumstances?

   Teachers have seen them.
Yes or No
If not, why not?
Some of the teachers have probably seen them.
Yes or No
If so, why only some of the teachers?

E. Usefulness of the objectives

16. As you examine the set of objectives, which among the following results do you believe likely to be produced?

- They will be achieved.
- They will facilitate student learning.
- They will facilitate an integrated approach to learning.
- They will facilitate a problem-solving approach to learning.
- They will facilitate evaluation.
- Other (please specify).
- They may not even be used.

Circle the answer(s) you wish to give, and mention any facts in support of your opinion.

17. Has the existence of the objectives had any impact on any of the following aspects of the teaching programme?

- Teaching/learning activities (if so, please give examples)
- Evaluation methods (if so, please give examples)
- Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.

F. Evaluation and revision of objectives

18. Are there provisions for a periodic review of the objectives?

- Yes or No
- If so, what is the review based on?

- Students’ performance data.
- Operational research data.
- Evidence of changing needs.
- Other (please specify).

Circle the answer(s) you wish to give, and add any remarks.

19. If so, who is involved in the review?

- Teachers
- Practitioners
- Education specialists
- Students
- Administrators
- Consumers (i.e. patients)
- Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.
20. If the answer to question 18 is yes.

Does such a review facilitate programme changes?

Yes or No

(If so, please specify how.)

The results indicated that the [examination] unduly emphasized activities for which there was little patient demand and failed to distinguish or require some frequently performed procedures.


**Evaluation of learning materials**

4.15

A distinction should be made between *technical validation* and *educational evaluation* of materials.

**Technical validation:** 

verification that the content is *technically correct*, up to date, written in the appropriate technical terms and full enough to meet learning objectives but without irrelevant information detrimental to the clarity or usefulness of the materials. This ensures the *relevance* of the content.

**Educational evaluation:** 

verification that the materials are properly structured, easy to use, clear, etc., so as to *facilitate learning* and enable the students to attain the specific objectives for which the materials have been selected or prepared.

* Based on Romiszowski (see footnote to page 1.72).

**EXERCISE**

<table>
<thead>
<tr>
<th>Key question on self-learning materials (SLM)</th>
<th>Yes</th>
<th>In part</th>
<th>No</th>
<th>Impossible to say from data available</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do the SLM set out the professional tasks to be mastered?</td>
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<tr>
<td>2. Do the SLM deal with a problem of high social and economic importance or that is life-threatening?</td>
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<tr>
<td>3. Do the SLM deal with a problem that is not being well hand led by health professionals?</td>
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<td>4. Will the SLM force the students to formulate or reformulate their learning objectives?</td>
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<td>5. Do the SLM make clear which important principles and concepts students need to understand in order to carry out their professional tasks in the unit?</td>
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<td>6. Do the SLM include all the learning resources that are needed?</td>
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<tr>
<td>7. Are the students involved in the selection of the learning materials they will need?</td>
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<tr>
<td>8. Do the SLM have enough practical exercises and repetition to enable the students to reach the required level (in terms of the criteria set for</td>
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</table>
9. Do the SLM specify the background work which the students can do on their own?

10. Do the SLM include provision for the students to evaluate their own progress towards the attainment of the learning objectives?

11. Are the students involved in the evaluation of the SLM (including evaluation of the tutor/specialist)?

12. Do the SLM specify how the final evaluation of the students will be done?

13. Does the final evaluation match the professional tasks that have been specifically enumerated (see question 1)?

14. Are the SLM sufficiently clear as a whole (test: teacher peer review)?

Evaluation of human resources

4.16

Based on Romiszowski (see footnote to page 1.72)

The evaluation of staff involved in the educational programme can be approached from several perspectives. One is to evaluate instructional performance and take this into account for career development, which will encourage faculty staff to attach greater importance to teaching as part of their career. Specific teaching techniques can also be evaluated, by observation and analysis of the learning activities of students, with a view to improving instructional performance. A third approach is pre-evaluation of the skills, experience or knowledge of the personnel selected for the programme, to determine how well prepared they are for this type of programme. It will thus be possible to choose competent staff or to define the type of training they need before the programme is implemented.

Many techniques have been developed to evaluate the performance of teachers. Here, we are mainly interested in what the staff contribute to the education programme. In higher education, faculty staff are usually recruited on the basis of scientific merit (particularly their publications), while their teaching/instructional abilities are rarely taken into account. However, it is increasingly being realized that it will be very difficult to cope with the world’s present and future health problems without qualified personnel. The background and abilities of faculty staff must therefore match their role and functions in the educational programme.

The work of most faculty staff will involve the following four functions:

A. Communicating

B. Planning educational programmes

C. Using active educational methods to give students the benefit of their expertise in their specialty or discipline

D. Using teaching aids and materials.

It is difficult to know what proportion of faculty staff feel they are experts in these four functions. Most of them have not received any training in educational technology, but they must nevertheless be able to perform all the above functions adequately when they teach.
Tutors can evaluate their own level of preparation in these four areas of competence with the help of the following questionnaire for self-analysis.

**How to use the questionnaire**

4.17

1. Choose the sections that correspond to the tasks to be performed or actually being performed by the person to be evaluated.

2. An expert in the functions to be evaluated should read the list of aptitudes in the sections selected and pick out those that relate to the task.

The expert may also identify others that are not on the questionnaire and add them in the spaces that have been left blank.

3. The expert will then evaluate the importance of each of the relevant elements using a six-point scale (see page 4.21) and enter the score in column 1 on the right-hand side of the questionnaire.

4. Proceed in the same way for all relevant elements of all relevant sections.

5. The person to be evaluated should then rate his current level of aptitude in each of the selected elements. It may not seem very reliable to ask teachers to evaluate their own competence in relation to a type of work they are not yet doing, but it has been found that, with a little practice, they are able to pick out their strong and weak points surprisingly well with the help of a questionnaire of this kind. If it is possible to contact a person who knows the teacher professionally (e.g. his supervisor), the reliability of this method can be further consolidated by asking this person to evaluate his subordinate. This evaluation will also be done using a six-point scale (see page 4.21).

6. Proceed in the same way for all relevant elements of all relevant sections.

7. Each element has now been rated in respect of its *importance* for good performance and the teacher’s *current level of competence* in that element. Both will be scored on a scale ranging from 5 to 0. The difference between the required standard of work and the present level of competence are then obtained by subtraction. When the score in column 1 is subtracted from the score in column 2, a positive result is obtained if competence exceeds what is required and a negative result if it falls short of this level.

8. These results (score in column 2 minus score in column 1) are then entered in column 3 to obtain a profile of competence indicating the extent to which the teacher is ready to do the proposed work. This profile also highlights the teacher’s strong points (positive scores), which can be put to good use if tasks are intelligently delegated, and weak points (negative score), which can be improved with suitable training.

**Model questionnaire for the evaluation of human resources**

4.18

1 Modified after Romiszowski (see footnote to page 1.72).

One day you may need to carry out one or more of the following tasks. So as not to be caught unprepared, you can estimate your current level of competence now and set to work to improve it if necessary.

Start by evaluating the relevance of each of the skills listed below, adding others if necessary, and then evaluate their importance using the six-point scale given on page 4.21.
<table>
<thead>
<tr>
<th>Aptitude for communication</th>
<th>1 Importance</th>
<th>2 Your competence</th>
<th>3 Your score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lead discussion in a small group.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Act as tutor to a small group working with the problem-solving approach.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Use questions to give guidance in group work.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Correct students in their learning activities and give them feedback.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Communicate orally (ease and fluency).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Listen attentively and understandably to others.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Write clearly, accurately and concisely.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Present audiovisual programmes, sound recordings, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Aptitude for designing educational programmes

| 2. Direct role-playing games and simulated social situations. | | | |
| 3. Conduct a case study. | | | |
| 4. Organize and conduct workshops and effective brainstorming sessions. | | | |
| 5. Plan and carry out individualized plans of study. | | | |
| 6. Use educational objectives to plan, organize and monitor teaching. | | | |
| 7. Make use of diagrams, figures, etc., to facilitate learning. | | | |

The score is positive when competence exceeds the importance of the task and negative when it falls short of this level.

| 8. Use formative and certifying evaluation to guide the learning process. | | | |
| 9. Organize and facilitate learning in a professional setting. | | | |

Aptitude for using teaching aids and material

<p>| 1. Plan and prepare simple visual aids. | | | |
| 2. Plan a slide sequence and a video film sequence. | | | |
| 3. Plan and manage a system for the cataloguing of visual aids. | | | |
| 4. Plan and manage a system for the maintenance of teaching aids. | | | |
| 5. Use simple film strips, slides, still pictures, etc. | | | |
| 6. Use an overhead projector. | | | |
| 7. Use a blackboard, flip-chart, etc. | | | |
| 8. Use flannelboards, magnetic display boards, etc. | | | |
| 9. Use 8-mm and 16-mm film projectors. | | | |
| 10. Use tape recorders to listen, record, copy and edit materials. | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Use video equipment to record, play back, copy and edit materials.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Use computers (already programmed) for teaching purposes and administration.</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Use data processing systems to produce educational materials.</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Make effective use of printed materials for educational purposes.</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Use photographic equipment to make slides and photographs.</td>
<td></td>
</tr>
</tbody>
</table>

For skills in the planning of training, refer to pages 12 and 13.

**Six-point scale to evaluate the importance of a given area of skills to ensure good performance**

4.20

5. **Essential**: it is impossible to carry out some aspects of the work without a high level of mastery of this item.

4. **Very important**: it is difficult to carry out some aspects of the work without almost perfect mastery of this item.

3. **Important**: it is desirable to have a reasonably complete mastery of this item to be able to carry out the work satisfactorily.

2. **Relatively important**: average competence in this item will suffice for the work to be carried out satisfactorily.

1. **Not very important**: it is desirable to have a general notion of this item, but fairly elementary competence will suffice for the work to be carried out satisfactorily.

0. **No importance**: this item is irrelevant to the work which the person to be evaluated is doing or will be expected to do. It can be dropped from the list.

**Six-point scale to evaluate current competence in an area of skills or a particular skill**

5. **Complete mastery**: the person is an expert or specialist in the subject, is completely up to date and has considerable practical experience.

4. **Almost complete mastery**: the person is very well informed and skilled with respect to this item, while not reaching the level of an expert or specialist with fully up-to-date knowledge. Has considerable practical experience.

3. **Good mastery**: the person is reasonably well informed and skilled in this item. Has some practical experience but may have some gaps.

2. **Fairly good mastery**: the person has some knowledge or competence in this item, but little or no practical experience in the use of this knowledge or skill in a real work situation.

1. **Very superficial mastery**: the person has some knowledge or skill in this item, but no practical experience, and is therefore hesitant in applying this knowledge. Would probably be able to do so if help, explanations, evaluation and feedback from more experienced colleagues were available.

0. **No mastery**: the person may have heard or read something about this item, but has never studied it closely or used it in practice.
Monitoring the process of implementation of the programme

4.21

Based on Romiszowski (see footnote to page 1.72).

In evaluating the learning process, we are concerned to see how the results are achieved. For the tutor in charge of a tutorial group, the main purpose of evaluating the process is to show up the weak points in the students’ approach to discussion and to take immediate steps to remedy them. For the designer of the course, the main purpose is to identify those parts of the course that could be improved in the future. For the director of training or course administrator, the purpose could be to evaluate the manner in which the staff are approaching certain instructional tasks in practice. The students should also be involved in the evaluation of the teaching/learning process and should be invited to give their views on the methods that are being used. This feedback could influence the way the course is planned or carried out in the following year.

(a) Technique for the evaluation of teachers

Evaluation will involve direct observation and measurement, by a variety of techniques, of the actual process of teaching.

   Free observation followed by discussion in the form of an oral summary for the purpose of evaluation. These will be facilitated by the use of video recordings for self-evaluation, which should make it easier to accept constructive criticism.

   Observation with the help of instruments based on a questionnaire filled in by the person in charge of evaluation. The questions will generally be based on the desired model of performance, and evaluation may be backed up video recordings, which will make for greater objectivity and credibility.

   Techniques of objective measurement, such as sampling or analysis of interaction. These techniques are meant to obviate the subjective aspect of the previous examples. One way of sampling the work process is to observe selected types of learning activities in a series of visits at random intervals, counting the number of times the teachers are active while the students are passive, all are active, etc. The teacher’s style will be evaluated by the frequency of the different types of activity as compared with the indicative norms for teacher-centred approaches. Techniques of interactive analysis differ in that they are based on observation of the totality of teaching/learning activity and directly measure the time spent talking by the teachers and answering by the students, the time spent on group work, individual work, etc. These measurements may be presented in the form of a profile of the learning process showing the percentage of total time spent on different kinds of activities/interactions.

(b) Technique for the evaluation of students

Evaluation of the way the students work should make it possible to identify their difficulties so that steps can be taken to improve the learning process.

A specific outline for diagnosis and feedback can be prepared, and should include the methods of teaching, learning and formative evaluation that are being used. This outline could specify the verbal or other types of behaviour that the students are expected to adopt as a result of the learning activities, together with the features of this behaviour that will be used by the teacher (or any other person involved in the teaching system) to identify the causes of learning.
difficulties.

An outline can also be devised for the students themselves to identify learning difficulties connected with their methods of work and the tutor’s style of teaching. An outline of this kind will also serve as an important instrument of communication between the student and the teacher or tutor.

Personal notes

4.22

Evaluation by students of programmes, teaching techniques and teachers

1 Summary of a paper presented by J.-F. d’Ivernois, 21 May, 1975, Séminaire de Pédagogie universitaire, Laval University, Quebec.

4.23

Introduction

An evaluation made by students can provide the teacher with a most useful feedback of information on the quality of his teaching. Anyone who genuinely wishes to teach better should therefore seek his students’ opinions. That may be done simply by a friendly talk with a few students, but it is preferable to prepare and distribute a questionnaire. Such an evaluation questionnaire may cover the whole or only part of the teaching, and it is for the teacher together with the students to decide just what should be evaluated by them. It would, for instance, be very valuable for the teacher to know how the students regard any changes in the teaching routine such as a new organization or the introduction of audiovisual material.

It may be noted that anyone who asks students to evaluate his teaching need not doubt the validity of their judgement. For a decade or so many psychometric studies have revealed the validity and the accuracy of student opinions as well as their close correlation with objective measurements of the instructor’s effectiveness. The many biases which were ascribed to the evaluators, for example, the influence of sex, academic efficiency (poor students/good students), level of studies (beginners, finishers), the status of the course (compulsory/optional) have all proved to be of negligible importance.

Preparation of simple evaluation questionnaires

Once the teaching aspects which are to be evaluated have been determined, the evaluation questionnaire is drawn up.

This questionnaire must comply with several essential requirements as concerns the wording of the statements, the scale of the answers and the method of administration.

1. Wording of the statements

The statements should be clear, simple and directly related to what it is desired to measure.

Statements that would be accepted straight away by everyone should not be included.

Statements containing double negatives should be rejected.
Each statement should contain a complete thought.

The terms uniquely, solely, or most of the time should be avoided or used in moderation.

A statement should preferably be in the form of an affirmation concerning which the student is asked to express a favourable, neutral or unfavourable opinion.

The number of statements should be limited. Too long a questionnaire wearies the evaluators and this inevitably affects the validity of the answers. It is estimated that a questionnaire should not exceed 60 statements.

2. Examples of statements

Specific objectives make it possible to identify what is most important in the content to be learned.

The time allocated for a learning activity is sufficient for you to achieve all the objectives aimed at by that activity.

3. Scale of answers

The student should not have to answer merely yes or no to a statement, for such an answer provides only scanty or dubious information.

That is why preference is given to the use of scales of answers comprising 5 degrees (and sometimes 7 or 9) (see below).

Students should enter against each statement (or on an answer-form or card) the number corresponding to their opinion. It is advisable to provide for an additional answer corresponding to a lack of opinion concerning the statement (coded 0).

The answers scale should be explained to the students at the beginning of the questionnaire, or mentioned against each statement. It is also as well to leave a space below each statement for comments by the student.

4. Method of administration

A person’s reaction to a given stimulus is first immediate and then delayed. If the questionnaire is handed out immediately after the event the results observed will be different from those obtained if the questionnaire is administered later. These differences in distribution are attributable to the effect of experience (also called the practice effect). The teacher should therefore take this factor into account when he envisages the administration of an evaluation questionnaire.

5. Analysis and interpretation of the answers

Processing (machine or manual) of the answers is simple. The answers to a given statement are then analysed by calculating the number of students (frequency) who have replied by 1, 2, 3, 4, 5 or 0 to that statement. The mean of the answers to the statement can also be calculated. To do this one point is assigned to an answer 1; two points to an answer 2; three points to an answer 3; etc. The total of the number of points obtained for the statement is calculated and then divided by the number of students answering. To make interpretation easier, the trends (favourable, unfavourable) should be grouped together.

A scale ranges from disagreement (1 and 2) through neutral (3) to agreement (4).
For certain questions, it may be considered that a participant in an educational workshop, for instance, should be obliged to adopt a definite position and not take refuge in neutrality: the same applies to the position no opinion.

Example

Statement: The time allocated for a learning activity is sufficient for you to achieve all the objectives aimed at by that activity.

Number of answers: 100

Distribution: 1 : 3 3 : 5 5 : 69 2 : 2 4 : 21 0 : 0

Trends: 1 - 2 (disagreement) : 5
4 - 5 (agreement) : 90

Mean of answers: 4.51

Construction of complex questionnaires

Simple questionnaires enable the students’ perception of reality to be measured. It is for the teacher who analyses the answers to deduce from the what them students desire or expect, but this interpretation may leave certain grey zones. If, for example, the statement submitted is: the course provides an adequate coverage of the subject matter and 40% of the students disagree with that statement then it is clear that these students feel that the course does not cover sufficient subject matter. On the other hand, what proportion of the 50% of students who agree with the statement think that the subject matter covered is not only adequate but even too much?

Complex evaluation questionnaires, such as the one devised by F. GagnØ, covering the perception by the students of the teacher/students relationship have the aim of measuring as unambiguously as possible both the students’ perception of reality and their level of expectations.

In a questionnaire of the GagnØ type, each statement should include:

- a title;
- a detailed description of the aspect to be measured;
- a 5-degree scale with qualitative expression of each degree;
- two questions: the first (A) measuring the student’s perception of reality and the second (B) the level of his expectations.

Frequency of problem-solving activities: What is required is to measure the frequency of the learning activities requiring students to search for solutions to priority health problems.

1. Very rare examples
2. Rare examples
3. More or less frequent examples
Analysis and interpretation

The means of the answers to questions A (Reality) and B (Expectations) are calculated for each statement. Interpretation of these two means is easy since degree 1 on the scale shown usually corresponds to the minimum frequency or intensity, while degree 5 corresponds to maximum frequency or intensity (see example). The deviation between these two means is then calculated (S score). This deviation shows the dissatisfaction of the students, a dissatisfaction expressed in terms of a lack or an excess. The lower the value of the S score (the nearer it is to zero) the more the particular aspect measured is deemed satisfactory. The S scores of several statements can be compared with one another for one and the same group of students. Furthermore, all the S scores in the questionnaire can be added together so as to give an overall and valid measurement of satisfaction or dissatisfaction. Finally, it should be noted that a questionnaire of the Gagnø type can be adapted to different educational methods, e.g. lecture courses, small group activities, teaching by computer, by television, etc.

Example of Interpretation of a Questionnaire of the Gagnø type.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Title of statement</th>
<th>Mean: Reality</th>
<th>Mean: Desires</th>
<th>Deviation (S score)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Variation in educational approach</td>
<td>2.39</td>
<td>3.74</td>
<td>1.35</td>
<td>Dissatisfaction</td>
</tr>
<tr>
<td>13</td>
<td>Active student participation (+ or -)</td>
<td>4.26</td>
<td>4.65</td>
<td>0.39</td>
<td>Satisfaction</td>
</tr>
<tr>
<td>27</td>
<td>Number of references to be consulted</td>
<td>4.51</td>
<td>3.27</td>
<td>1.24</td>
<td>Dissatisfaction (excess)</td>
</tr>
</tbody>
</table>

On this subject, see also Evaluation of teachers and teaching effectiveness by Christine H. McGuire in WHO Public Health Papers No. 61, Geneva, 1974.

EXERCISE

4.27

List the advantages and limitations of this type of evaluation of the educational process by students.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
</table>

Compare your list with the list on the next page.

Advantages and limitations of teacher evaluation

4.28

<table>
<thead>
<tr>
<th>Sources</th>
<th>Methods</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Students</td>
<td>Questionnaire, informal contacts, observation of students’ attendance.</td>
<td>The opinion of the students as consumers is very important, since it</td>
<td>Likely to be highly variable. Limited value</td>
</tr>
<tr>
<td>Results of evaluation of the students’ performance</td>
<td>Formative and certifying tests.</td>
<td>Important impact on both students and teachers,</td>
<td>Influenced by factors other than the role of the teacher.</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Colleagues</td>
<td>Observation during teaching sessions.</td>
<td>(Assumed to have) ability to evaluate.</td>
<td>Possibility of professional rivalry.</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>Self-evaluation, sound and video recordings, discussion with others.</td>
<td>Less threatening and helps towards improvement.</td>
<td>Tends not to take account of own shortcomings.</td>
</tr>
</tbody>
</table>

1 This list was drawn up at a teacher training workshop at Kelaniya University, Sri Lanka, 1986.

**Evaluation of students’ level of performance**

4.29

The following pages contain some examples of tests. In each case you are advised to practise making up a test on a subject with which you are familiar, after having selected a specific educational objective whose achievement can be effectively measured by the test in question (i.e., the test must be valid).

<table>
<thead>
<tr>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral test 4.29</td>
</tr>
<tr>
<td>Real or simulated practical test 4.30</td>
</tr>
<tr>
<td>Execution of a project 4.30</td>
</tr>
<tr>
<td>Observational rating scale 4.31</td>
</tr>
<tr>
<td>Scale of human values 4.35</td>
</tr>
<tr>
<td>Essay 4.36</td>
</tr>
<tr>
<td>Short, open answer questions (modified essay question, and restricted response test) 4.36</td>
</tr>
<tr>
<td>Multiple choice questions (MCQ) 4.39</td>
</tr>
<tr>
<td>Programmed examination 4.47</td>
</tr>
</tbody>
</table>


**A few words about the traditional oral examination**

**Definition:** An examination consisting of a dialogue with the examiner who asks questions to which the candidate must reply.

In its standard form, the oral examination is a closed-book test. In that form it can evaluate only level 1 educational objectives (see page 1.51) in the domain of intellectual skills. Like traditional written examinations using short, open-answer questions or MCQ, it provides a check on whether the student can express, more or less clearly, his knowledge of isolated facts or groups of facts that he ought to remember. Most often, it takes the form of a series of not necessarily interrelated questions.

There is a dialogue only if the examiner so wishes.
It should be pointed out that, apart from its advantages and limitations which were described on page 2.30, this type of examination suffers from a scarcity of examiners who are really capable of making the best use of it in practice.

A better way of assessing a student’s ability to communicate orally with another person is to use simulation methods, such as role-playing or a telephone conversation, which are much nearer to actual professional tasks.

Assessment of professional skills

4.30

Real or simulated practical tests using check-list

These tests are based on the direct observation of a professional task (cf. page 2.22).

A practical test is one that requires the student to perform a professional task in an environment and under conditions the same as or similar to those in which he will have to perform it in his future professional life.

For example:

The student is required to weigh a baby in an MCH centre and note the result on the appropriate record card.

The student measures the blood pressure of another student.

The student is required to prepare a blood slide.

All these tasks are entered on a check-list (done well, done badly, not done).

It is advisable to use this technique when the main component of an educational objective is a practical skill.

The disadvantages of this type of test are: the relatively high cost in teaching personnel in view of the time required to observe each student’s work; the risk of the patient being placed in a disagreeable situation; the difficulty in standardizing the test conditions; and the heavy administrative task of coordinating the time schedules of teachers, students and services.

Execution of a project

These tests are based on the indirect observation of a professional task.

A project execution test is one that requires the student to carry out an activity, in a variable period of time, that results in a product which is to be evaluated by the teacher.

For example:

The product might be a concrete piece of work such as a dissection, a dental impression or a histopathological slide; in addition to practical skills, certain intellectual processes can be evaluated by project in a written form, such as a research report or a bibliography.

It is advisable to use this technique when the main component of an educational objective is a complex practical or intellectual skill, and when the product is more important than the student’s manner of working.

The disadvantages of this type of test are: the relatively high cost in teaching personnel responsible for evaluating the result of the project; and the need to establish a relationship of confidence with the student to avoid cheating.

EXERCISE

Draw up a practical test, either real or simulated, or else a project test, designed to assess a professional task (pp. 1.54 or 1.64 or any task chosen by you), and keeping in view the criteria of validity, objectivity and
practicability (re-read p. 2.35).

Evaluate your results by constructing a specification table (see p. 3.88).

Assessing attitudes by observational rating scale

4.31

Everybody agrees that the attitudes of the physician and the other members of the health team to the patient and the patient’s family are of the greatest importance.

Yet when one observes the way in which students’ skills in this matter are assessed, it is seen to be so inadequate that one cannot help being struck by the paradox of the situation.

It must be recognized, in all humility, that this is the most difficult domain in which to make assessments, and the efforts of research workers in this field deserve every support. In a book such as the present one, only a superficial treatment of this subject can be given, and the reader should refer to more specialized publications (see bibliography).

1. Selection of students and assessment of attitudes

The term attitude denotes certain constant traits in an individual’s ways of feeling and of thinking, and his predispositions towards action with regard to another person such as a patient or collaborator. An attitude is generally considered to be a hypothetical construct which is not directly observable but can be inferred from speech or outward behaviour. The inventory of attitudes constitutes the operational definition of the attitude.

Attitudes are probably not innate. The whole personality structure of an individual, and thus the whole of his behaviour, is constituted by a complex of interlinked attitudes. In its present state, research seems to indicate that it is illusory to expect to be able to change attitudes in the relatively short period of a programme of higher studies. Perhaps then it would be preferable to make sure, by a suitable selection process, that students at the beginning of their studies already possessed the appropriate attitudes for their future profession. It must however be remembered that the definition of those attitudes may easily be contestable; the preparation of such definitions must therefore be a group activity free from arbitrary influences. It would be wise, more over, to conduct carefully controlled experiments before taking any action based on the results of attitude assessment.

The situation being what it is, the drawing of lots may not unreasonably be considered as a method of selection.

1 The selection of students is made by drawing lots in the Netherlands.

2. Observational rating scales during studies

The method of observational rating scales requires the repeated and standardized direct observation of students’ activity over a long period (several months) and in natural professional situations such as an outpatients clinic, a consulting room, a laboratory, or a hospital ward. The rating scales are used in evaluating the students’ reactions and attitudes. The fact that the scales are easy to use often leads people to forget the many possible sources of error in such evaluations.

If a student is being observed when examining a patient, and if it is wished to make a separate evaluation of how he gains the patient's confidence, the
following rating scale may be used.

| The student has taken all the necessary precautions, and the patient appears | 4 |
| completely relaxed | |
| The student has taken the necessary precautions and has reassured the patient | 3 |
| several times | |
| The student has made an effort, and has followed it up | 2 |
| The student has made an effort, without following it up | 1 |
| The student seems to be quite unaware of the problem | 0 |

It is advisable to use this technique when the main component of an educational objective is an interpersonal relationship (see p. 1.50).

An example of an attitude rating scale

4.32

Task/Educational Objective: During a telephone conversation, to reassure the mother of a newly hospitalized child

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When giving the mother information on her child's condition</td>
<td>refuses to reply to the mother's questions</td>
<td>gives no information spontaneously</td>
<td>gives inaccurate information</td>
<td>gives accurate information but does not reply to mother's questions</td>
<td>gives accurate information and replies to mother's questions</td>
</tr>
<tr>
<td>2. When giving a clear explanation of what has been done for the child</td>
<td>often uses medical terms without ever explaining their meaning</td>
<td>often uses medical terms and seldom explains their meaning</td>
<td>seldom uses medical terms but does not always explain their meaning</td>
<td>seldom uses medical terms and always explains their meaning</td>
<td>uses only terms that the mother can understand</td>
</tr>
<tr>
<td>3. When suggesting that the mother should see her child</td>
<td>refuses the mother's request to see her child</td>
<td>does not suggest that the mother should see her child</td>
<td>agrees when the mother makes the request</td>
<td>spontaneously suggests that the mother should see her child</td>
<td>spontaneously makes the suggestion and explains any precautions to be taken</td>
</tr>
<tr>
<td>4. When telling the mother how she can obtain information about her child's condition</td>
<td>tells her nothing</td>
<td>when the mother enquires, refers her to the nurse</td>
<td>when the mother enquires, tells her the visiting hours and the persons she should ask</td>
<td>spontaneously informs the mother how to obtain information about the child's condition outside official hours</td>
<td>encourages the mother to come and obtain information about her child's condition outside official hours</td>
</tr>
<tr>
<td>5. When suggesting to the mother how a rupture of the mother/child</td>
<td>refuses to say how when the mother enquires</td>
<td>makes no suggestion</td>
<td>puts off the question until later</td>
<td>spontaneously suggests that the mother should stay at the hospital with</td>
<td>attempts to overcome the difficulties in the way of the mother staying with</td>
</tr>
</tbody>
</table>
Criterion: The student should score 7 out of 10 on the above rating scale.

After Professor J.-P. Grangaud (Test and measurement workshop, Timimoun, 1977).


**EXERCISE 4.33**

Select a professional task (educational objective) whose main component is an attitude and construct a descriptive rating scale for its evaluation.

Task/Objective: The student should be able to:

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Criterion/acceptable level of performance:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

**EXERCISE 4.34**

Try once more - it is not easy. Show your first attempt to several of your colleagues separately; discuss it in a small group including users of health services.

Task/Objective: The student should be able to:

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

Criterion/acceptable level of performance:

<p>| | |</p>
<table>
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<td></td>
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</tr>
</tbody>
</table>

**Evaluation of human values**

4.35
A person (student or teacher) can be evaluated on the basis of the following two lists.

1. See also p. 1.637.

**List A (12 items)**

<table>
<thead>
<tr>
<th>Helpfulness</th>
<th>Unhelpfulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepts advice</td>
<td>Doesn’t accept advice</td>
</tr>
<tr>
<td>Discreet</td>
<td>Indiscreet</td>
</tr>
<tr>
<td>Integrity</td>
<td>Corruptible</td>
</tr>
<tr>
<td>Tolerant</td>
<td>Intolerant</td>
</tr>
<tr>
<td>Open to change</td>
<td>Conservative</td>
</tr>
<tr>
<td>Sense of responsibility</td>
<td>Irresponsible</td>
</tr>
<tr>
<td>Resistant to stress</td>
<td>Readily succumbs to stress</td>
</tr>
<tr>
<td>Persevering</td>
<td>Unstable</td>
</tr>
<tr>
<td>Flexible</td>
<td>Inflexible</td>
</tr>
<tr>
<td>Receptive</td>
<td>Insensitive</td>
</tr>
<tr>
<td>Natural</td>
<td>Affected</td>
</tr>
</tbody>
</table>

**List B (4 items)**

<table>
<thead>
<tr>
<th>Honesty</th>
<th>Dishonest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empathy for others</td>
<td>Indifferent</td>
</tr>
<tr>
<td>Respects others</td>
<td>Contemptuous</td>
</tr>
<tr>
<td>Aware of his/her own limits</td>
<td>Unaware of his/her own limits</td>
</tr>
</tbody>
</table>

It is important not to lose sight of the fact that people tend to be indulgent rather than severe in their evaluations. Thus it is not so much the absolute value of the judgements made that needs to be considered but the degree of difference between the judgements made by several observers.

**Long and short written questions**

4.36

**The use of the essay question**

Use essay questions only to evaluate a type of performance which cannot be measured just as efficiently by other methods (synthesis of a group of complex concepts, summary of a document, comparison of two phenomena, cause analysis, finding relationships, criticizing the relevance of a concept, formulating a plan of action).

Limit the problem posed so that it is clearly apparent to the candidate and define the structure of the answer.

Employ terms that are as explicit as possible, such as summarize, or compare, evaluate, define, arrange in order, etc. rather than discuss or state everything you know, so that all the candidates immediately know what they have to do.

Choose problems which call for careful consideration but whose solution can be briefly set out in the time allowed.

Allow no choice among the questions set.

For every question, set out yourself the elements which, according to you, should appear in the answer (scoring procedure).

Mark papers anonymously.
When two or more teachers correct the same test, they should agree on the scoring procedure before the test and correct the results separately.

Use a point system of scoring based upon those elements that are expected to appear in the answers.

Try out the scoring procedure on a few papers. Preferably, have all the teachers then read all the answers to a given question; or, if need be, have one of them read all the answers to a particular question in all the papers, have another teacher do the same for another question, and so on.

Score the answers of all the students to one question before going on to the scoring of another question.

Do not form a judgement of a candidate on the basis of only one question but calculate for each candidate a summative score based on the reading of several different essays, since such scores are more reliable than the score for any one essay taken separately.

**Use of short, open-answer questions**

This involves series of questions drafted in such a way that the answer calls for a predetermined and precise concept. As their name indicates, the answer expected is short and can be expressed in different forms (open). Ideally, only the answer is acceptable no matter in what terms it is expressed.

The author of the question must define in advance (and in cooperation with colleagues) the answer called for by the wording of the question. If it appears that conceptually different answers will do for a given question then it should be reworded until that drawback disappears.

The pagination should allow the necessary space for the answer below each question. Marking is theoretically simple since the answer has been predetermined. In practice the frequency of difficulties arising from the conflicting views of two correctors is found to be of the order of 2%. There remain the problems of illegible writing, ¹ absence of answers, copying mistakes, etc.

¹ The same problem arises in the use of MCQ with automatic marking, but its frequency does not exceed 0.4%, and is very often less.

Moreover, all the rules concerning essays apply.

Short, open-answer questions are also called restricted response tests.


A set of short, open-answer questions preceded by a case history is sometimes called: modified essay questions.

³ Know, J.D.E. The modified essay question, Dundee Association for the Study of Medical Education, 1976 (Medical Education Booklet No. 5).

**EXERCISE**

4.37

Following some of the principles set out on the preceding page, prepare a written, open-book ¹ examination question of the essay type, and three short,
open-answer questions; indicate the standard of performance for each so that marking can be objective, i.e., a rating scale comprising all the information that another person will need to be able to mark in the same way as you.

**Written question of the essay type, including the text of the expected answer.**

**Scoring Instructions: Acceptable level of performance:**

1 An open-book question means that the candidate may refer to any book, document, handout or personal notes. Such a question is not, therefore, intended to evaluate ability to memorize.

**EXERCISE**

4.38

Now go on to draft some short, open answer questions.

<table>
<thead>
<tr>
<th>Text of the question</th>
<th>Acceptable answers</th>
</tr>
</thead>
</table>

**Scoring instructions: Acceptable level of performance.**

**Directions for writing multiple-choice questions**

4.39

1. Make certain that the stem consists of a complete statement, not just a single word.

2. Place all common elements in the stem of the item. This adds simplicity and compactness to the item.

3. Make each item completely independent of answers to other items (for instance, the stem of one should not suggest the answer to another).

4. Eliminate all unrelated details from an item.

5. In general, avoid negative statements, but if a negative expression does appear in the stem of the question, underline it to draw the student's attention to it.

6. Use plausible or logical distractors. Each distractor should, by its content or nature, be such that it appears to have something to do with the question. Unrelated distractors appear silly to a thoughtful examinee. Since the number of possible answers is thereby cut down, the item loses some of its value.

7. Avoid the use of clues that may suggest the correct answer.

8. Be sure that the distractors and the correct response possess homogeneity, that is, they should be fairly similar in content or in the total number of words.

9. Be cautious of the use of none of the above as a distractor or as a correct answer.

10. If it is impossible to obtain more than three plausible responses, do not waste time trying to invent some others.

11. When dealing with items that have numerical answers, arrange the answers in order from large to small or vice-versa.
12. Arrange the place for the correct answer in such a way that, for the test as a whole, no letter corresponding to a given answer appears more frequently than some other letter.

Examples of multiple-choice questions

4.40

One best response type

Question 1

In differentiating cirrhosis of the liver from chronic constrictive pericarditis, a useful physical sign is:

(a) hepatomegaly;
(b) ascites;
(c) distension of the neck veins;
(d) pitting oedema of the ankles and legs;
(e) splenomegaly.

Question 2

Active immunization is available against all of the following diseases except:

(a) tuberculosis;
(b) smallpox;
(c) poliomyelitis;
(d) malaria;
(e) yellow fever.

The multiple true-false type (also called multiple-response item).

This type consists of a stem followed by several true or false statements. The candidate is to determine whether or not each of the four statements which follows is true or false. He then responds according to a code which permits one out of five possible combinations or responses whereby one, two, three, or all four statements may be true.

- when properly written, the multiple true-false item type tests the student’s knowledge or understanding of several related aspects of a substance, a disease, or a process;
- each of the statements or completions offered as possibilities must be clearly true or false. This is in contrast to the type 1 format in which alternatives which are partially correct may be used as distractors;
- this type of item should be written so that no two of the alternatives are mutually exclusive, i.e. the answer all are correct must be a possible response.

The directions for this item type are as follows:

For each of the incomplete statements below, one or more of the completions is correct. On the answer sheet blacken space under:

(a) if only 1, 2 and 3 are correct;
(b) if only 1 and 3 are correct;
(c) if only 2 and 4 are correct;
(d) if only 4 is correct;
(e) if all are correct.
Question 3

A child suffering from an acute exacerbation of rheumatic fever usually has:

1. an elevated sedimentation rate;
2. a prolonged P - R interval;
3. an elevated antistreptolysin 0 titre;
4. subcutaneous nodules.

The matching type

Directions for constructing matching items

1. Limit the number of entries to about 10. If situations arise where 20 or 30 entries must be considered, construct two or three matching items. When long lists have to be matched, the student wastes too much time in trying to find the correct response.

2. Have a longer list of questions than of possible answers and state in the directions that these may be used more than once. When there are an equal number of questions and answers, it is possible for the student, after responding to some of them, to complete his task by elimination and guessing.


The directions given to examinees for this type of item are as follows:

Each group of questions below consists of lettered headings followed by a list of numbered words or statements. For each numbered word or statement, select the one heading that is most closely associated with it and blacken the corresponding space on the answer sheet. Each lettered heading may be selected once, more than once, or not at all.

Examples:

Questions 4 to 9

(a) increased metabolic activity;
(b) hyperinsulinism;
(c) lack of storage of glycogen in the liver;
(d) storage of an abnormal glycogen in the liver;
(e) decreased secretion by pituitary or adrenal glands;

4. adenoma of islets of Langerhans;
5. violent physical exercise;
6. hyperthyroidism;
7. Simond disease;
8. Von Gierke disease;
9. epidemic hepatitis.

Questions 10 to 14
10. a gastric antacid which is also used in the therapy of hypoparathyroidism because of its property of reducing the absorption of phosphorus;

11. because it is absorbed, it may cause alkalosis, particularly in infants and elderly patients;

12. a gastric antacid which has the disadvantage of causing acid-rebound;

13. a gastric antacid which precipitates and inactivates gastric pepsin;

14. a gastric antacid and demulcent which can be converted to liver glycogen.

The comparison type

The comparison type permits one to compare and contrast two diseases, signs, symptoms, laboratory findings, etc.

When using this type of item, one must be careful to:

avoid the trivial;

avoid selecting as one of the pair something that is rare or unusual. For example, if the item asks about the relation of a certain symptom to disease x or y, and the frequency of the symptom in the two diseases is 90% and less than 1% respectively, then the examinee is in a dilemma. If he follows the principle of the general rule, he may select answer A (x only); but if he is aware that the symptom does occur in the exceptional case of disease y, then he may select answer C (both). Which response is correct?

The instructions for this type of item are as follows:

Each set of lettered headings below is followed by a list of numbered words or phrases. For each numbered word or phrase, blacken the space on the answer sheet under:

(a) if the item is associated with (a) only;
(b) if the item is associated with (b) only;
(c) if the item is associated with both (a) and (b);
(d) if the item is associated with neither (a) nor (b).

Examples:

Questions 15 to 17

(a) hookworm disease;
(b) ascariasis;
(c) both;
(d) neither;

15. eosinophilia;

16. hypochromic anaemia;

17. infection through the skin.

Questions with diagrams, photographs, etc.
Questions 18 to 20

4.42

18. Total lung capacity

19. Inspiratory capacity

20. Vital capacity

Test and measurement, or the study of tests used in measurement techniques, is a fairly new science. It was introduced into the world of health sciences teaching about 50 years ago against some opposition, and the problem has certainly aroused the interest of teachers; however, some of them feel that the evaluation specialists are trying to poach on their preserves, and that this will limit their academic freedom. This is often due to a lack of information.

Better information would help to disarm the defence mechanisms displayed by teachers when the problem is tackled scientifically, and would thus reduce heated reactions.

If no reference is made to questions of the true-false type it is not a chance omission! They are really very bad and should not be used.

Examples of items constructed in accordance with the level of intellectual processes

4.43

Utilization of clinical tests for application of basic science concepts.

**Level 1 - Recall of facts**

**Item 1:**

The Fick principle is illustrated mathematically by which of the following formulae?

A

B

C

D

E

**Level 2 - Interpretation of specific data**

**Item 2:**

Apply the Fick principle to the following data and calculate the amount of glucose (in mg/min) extracted by the spleen of a dog:

- Cardiac output - 2 litres/min
- Stroke volume - 200 ml/min
- Cardiac index - 2.8 litres/sq. metre
- Arterial glucose - 100 mg/ml
- Splenic vein glucose - 96 mg/ml
- Splenic blood flow - 50 ml/min

Which of the following corresponds to the result of your calculations?

A 140; B 178; C 200; D 225; E 250
Clinical case (for questions 3, 4 and 5)

A 25-year-old male patient comes to your office complaining of cramps in the muscles of his arms or legs whenever he engages in strenuous muscular exercise. This complaint has become more prominent over the past three to four years. The general physical examination is normal. The patient has previously been seen by another doctor who performed a muscle biopsy. When you call the other doctor’s office, you learn that the only abnormality noted on the biopsy was excess accumulation of glycogen in the muscle fibres. Electromyography was normal. The blood chemistry determinations related to carbohydrate metabolism which are performed in the hospital where you work are glucose and lactate.

You decide that you want to find out why the patient has muscle cramps and excess glycogen. To obtain further data, you apply the Fick principle to the right leg and insert small polyethylene catheters in the femoral artery and femoral vein at the level of the inguinal ligament. You make a blood flow estimation for the right leg and obtain a value of 200 ml/min at rest. You also take two resting blood samples from the arterial and venous catheters.

You then have your patient pump a bicycle ergometer for five minutes and at the end of exercise you take a series of five arterial and venous samples at two minute intervals. You have glucose and lactate determinations performed on each of the 14 blood samples.

The results on the resting samples are reported as follows:

<table>
<thead>
<tr>
<th></th>
<th>Arterial</th>
<th>Venous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>75 mg %</td>
<td>73 mg %</td>
</tr>
<tr>
<td>Lactate</td>
<td>8 mg %</td>
<td>9 mg %</td>
</tr>
</tbody>
</table>

**Item 3:**

The glucose and lactate extraction (in mg/min) by the tissues of the right leg in the resting state is:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>400</td>
<td>4</td>
<td>100</td>
<td>0.01</td>
<td>40</td>
</tr>
<tr>
<td>Lactate</td>
<td>200</td>
<td>2</td>
<td>200</td>
<td>0.005</td>
<td>20</td>
</tr>
</tbody>
</table>

**Level 3 - Solution of a problem**

**Item 4:**

On the basis of your knowledge of muscle carbohydrate metabolism, the history from the patient and the muscle biopsy report, which of the following sets of pre-post exercise data on venous blood would be most likely in this patient?

**Item 5:**

Study the basic principles of carbohydrate metabolism as shown in the figure below. Note those parts of the metabolic route indicated by a letter (A, B, C, D and E).

Assuming that one of several reasonable explanations of the symptoms presented by the patient is a metabolic block, and on the basis of the data available to you after study of the preceding parts of the question, select the letter which would be the most probable site in this route of metabolic block in the patient.

Mark on the answer sheet the letter identifying the point in the route where a more thorough study would have most chance of giving positive results.
Any examination question that has not been tried out on a representative student sample should not be used in a certifying test.

EXERCISE

4.45

Compose one or two multiple-choice questions of each of the types described above (one best response, multiple true-false, matching, and comparison types). At least half of your questions should measure an intellectual process above level 1, recall of facts (either level 2, interpretation of data, or level 3, problem-solving). Use the objectives that you yourself drew up on pages 1.68 and 1.69.

EXERCISE

4.46

You should now be able to reply yes to each of the following questions about the items you have just composed. Refer also to the directions given on page 4.39.

In general

1. Is the item realistic and practical?

2. Does it deal with a matter that is professionally useful and important?

3. Is it drawn up using the technical language of the profession?

4. Does it require intellectual skills of a professional kind?

5. Is it independent of every other item in the test?

6. Is it specific?

7. Does it avoid the error of giving away the correct answer by irrelevant details or extraneous data?

The essential problem

8. Is it clear?

9. Is it stated in precise terms?

10. Is it stated briefly and completely?

11. Does it contain only data related to the answer?

The distractors

12. Are they important, plausible answers rather than obvious distractors?

13. Do they deal with similar ideas, or data expressed in similar form?

An examination must have regard to practicability

Whether it is practicable will depend on the time necessary for its construction and administration, and the scoring and interpretation of results, as well as on the general ease of its use. Examination methods that lack practicability become
a heavy burden on the teacher, who will then tend to give less than due
importance to the measuring instrument.

Simulation has the advantage of coming nearer to reality while permitting
standardization and protecting the patient.

The programmed examination

1 Also called patient management problems.

See also *Simulation in instruction and evaluation in medicine*, in WHO

4.47

The advantages of this relatively recent method (it appeared at the beginning of
the 1960s) are so great that they should help to compensate for the difficulties
attaching to its use.

Briefly, its aim is to measure (by simulation on paper) the problem-solving
component of clinical competence.

Like the method of multiple-choice questions, it is highly objective and can be
corrected by computer. Its name shows that this new examination method has
certain aspects identical to those of programmed teaching, where the candidate
advances, step by step, through a series of consecutive clinical problems.

The method was developed in the United States of America and several types of
such simulation tests can be found in the literature. They are sometimes referred
to as patient management problems (PMP), clinical simulations, etc.

Objectives of the method

The aim of the method is to evaluate clinical competence:

- Ability to detect and satisfactorily interpret abnormal signs and
  symptoms.

- Ability then to reach a reasonable diagnosis and to show
  satisfactory judgement in the choice of treatment.

Until 1963, examiners tried to find an answer to these questions by confronting
the candidate with a carefully selected patient. This method was effective in the
past, when candidates were not very numerous. More recently, faced with thousands
of candidates, thousands of patients and thousands of examiners, test specialists
confronted a difficulty which they rapidly recognized. There were three
variables: the candidate, the patient and the examiner. This represented two
variables too many for a valid evaluation of the candidate.

The first research aim was to seek a valid definition of the qualities involved
in what is termed clinical competence (at the level, for example, of a hospital
intern). One method employed was that of the questionnaire using Flanagan’s
critical incident technique (see p. 1.21).

Through direct interviews and questionnaires, some 600 physicians were asked to
describe clinical situations during which they had personally observed interns in
the course of their work and had been impressed on the one hand, by examples of
satisfactory clinical conduct, and, on the other, by examples of unorthodox
clinical conduct. Three thousand situations of this type were analysed. This
ample documentation gave an idea of what had to be evaluated.

The following step was to determine how to evaluate this what. Numerous methods
were envisaged.

Silent films, in colour, of carefully selected patients were used instead of actual patients, the examiner being replaced by a series of multiple-choice questions concerning the patient presented. This method proved satisfactory and it is now in routine use by examining bodies.

Finally another method was found (programmed testing) for evaluating the abilities of the intern when placed in a clinical situation as real as possible and called upon to face the unforeseeable problems presented by every patient.

In everyday routine the intern may be required, for example, to see a patient who has just been admitted to the medical department. He goes to the patient, gets information from him and makes a clinical examination. He must then take a certain number of decisions. He calls for certain laboratory tests whose results, combined with those of the clinical examination, will lead him to reach a diagnosis and decide on a treatment. The patient’s condition may then improve, worsen or remain unchanged by the treatment. The situation changes, new problems appear and fresh decisions must then be taken in the light of these new data.

The programmed testing recreates, as far as possible, the changing situation represented by every patient. Each patient is described in accordance with a real case history. From four to six clinical problems are presented following the case study with the aim of simulating a situation changing in time. The patient can be followed up for several days, weeks or possibly months, just as in real life, until he is discharged either cured or with his condition improved or, if he dies, passes to the autopsy table.

At each step in time the candidate is required to make decisions; he immediately learns the results thereof and, with this fresh information, goes on to the following choice, always concerning the same patient.

The eraser technique

The methodology of this type of test, as with programmed teaching, requires that the information given to the candidate is hidden from him until he has made a decision and thus becomes entitled to obtain additional information.

We shall not deal at length with the different technical difficulties that had to be overcome before a satisfactory system was found. As things are at present the appropriate information is hidden by a completely opaque layer of ink which can be removed, however, with an ordinary pencil eraser, or revealed by a system comparable to invisible ink (for the formula see page 4.54).

The method can be easily used for examining a large number of candidates simultaneously.

Examples of case histories

A clinical observation, situation or study is described to the candidate and he is then asked:

1. To study the details carefully and then the list of possible decisions presented for each choice linked with the initial observation.

2. To choose from the list only the numbered items which seem important and appropriate.

3. To erase the corresponding opaque rectangle on the answer sheet, or to discover the consequences by applying a special product.
The candidate is reminded:

1. That except in rare instances, it is not suggested how many of the proposed decisions he should choose.

2. That information (or consequences) will appear in the space erased for both correct and incorrect choices.

3. That since the information gradually revealed may orientate his subsequent decisions, he should consider them one after another in the order indicated.

4. But that within each choice, the order of the numbered decisions is proposed at random although it is advisable for the candidate to re-establish a logical order in his choice.

Scoring

The usual manual machine or computer method of scoring is employed, each space erased corresponding to one answer so that the candidate is unable to cancel a mistake once his choice has been made (the same applies in the case of a real patient).

The candidate is penalized whenever he makes an incorrect choice and whenever he fails to make a choice which was appropriate. The scoring is thus negative, taking into account sins of both omission and commission.

The choice proposed to candidates can be divided into three groups:

(a) Appropriate; should be made with the aim of improving the patient’s condition (this is indicated by the mark +1);

(b) Not indicated; should not be done and, if it is done, may be dangerous for the patient (mark -1);

(c) Neutral, of debatable importance; may or may not be done according to local conditions, teaching, customs, etc. (mark 0).

The candidate who does not make a choice regarded as suitable by the examiner or who makes a choice regarded as not indicated or dangerous is penalized.

Choice (c) has no effect on the scoring.

Consequently, this is a scoring system completely different from that for multiple choice questions where the candidate must select the best (and only) answer from several suggested.

In programmed testing he must decide to select all those choices he regards as appropriate for the treatment of the patient. He is not told how many choices he must make. The same applies in medical practice, where the physician makes a choice between what should be done and what should not be done. If he is proceeding on the right lines, he makes a certain number of decisions out of all those which could be made.

Experience (immediate feedback after “erasing”) gives him fresh data which will guide him towards new decisions.

If he is on the wrong track, experience (erasing) will show him his errors as they arise and give him a chance of changing his action although he will not be able to cancel out his mistakes.

Improvement of case histories
By means of test and measurement correlation studies the quality of questionnaires can be improved. The teachers who have drawn up the questions learn from the statistical study, question by question, how they can better test discriminatory qualities of judgement enabling a choice to be defined as appropriate, non-indicated, or neutral.

The task is different and considerably more arduous than that involved in drawing up the usual multiple-choice questions.

On the other hand, the examiners find themselves on more familiar ground and feel that they are dealing with practical clinical situations in a much more realistic way than when they had to decide on a single best choice.

The method is far from perfect and calls for constant improvement, but gives new hopes for the evaluation of the clinical competence of physicians. It makes possible the evaluation of certain qualities which were not evaluated in the past, qualities considered essential for preparing the physician to assume independent responsibility in the practice of his profession.

First example of a programmed test

4.50

Specific objective: To deal in order of priority with several patients who come for treatment at the same time.

Level required: To master the objectives 1.5.1, 5.2 and 5.3 (see pp. 1.41 and 1.42).

Description of the situation

Coming into the waiting room of a children’s outpatient clinic, you find 15 children accompanied by their mothers, as follows:

1. A three-year-old with a scalp affection
2. A six-month-old breast-fed infant suffering from diarrhoea for 24 hours without outward signs of dehydration
3. A newborn infant, 10 days old, with jaundice
4. A boy, eight years old, feverish for two days
5. A girl, three years old, good general condition, with hyperthermia and difficulty in swallowing
6. A mother carrying her newborn infant under her veil
7. A 15-month-old girl with a cough and fever for past two days
8. A two-month-old infant who has suffered from diarrhoea for a week and is obviously dehydrated
9. A six-month-old infant, cyanotic, feverish, with breathing difficulties
10. A five-year-old with breathing difficulties and wheezing
11. A boy, 14 years old, with an infection of the hand
12. A six-year old girl who has suffered from abdominal pains for the last two weeks
13. An infant of seven months coming for a routine check-up

14. An eight-year-old, pale but without signs of dyspnoea

15. A boy, seven years old, with arthritis of the right knee for past two days

N.B. Before you start this exercise you should cover the area in the shaded box.

**Section A**

You now decide to: (you are entitled to only one choice)

<table>
<thead>
<tr>
<th>Decisions to consider</th>
<th>Consequences</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Begin by examining the patients in the order of their arrival.</td>
<td>Five minutes after beginning your examinations, the nurse calls you into the waiting room. The condition of one of the children is critical. Select another decision.</td>
<td>-1</td>
</tr>
<tr>
<td>2. Have measurements taken of the temperature, weight and height of all the children.</td>
<td>Meanwhile, one of the children suffers a respiratory arrest. Select another decision.</td>
<td>-1</td>
</tr>
<tr>
<td>3. Examine some of the children in priority.</td>
<td>Select the three children that you should examine first in your consulting room. Go on to Section B and follow up these three children among the 15 on the list.</td>
<td>+1</td>
</tr>
<tr>
<td>4. Send children 7, 9 and 10 for X-ray.</td>
<td>While on their way, one of them faints. Select another decision.</td>
<td>-1</td>
</tr>
</tbody>
</table>

**Section B**

Instructions: Select the children who need immediate attention from those numbered 1-15 described on page 4.50.

<table>
<thead>
<tr>
<th>No. of child</th>
<th>Consequences</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>While you are examining this child, a child dies in the waiting room.</td>
<td>-1</td>
</tr>
<tr>
<td>2.</td>
<td>You are called into the waiting room where a child is in convulsions.</td>
<td>-1</td>
</tr>
<tr>
<td>3.</td>
<td>The nurse summons you urgently.</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>In the waiting room, a child suffers a respiratory arrest.</td>
<td>-1</td>
</tr>
<tr>
<td>5.</td>
<td>You are urgently called to the waiting room.</td>
<td>-1</td>
</tr>
<tr>
<td>6.</td>
<td>Under the mother’s veil, you discover a newborn child 10 days old, poor muscle tone, cyanotic and congested, refusing the breast. T: 95°F (35°C). Conjunctiva yellowish. Go on to Section C.</td>
<td>+1</td>
</tr>
<tr>
<td>7.</td>
<td>You are summoned to the waiting room.</td>
<td>-1</td>
</tr>
<tr>
<td>8.</td>
<td>W: 4.1 kg, H: 56 cm, CC: 39 cm, T: 96.4°F (35.8°C). Persistent abdominal skinfold; eyeballs sunken; cold hands and feet. Go on to Section D</td>
<td>+1</td>
</tr>
<tr>
<td>9.</td>
<td>W: 7.6 kg, H: 64 cm, CC: 44 cm, pulse 180/min, RF: 90/min. Foci of crepitant sounds in both lungs. Go on to Section E.</td>
<td>+1</td>
</tr>
<tr>
<td>10.</td>
<td>While making your auscultation you are summoned urgently.</td>
<td>-1</td>
</tr>
<tr>
<td>11.</td>
<td>During your examination, the mother of another child bursts into your consulting room with her child who is in convulsions.</td>
<td>-1</td>
</tr>
<tr>
<td>12.</td>
<td>You are urgently called into the waiting room.</td>
<td>-1</td>
</tr>
<tr>
<td>13.</td>
<td>You are urgently called into the waiting room.</td>
<td>-1</td>
</tr>
</tbody>
</table>
14. A child is in convulsions in the waiting room. -1
15. A child has a respiratory arrest in the waiting room. -1

W: Weight; H: Height; CC: Cranial circumference; T: Temperature; RF: Respiratory frequency.

Section C

For this child you now decide to:

<table>
<thead>
<tr>
<th>Decisions to consider</th>
<th>Consequences</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interrogate the mother.</td>
<td>While you are doing this, the dyspnoea becomes more severe and the child becomes more congested.</td>
<td>-1</td>
</tr>
<tr>
<td>2. Make a complete examination of the child.</td>
<td>During the examination, the child becomes cyanotic.</td>
<td>0</td>
</tr>
<tr>
<td>3. Request biological tests.</td>
<td>The moment the needle is inserted into the vein, the child has a respiratory arrest.</td>
<td>-1</td>
</tr>
<tr>
<td>4. Immediately treat the symptoms.</td>
<td>Go on to Section F.</td>
<td>+1</td>
</tr>
</tbody>
</table>

Section D

For this child, you now decide to:

<table>
<thead>
<tr>
<th>Decisions to consider</th>
<th>Consequences</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interrogate the mother.</td>
<td>The child has a collapse.</td>
<td>-1</td>
</tr>
<tr>
<td>2. Make a complete examination.</td>
<td>During the examination the child becomes cyanotic. Pulse 180.</td>
<td>0</td>
</tr>
<tr>
<td>3. Request a blood count, sedimentation rate, urea and glycaemia.</td>
<td>While you are inserting the needle, the child has a respiratory arrest.</td>
<td>-1</td>
</tr>
<tr>
<td>4. Immediately give emergency treatment.</td>
<td>Go on to Section G.</td>
<td>+1</td>
</tr>
</tbody>
</table>

Section E

For this child, you now decide to:

<table>
<thead>
<tr>
<th>Decisions to consider</th>
<th>Consequences</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interrogate the mother.</td>
<td>While you are doing so, the child goes into convulsions.</td>
<td>-1</td>
</tr>
<tr>
<td>2. Make a complete examination.</td>
<td>The child’s temperature rises to 106.7°F (41.5°C).</td>
<td>0</td>
</tr>
<tr>
<td>3. Perform a lumbar puncture.</td>
<td>While you are doing so, the cyanosis suddenly increases.</td>
<td>-1</td>
</tr>
<tr>
<td>4. Immediately give emergency treatment.</td>
<td>Go on to Section H.</td>
<td>+1</td>
</tr>
</tbody>
</table>

Treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Section F</th>
<th>Section G</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Place the child near heat source</td>
<td>Temperature rises to 97.7°F (36.5°C)</td>
<td>+1</td>
<td>When done: temp: 97.1°F (36.2°C)</td>
</tr>
<tr>
<td>2. Decongest</td>
<td>When done, the obstruction becomes less.</td>
<td>+1</td>
<td>Child not congested</td>
</tr>
<tr>
<td>3. Empty the stomach</td>
<td>Pointless</td>
<td>0</td>
<td>Pointless</td>
</tr>
<tr>
<td>4. Give oxygen</td>
<td>+1</td>
<td>Pointless</td>
<td>0</td>
</tr>
</tbody>
</table>
When done, the cyanosis disappears

5. Give a perfusion
   - Note under Section I the quantity of serum, the serum composition and rate of flow
   +1
   - Note under Section J the quantity of liquid, the nature of the perfusion and the rate of flow
   +1
   - Note under Section K the quantity of liquid, the nature of the perfusion and the rate of flow
   +1

6. Give an enema of 200 cc of water at 14°C
   - To bring down the temperature???
   Cancelled by the officer on duty
   -1
   - Treatment unsuitable, cancelled by the resident physician
   -1
   - Note under Section K the quantity and the nature of the liquid injected
   +1

7. Paracetamol
   - Prescription cancelled by the officer on duty
   -1
   - Prescription cancelled by the resident physician
   -1
   - Note under Section K the dose and the route of administration
   +1

8. Cefalotin
   - On what basis?
   Prescription cancelled.
   -1
   - Not indicated.
   Prescription cancelled.
   -1

9. Ampicillin
   - There is no valid reason to give this child antibiotics
   -1
   - Not indicated.
   Prescription cancelled.
   -1
   - Not indicated.
   Prescription cancelled.
   -1

10. Ampicillin-gentamicin
    - You have no valid basis at this stage. Prescription cancelled for the time being
    0
    - Not indicated.
    Prescription cancelled
    -1
    - Not indicated.
    Prescription cancelled
    -1

11. Decide on admission to hospital
    - Done
    +1
    - It seems adequate to keep the child for a few hours after the perfusion
    0
    - Done
    +1

12. Benzylpenicillin
    - You have no valid basis for giving antibiotics. Prescription cancelled.
    -1
    - Prescription cancelled
    -1
    - Note under Section K the dose and the route of administration
    +1

13. Chloramphenicol
    - This antibiotic is not for the new born. Prescription cancelled
    -1
    - Prescription cancelled
    -1
    - No indication.
    Prescription cancelled
    -1

14. Hydrocortisone hemisuccinate
    - Not indicated.
    Prescription cancelled
    0
    - Not indicated.
    Prescription cancelled
    0
    - Not indicated.
    Prescription cancelled
    -1

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Section I
Section J
Section K

Drawn up by Professor J.-P. Grangaud, Test and Measurement Workshop, Timimoun, Algeria, February 1977; revised by Professor M. Mazouni, January 1995.
Note:

Special printing techniques require somewhat sophisticated and often patented apparatus. A simple technique developed under WHO sponsorship has been published under the title: *An invisible ink process for use as an educational tool.* In: *Information: occasional publication No. 3, 1981*, B.L.A.T. Centre for Health and Medical Education, Tavistock Square, London, WC1H 9JP. It is suitable for reproduction by stencil or offset processes. The invisible ink and the developer can be made from products easily obtainable on the market.

The simplest technique is still that described by Rimoldi* in 1955. The description of the clinical picture is typewritten on an ordinary sheet of paper; the decisions to consider are also typewritten, but on cards of 8 × 10 cm, and the consequences are on the back of the same cards. When the student has made his choice, he turns over the selected card and, if it is a certifying test, the teacher notes this. The P4 packs from H. Barrows, McMaster University, Canada, are a good example of the technique.


In the next example, students are not only required to show their knowledge but must also follow a problem-based line of reasoning and be able to substantiate their proposals from their knowledge of the basic sciences.

Second example of a programmed test

4.55

(adapted from a test used by the Faculty of Medicine at the University of Newcastle, New South Wales, Australia; and revised by Dr J.L. Hoffmann, Cantonal Hospital, Geneva, Switzerland, 1993)

One of the patients in your general practice, James Conway, a 53-year-old Government official, presents at your morning surgery complaining of recurrent chest pain which has increased in frequency over the past three months. You notice that he is rather pale and also fairly thin.

N.B. Before you start this exercise you should cover the area in the shaded box.

1. Suggest four anatomical structures which could give rise to his chronic chest pain. Give one common clinical condition as an example to illustrate the cause of chronic pain for each structure.

<table>
<thead>
<tr>
<th>Anatomical structure</th>
<th>Clinical condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>myocardium</td>
<td>angina pectoris</td>
</tr>
<tr>
<td>pleura</td>
<td>pleuritis or carcinoma</td>
</tr>
<tr>
<td>pericardium</td>
<td>pericarditis</td>
</tr>
<tr>
<td>thoracic skeleton</td>
<td>osteoarthrosis of thoracic spine</td>
</tr>
<tr>
<td></td>
<td>ruptured cervical disk</td>
</tr>
<tr>
<td></td>
<td>inflamed costal cartilage</td>
</tr>
<tr>
<td></td>
<td>bony tumor</td>
</tr>
<tr>
<td>chest wall</td>
<td>muscle or ligament strain or injury</td>
</tr>
<tr>
<td></td>
<td>pneumothorax</td>
</tr>
<tr>
<td>oesophagus</td>
<td>hiatus hernia</td>
</tr>
<tr>
<td></td>
<td>gastro-oesophageal reflux</td>
</tr>
<tr>
<td></td>
<td>oesophagitis</td>
</tr>
</tbody>
</table>
gall bladder  cholecystitis
pancreas  acute pancreatitis

Acceptable level of performance: *Four structures (including the two in italics)*
*plus one condition corresponding to each structure.*

4.56

You question the patient and elicit the following information:

Pain is like a tight band of pressure across his chest, always the same, brought on by exertion or emotional upset, and lasts for two or three minutes after he stops what he is doing. It has been getting worse over the past three months or so.

You notice that, when he is describing his pain, James uses his whole hand to localize the pain, with wide, sweeping movements and slightly clenched fingers.

Pain has no relation to meals, or to breathing.

2. How does this information help you to differentiate between pains arising from the cardiovascular, respiratory, digestive or musculoskeletal systems?

State how each piece of information indicates, contraindicates or allows you to exclude parts of each of the four body systems as the origin of James’s pain.

<table>
<thead>
<tr>
<th>Item of information</th>
<th>Indicates, contraindicates or excludes</th>
<th>Body system or part of body system</th>
</tr>
</thead>
<tbody>
<tr>
<td>tight, crushing band of pressure</td>
<td>indicates</td>
<td>myocardium</td>
</tr>
<tr>
<td>brought on by exertion or emotional upset</td>
<td>indicates</td>
<td>myocardium</td>
</tr>
<tr>
<td>disappears 2-3 minutes after Stopping activity</td>
<td>contraindicates</td>
<td>gastrointestinal</td>
</tr>
<tr>
<td>has got worse over last three months</td>
<td>indicates</td>
<td>myocardium</td>
</tr>
<tr>
<td>localization of pain</td>
<td>indicates</td>
<td>heart</td>
</tr>
<tr>
<td>no relation to meals</td>
<td>contraindicates</td>
<td>gastrointestinal</td>
</tr>
<tr>
<td>no relation to breathing</td>
<td>contraindicates</td>
<td>pleura or respiratory musculature</td>
</tr>
</tbody>
</table>

Acceptable level of performance: *any four items of information with correct supplementary indications.*

4.57

You decide to examine James Conway.

3. List five items to which you would pay particular attention on physical examination. In each case state the inference that could be drawn from a positive finding.

<table>
<thead>
<tr>
<th>Physical examination item</th>
<th>Possible positive finding and inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>arterial blood pressure</td>
<td>elevated? positive risk factor in ischaemic heart disease</td>
</tr>
<tr>
<td>pulse (rate, rhythm, character, volume)</td>
<td>arrhythmia? tachycardia? may implicate heart in diagnosis</td>
</tr>
<tr>
<td>breath sounds</td>
<td>pleural rob? crepitations? rales? may suggest pleuritis, pulmonary congestion, bronchial</td>
</tr>
</tbody>
</table>
heart sounds
murmurs? valvular heart disease pericardial rub? pericarditis abnormal sounds?
cardiovascular disease

jugular venous pulse and pressure
elevated? right heart failure

position of apex beat
displacement? cardiomegaly

chest wall
signs of trauma, local injury, lumps, tenderness? muscle or ligament strain, disk lesion, neoplasm

skin

soft tissues
edema? heart failure, hypoproteinaemia, severe anaemia

Acceptable level of performance: five physical examination items with one feasible finding and inference for each.

4.58

On examination, you can find no evidence of injury to, or abnormality of, the chest wall. You make the following observations:

(i) arterial blood pressure 135/85 mmHg; (ii) pulse 105 per minute, good volume, regular; (iii) skin and mucous membranes - pale; (iv) slight pitting oedema of ankles; (v) on auscultation: normal breath sounds; (vi) soft systolic murmur best heard at apex.

4. Which of the above do you consider to be abnormal? What diagnostic inference can you draw from each abnormal sign?

(i) Arterial blood pressure within normal range.

(ii) Pulse rate high, but of good volume and regular. Inference: cardiac output probably normal or raised rather than reduced. No obvious arrhythmias.

(iii) Pale skin and mucous membranes. Inference: possible anaemia or pronounced sympathetic nervous activity (heart rate consistent with both conditions but arterial blood pressure level does not support second possibility).

(iv) Pitting oedema of ankles. Inference: right heart failure; reduced plasma protein concentration; ? severe anaemia.

(v) Normal breath sounds.

(vi) Soft systolic murmur at apex. Inference: ? functional murmur due to increased cardiac output.

Acceptable level of performance: identification of (iv) as definitely abnormal and (ii), (iii) and (vi) as possibly abnormal, plus one reasonable inference from (iv) and from one other of (ii), (iii) and (vi).

5. Suggest two plausible reasons for pale skin and mucous membranes in this patient.

1. Anaemia/reduced haemoglobin levels.

2. Constitutional.

3. Vasconstriction.
Reduced cardiac output not acceptable - pulse has good volume. Increased sympathetic nervous activity could be accepted (on the basis of increased heart rate) but arterial blood pressure value is not fully consistent.

Acceptable level of performance: *anaemia plus one other reason.*

4.59

You assume that James Con way’s chest pain suggests angina pectoris and that this pain of cardiac origin is brought on by exertion or emotional upset.

6. Draw a flow chart with arrows to account for this pain, indicating any possible biochemical changes.

Acceptable level of performance: pathway similar to above (essential concepts in italics).

7. From a theoretical standpoint, what difference do you think it would make to the onset and intensity of the pain if James’s heart rate rises to 150 beats per minute during exercise instead of, say, 120 beats per minute?

1. In theory the pain would be the same or greater but would have a more rapid onset.

Justify your conclusion.

2. Coronary blood flow occurs only during diastole. The higher the heart rate, the shorter the period for diastolic coronary blood flow. This would further compromise an already inadequate myocardial oxygen supply. (N.B. The faster beating heart would require more oxygen per minute than the slower beating heart.)

Acceptable level of performance: *essentials of above description.*

4.60

Further questioning reveals that James’s pain often seems to go down his left arm as well as to come from the centre of his chest.

8. Give the reason for anginal pains also appearing to originate in areas remote from the heart. Use as much anatomical detail as you are able.

Pain sensation for the heart and sensation from the medial aspect of the arm both enter the same spinal segment, namely T2 (−1). The central nervous system is unable precisely to localize visceral pain which is referred to skin supplied by the same spinal segment.

Acceptable level of performance: satisfactory = items in italics

not satisfactory = mention of segments other than T1 - T3.

You are fairly certain that James’s pain is of cardiac origin. After sending James for a fasting blood test and chest X-ray, you receive the following information:

(a) blood test:

- erythrocytes: 4.1 $10^{12}$/l (normal: 4.5 - 6.2 $10^{12}$/l)
- haemoglobin: 65 g/l (normal: 140 - 170)
- leukocytes: 5.3 $10^9$/l (normal: 4.1 - 10 $10^9$/l)
- cholesterol: 8.0 mmol/l (reference range up to 7.2 mmol/l)
triglycerides: 22 mmol/l (reference range up to 18 mmol/l)

(b) chest X-ray: lungs clear, heart normal size

9. What conclusions do you draw from the results listed under (a) and (b)? Mention each abnormal finding in your answer and explain how each abnormality might contribute to James’s attacks of chest pain during exercise.

<table>
<thead>
<tr>
<th>Abnormal finding</th>
<th>Contribution to chest pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>erythrocytes and haemoglobin</td>
<td>Deficiency in erythrocyte numbers and gross deficiency in haemoglobin concentration leads to reduced oxygen-carrying capacity of blood. This may limit availability of oxygen to the myocardium during exercise and result in ischaemic pain.</td>
</tr>
<tr>
<td>hyperlipidaemia/ hypercholesterolaemia</td>
<td>Predispose to atherosclerosis. Coronary atherosclerosis would compromise blood supply to the myocardium, thereby limiting availability of oxygen.</td>
</tr>
</tbody>
</table>

Acceptable level of performance: essential points of the above.

James is anaemic; the oxygen-carrying capacity of his blood is reduced. His serum lipids are above the upper limit of the reference range. It is likely that atherosclerosis may be compromising the diameter of his coronary arteries, thereby limiting blood supply to the myocardium. These factors together may account for anginal pain when myocardial oxygen demand rises during exercise.

10. Assuming it was possible to biopsy James’s myocardium, list three histological changes which you would expect to see. State the probable cause of each change.

1. Fibrous tissue replacing myocardial fibres.
   Cause: chronic ischaemia destroys myocardial cells which are replaced by fibrous scar tissue.

2. Myocardial fibres immediately adjacent to fibrotic zones pale and atrophic.
   Cause: areas of relative ischaemia produce atrophic changes in myocardial cells.

3. Myocardial fibres in areas away from fibrotic zones hypertrophic.
   Cause: myocardial cells in normally perfused areas become hypertrophic to compensate for atrophic and dead cells.

Acceptable level of performance: two changes plus one probable cause for each change.

11. Describe briefly the changes you would expect to see in James’s coronary blood vessels.

1. Fatty streaks - accumulation of lipid in myointimal cells of the tunica intima, seen on intimal surface.

2. Raised fibrous plaques - degeneration of lipid-filled myointimal cells is followed by their replacement with fibrous tissue. The plaques encroach on media with damage to muscle and elastic fibres. Cholesterol will be visible in the centre of the lesion.

3. The plaques may be complicated by visible haemorrhage into the plaques, ulceration or calcification.
Your patient is anaemic and probably has some atherosclerosis. Together these conditions may be preventing an adequate oxygen supply to the myocardium at times of increased activity. When Mr Conway returns for the results of his tests, his wife is with him. They are both very concerned about his condition and seem very anxious.

12. List the aims of your ensuing conversation with James Conway and his wife.

1. Explain clearly and concisely the nature of the condition.
2. Check that they have understood what you have said.
3. Encourage them to talk about their worries, correcting any misapprehensions.
4. Give them the opportunity to ask further questions and answer them.

Acceptable level of performance: essence of above.

13. Mr Conway thinks he has had it. What is your view of the likely prognosis for James’s condition? Give reasons.

With this information only it is difficult to advance a reliable prognosis. The cause of the anaemia is unknown. It may be treatable - and thus would almost certainly improve his present condition - or it may not be treatable. Similarly, the cause of his hyper-lipidaemia is unknown. It may be caused by imperfect diet or it may be the result of a genetic abnormality of lipid handling.

Acceptable level of performance: should mention the difficulty of making a reliable prognosis on the basis of insufficient data.

14. List the items for your plan of management for Mr Conway.

1. Establish the cause of anaemia and apply corrective therapy if possible.
2. Investigate the cause of hyperlipidaemia and hypercholesterolaemia. If dietary, give advice about diet and lifestyle. If diet has no effect, drug treatment may be advisable to control lipid profiles.
3. Angina may resolve if anaemia is corrected. Further investigations as to the extent of lesions in the coronary circulation may be required (exertion ECG, radionuclide examination, coronography).

Acceptable level of performance: essentials of the above.

Among your short-term management strategies, you suggest that he takes glyceryl trinitrate whenever he feels the pain.

15. How is glyceryl trinitrate thought to work in relieving angina?

Glyceryl trinitrate is a short-acting peripheral vasodilator and causes a rapid fall in blood pressure. This reduces after-load on the heart and reduces cardiac work. Myocardial oxygen demand is thus reduced and existing supply may then be adequate to meet the demand. In coronary patients, nitrate derivatives seem to act primarily on the venous system, causing a reduction in preload; vasodilatory action on the coronary arteries has also been clearly demonstrated.

Acceptable level of performance: essence of the above.

16. What route of administration would you suggest? Give reasons.

Sublingual: rapid uptake into the bloodstream through buccal mucous membrane and thence to heart and systemic circulation.
Long-acting preparations of glyceryl trinitrate may be given orally or transdermally for prophylaxis without being inactivated. 

Acceptable level of performance: correct route and reason as above.

EXERCISE

Try to draw up a programmed test. Take as a basis a clinical or an epidemiological situation. Show the result to several colleagues and ask for constructive criticism. List the advantages and disadvantages of this type of test.

Stages of assessment

4.65

- prerequisite level testing
- pre-testing
- interval testing
- pre-final feedback comprehensive testing
- subjective impression
- final testing
- safety testing
- follow-up testing

Different types of examinations during a course and their stages

4.66

Prerequisite level test

Before commencing a course it is necessary to ascertain whether the students have reached a certain level, namely the prerequisite level (refer back to page 1.56). Teachers must specify which skills and knowledge are considered indispensable to ensure that the students will derive maximum benefit from the instruction planned for them. This test shows whether or not all the students are at this level, and whether the proposed instruction needs to be modified to bring them up to this level. If this is not done the quality of instruction must suffer. Depending on the number of students who need bringing up to this level, teachers must decide on the type of remedy - either reference to books or additional instruction - for the students concerned, possibly with the assistance of students who have reached the level and can be given the task of instructor. As far as possible a repeat for all the students should be avoided, since this would amount to ignoring the diagnosis obtained by means of the prerequisite level test.

Pre-testing

When a given course commences it is advisable to make sure of the level of the students with respect to the course; on the one hand, this measurement of the starting level will permit the assessment of the real gain at the end of a course, on the other - and this has been shown experimentally - it may be found that some students are already quite advanced as regards the objectives envisaged for the course and allowance should therefore be made for this. This is a formative test (see pages 2.15-2.16).

Interval testing

These tests must be set as the course proceeds to give students the feedback they need in order to know where they stand after a particular period of instruction. Teachers must ensure that these tests are, as far as possible, of the same difficulty as the final examination. One way of doing this is to select at random
at least three packets from a group of evaluation instruments. These three equivalent packets (a₁, a₂, a₃, see diagram on page 4.67) will be used not only for interval testing but also for pre-testing (formative), pre-final feedback comprehensive testing (formative) and final testing (certifying). Thus, when the students reach the final examination they will not be haunted by the idea of its difficulty; they will have been brought up to the necessary level beforehand.

**Pre-final feedback comprehensive testing**

This is a test of the *formative* type set before the final examination (comprehensive) of a course or the year (pre-final). Its purpose is to inform students about their level of competence (feedback) and it should not be limited to a single skill but should cover a group of skills. This will be facilitated if the school follows an integrated curriculum. If it does not, the teacher must include questions from other fields directly relevant to understanding of the subject taught.

**Subjective impression**

Evaluation of this type is carried out on the basis of the teacher’s personal knowledge of the students after contact with them during the year; he seeks to divide the students into three categories: good, average and bad. It would perhaps be preferable to divide them into two groups only: satisfactory and unsatisfactory. This evaluation should be carried out before the final examinations at the end of the year.

**Certification testing**

This is of different types: oral, practical, traditional written, short open-answer, or multiple-choice questions according to the educational objectives to be measured. It may be organized throughout and at the latest at the end of a course.

4.67

**Safety testing**

This should be carried out if there is an abnormal difference between the subjective impression and the results of the certification examinations. If a student who was considered satisfactory or good has a bad mark in the certification examination, it is essential to re-evaluate the situation and not to give that examination the role or final and arbitrary sanction which it has so often had in the past.

**Follow-up testing**

This is a form of evaluation which is carried out some time after completion of the course to determine the extent to which the student has retained the acquired level of competence.

> When several measuring instruments give consistent results despite different weaknesses, the reliability of the evaluation is increased.

**Desirable qualities of rating scales**

4.68

- clarity
- relevance
- precision
- variety
- objectivity
uniqueness

Factors influencing rating

4.69


An evaluation made by a human observer is more or less objective and subject to error. The following are the factors influencing rating. The list is not exhaustive!

Errors due to leniency

Leniency is a well known factor. One means of counterbalancing this tendency is to use a scale containing only one unfavourable appraisal in five, for instance:

In this case the appraisals will probably be distributed symmetrically around good.

Central tendency

Examiners have a tendency not to give extreme appraisals and hence to group all candidates around the mean. This central tendency may be reduced by using a scale that is wider at the centre than at the ends, for example:

The halo effect

One particular feature of a candidate sometimes seems so important to the examiner that it influences the overall evaluation. Thorndike called this the halo effect. However, this effect is reduced as the number of separate aspects of the problem dealt with by the evaluation is increased.

The logical error

The logical error is similar to the halo effect and occurs when the examiner supposes that there is a relationship between two variables to be evaluated and that if the first variable is of a particular order, the second will be similar. This error may be reduced if the evaluation relates to an observable element rather than to an abstraction which could lead to semantic confusion.

The contrast error

An observer who is very orderly will tend to consider, by contrast, that other people are less orderly than he is, and vice versa. On the other hand, people frequently believe that others are like me and are very surprised to see that this is not so.

The proximity error

If an observer evaluates two different factors, the evaluation of one factor tends to influence that of the other, and the shorter the interval between the two, the more pronounced the tendency (proximity error) will be.
# Test construction specification table (for intellectual skills)

4.70

<table>
<thead>
<tr>
<th>Content areas</th>
<th>Number of test items in relation to type of competence measured by test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recall of facts</td>
</tr>
<tr>
<td>Objective 1</td>
<td>6</td>
</tr>
<tr>
<td>Objective 2</td>
<td>8</td>
</tr>
<tr>
<td>Objective 3</td>
<td>12</td>
</tr>
<tr>
<td>Objective n</td>
<td>4</td>
</tr>
<tr>
<td>No. of items</td>
<td>30</td>
</tr>
</tbody>
</table>

**EXERCISE**

4.71

Complete this specification table, making a qualitative analysis of the exercises proposed in this guide: for each exercise, decide which is the level tested - Level 1: Recall of facts; Level 2: Interpretation of data; Level 3: Problem solving; (reread page 1.51). Then calculate the percentage share of each level in the total. Check your results on the next page.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description of exercise</th>
<th>Competence measured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Recall of facts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interpretation of data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem solving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n %</td>
</tr>
<tr>
<td>2, 3</td>
<td>Identifying priority community health needs</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Defining the main functions of health personnel</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Identifying professional activities</td>
<td></td>
</tr>
<tr>
<td>22, 26</td>
<td>Analysis of the relevance of a programme</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Identifying components of a professional task</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Selecting active verbs relating to a task</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Identifying the elements of a task</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Identifying the elements of an educational objective</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Drawing up specific educational objectives</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Drawing up enabling educational objectives</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Critical analysis of an educational objective</td>
<td></td>
</tr>
<tr>
<td>1 to 11</td>
<td>Evaluation of knowledge about educational objectives</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Statement of educational decisions</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Distinguishing between formative and certifying evaluation</td>
<td></td>
</tr>
<tr>
<td>15, 16, 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of questions</td>
<td>%</td>
<td>EXERCISE</td>
</tr>
<tr>
<td>---------------------</td>
<td>---</td>
<td>----------</td>
</tr>
<tr>
<td>4.72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Selecting a method of evaluation</th>
<th>17, 18</th>
<th>Comparing several methods of evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Graphic representation of an evaluation system</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Identifying obstacles to and strategies for applying an evaluation system</td>
<td></td>
</tr>
<tr>
<td>12 to 20</td>
<td>Evaluation of knowledge about evaluation planning</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Describing learning situations</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Describing the teacher/tutor’s functions</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Selecting a teaching method</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Comparing several teaching methods</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Constructing an organizational chart for programme implementation</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Identifying obstacles to and strategies for introducing a new programme</td>
<td></td>
</tr>
<tr>
<td>21 to 29</td>
<td>Evaluation of knowledge about programme construction</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Listing advantages and limitations of evaluation by students</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Drawing up a practical test or project test</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Constructing an attitude table</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Preparing an essay question</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Preparing short open-answer questions</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Preparing multiple-choice questions</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Preparing a programmed test</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Completing a specification table for a test</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Calculating the acceptable level of performance (ALP) for an MCQ test</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Calculating the difficulty index and discrimination index for a question</td>
<td></td>
</tr>
<tr>
<td>30 to 40</td>
<td>Evaluation of knowledge about test and measurement techniques</td>
<td></td>
</tr>
</tbody>
</table>
Check your answers to the exercise on the preceding page.

Your percentages should be about equal (within 10%) to those given below. Broadly, you should have found about 20% of the questions/tests at level 1 (recall of facts) and 80% at levels 2 or 3. At least that is what the author of this Handbook believes.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description of exercise</th>
<th>Competence measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 3</td>
<td>Identifying priority community health needs</td>
<td>Recall of facts: 2, Interpretation of data: 2, Problem solving: 2</td>
</tr>
<tr>
<td>5</td>
<td>Defining the main functions of health personnel</td>
<td>Recall of facts: 1, Interpretation of data: 1</td>
</tr>
<tr>
<td>6</td>
<td>Identifying professional activities</td>
<td>Recall of facts: 2, Interpretation of data: 3</td>
</tr>
<tr>
<td>22, 26</td>
<td>Analysis of the relevance of a programme</td>
<td>Recall of facts: 1, Interpretation of data: 1</td>
</tr>
<tr>
<td>7</td>
<td>Identifying components of a professional task*</td>
<td>Recall of facts: 19, Interpretation of data: 19</td>
</tr>
<tr>
<td>8</td>
<td>Selecting active verbs relating to a task</td>
<td>Recall of facts: 1, Interpretation of data: 1</td>
</tr>
<tr>
<td>10</td>
<td>Identifying the elements of a task*</td>
<td>Recall of facts: 12, Interpretation of data: 12</td>
</tr>
<tr>
<td>10</td>
<td>Identifying the elements of an educational objective*</td>
<td>Recall of facts: 12, Interpretation of data: 12</td>
</tr>
<tr>
<td>8</td>
<td>Drawing up specific educational objectives</td>
<td>Recall of facts: 3, Interpretation of data: 3</td>
</tr>
<tr>
<td>9</td>
<td>Drawing up enabling educational objectives</td>
<td>Recall of facts: 2, Interpretation of data: 2</td>
</tr>
<tr>
<td>10</td>
<td>Critical analysis of an educational objective</td>
<td>Recall of facts: 5, Interpretation of data: 5</td>
</tr>
<tr>
<td>1 to 11</td>
<td>Evaluation of knowledge about educational objectives*</td>
<td>Recall of facts: 20, Interpretation of data: 32,4</td>
</tr>
<tr>
<td>19</td>
<td>Statement of educational decisions</td>
<td>Recall of facts: 1, Interpretation of data: 1</td>
</tr>
<tr>
<td>14</td>
<td>Distinguishing between formative and certifying evaluation*</td>
<td>Recall of facts: 13, Interpretation of data: 13</td>
</tr>
<tr>
<td>15, 16, 18</td>
<td>Selecting a method of evaluation</td>
<td>Recall of facts: 5, Interpretation of data: 5</td>
</tr>
<tr>
<td>17, 18</td>
<td>Comparing several methods of evaluation</td>
<td>Recall of facts: 3, Interpretation of data: 3</td>
</tr>
<tr>
<td>19</td>
<td>Graphic representation of an evaluation system</td>
<td>Recall of facts: 1, Interpretation of data: 1</td>
</tr>
<tr>
<td>20</td>
<td>Identifying obstacles to and strategies for applying an evaluation system</td>
<td>Recall of facts: 1, Interpretation of data: 1</td>
</tr>
<tr>
<td>12 to 20</td>
<td>Evaluation of knowledge about evaluation planning</td>
<td>Recall of facts: 12, Interpretation of data: 16,6</td>
</tr>
<tr>
<td>21</td>
<td>Describing learning situations</td>
<td>-</td>
</tr>
<tr>
<td>28</td>
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<td>25</td>
<td>Selecting a teaching method</td>
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<td>25</td>
<td>Comparing several teaching methods</td>
<td>-</td>
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<tr>
<td>29</td>
<td>Constructing an organizational chart for programme implementation*</td>
<td>-</td>
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<td>29</td>
<td>Identifying obstacles to and strategies for introducing a new programme</td>
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<td>21 to 29</td>
<td>Evaluation of knowledge about programme construction*</td>
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</tr>
<tr>
<td>32</td>
<td>Listing advantages and limitations of evaluation by students</td>
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<tr>
<td>33</td>
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<td>33</td>
<td>Constructing an attitude table</td>
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<tr>
<td>34</td>
<td>Preparing an essay question</td>
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<td>36</td>
<td>Preparing a programmed test</td>
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<td>-</td>
</tr>
<tr>
<td>40</td>
<td>Calculating the difficulty index and discrimination index for a question*</td>
<td>-</td>
</tr>
<tr>
<td>30 to 40</td>
<td>Evaluation of knowledge about test and measurement techniques*</td>
<td>12</td>
</tr>
</tbody>
</table>

**Number of questions**

| 39 | 18,2 | 104 | 73 | 216 | / |

| % | 20 | 80 | 100 |

### Relative and absolute criteria tests

4.73

These two expressions are also referred to in the literature as *norm-referenced* and *criterion-referenced* tests.

It is very important to distinguish between tests based on reference to the norm (i.e., in accordance with the curve for the results of all the students who have taken the same test, and that is why this criterion is termed relative), and tests based on reference to a criterion (i.e., in relation to the description of an acceptable performance, that is to say, the specific educational objective fixed in advance).
An *absolute criteria* test is one deliberately designed to give results than can be directly interpreted in terms of the acceptable level of performance of the person tested. It enables a person’s performance to be evaluated in relation to a previously specified level of performance. The aim, therefore, is to determine whether a person has or has not mastered a particular task, and not to compare one person’s performance with that of another or of a group of persons. A *relative criteria* test, on the other hand, aims at enabling a valid discrimination to be made between persons on the basis of different types of performances; it is thus a competitive test.

*Relative criteria* tests are the ones most frequently employed for examination purposes. Unfortunately their disadvantages greatly outnumber their advantages, for if a group of students is particularly brilliant the utilization of relative criteria tests will lead to some of them being failed although their level of performance may be satisfactory from the absolute viewpoint. On the other hand, if a given group of students has on the whole a low performance level (because the appropriate instruction has not been given, or has been poorly given, or for some other reason) the relative criteria system may allow poor students to pass if they are above the average of their group. The consequences may be extremely harmful for the health of the population.

If, on the other hand, a situation arises in which a certain number of persons have to be selected for admission to a given course of study, it becomes necessary to compare their performances. In that case a relative criteria test is appropriate.

If it is felt unanimously by an evaluation committee, for example, that all the students should be able to master an emergency procedure, then this can be ascertained only by an *absolute criteria* test. These tests are, indeed, the only ones that justify the certifying of any health worker as having demonstrated an acceptable level of performance.

It is thus theoretically possible, and even desirable, that *all* the students taking an absolute criteria test should pass. That would demonstrate the high degree of effectiveness of the training programme. It would also, of course, be theoretically possible for all the students to fail.

On the other hand, a relative criteria test is, by its nature, one which will always divide the students taking it into at least two categories, those who succeed and those who do not, without any guarantee that the former are also competent.

---

It basically comes down to a choice between a measurement strategy which compares people versus one that lets us know what it is that people can or cannot do.

(J. Popham)

A measuring technique adapted to *absolute criteria* tests is suggested on pages 4.74 - 4.75, namely calculation of the acceptable level of performance (or minimum pass level). You will find on pages 4.77 - 4.81 the measuring techniques suitable for *relative criteria* tests (difficulty and discrimination indexes).

**Calculation of the acceptable level of performance (ALP) for an MCQ test**

4.74

1. **Definition**

The acceptable level of performance is a *threshold* value making it possible to decide (according to *absolute criteria*) whether a student who knows barely enough should be *passed* or *failed*. 

213
Calculation of the ALP for a test is not valid unless the number of MCQs is more than 30.

Use of the ALP involves an advance judgement (before the test) on the relative difficulty of each question and enables a judgement based on the test as a whole to be made.

Calculation of the ALP depends on the collective decision of several teachers each of whom has first made an independent judgement.

2. Procedure

This procedure was developed from an article by L. Nedelsky (Absolute grading standards for objective tests. Educ. Psycholog. Meas., 14, 3-19, 1954).

To calculate the acceptable level of performance (ALP) of a student for an MCQ test:

2.1 the evaluation board decides what is the correct answer to each MCQ;

2.2 the board decides which answer or answers must definitely be eliminated by the student, other than by chance;

2.3 the board calculates the acceptability index for each MCQ;

2.4 the ALP for the test as a whole is the sum of the acceptability indexes for each MCQ.

The acceptability index for an MCQ is calculated as follows:

Carefully study all the choices offered and decide which the student “who knows just enough to pass” should be able to reject. For example, if a question offers five choices (only one of which is the correct answer) and it is deemed that the student “who knows just enough to pass” should be able to reject one of these choices straight away, it follows that the marginal student could obtain the correct answer by mere chance approximately one time out of four. In this case the acceptability index of the question is 0.25.

<table>
<thead>
<tr>
<th>For an MCQ</th>
<th>with five choices</th>
<th>with four choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>- if all the choices are equivalent, the index =</td>
<td>1/5 = 0.20</td>
<td>1/4 = 0.25</td>
</tr>
<tr>
<td>- if one choice must be eliminated, the index =</td>
<td>1/4 = 0.25</td>
<td>1/3 = 0.33</td>
</tr>
<tr>
<td>- if two choices must be eliminated, the index =</td>
<td>1/3 = 0.33</td>
<td>1/2 = 0.50</td>
</tr>
<tr>
<td>- if three choices must be eliminated, the index =</td>
<td>1/2 = 0.50</td>
<td>1/1 = 1.00</td>
</tr>
<tr>
<td>- if four choices must be eliminated, the index =</td>
<td>1/1 = 1.00</td>
<td></td>
</tr>
</tbody>
</table>

Let us take two MCQs which are worded identically but where the choice of answers is different.

Question:

Which of the following values corresponds to the number of red cells per mm$^3$ of blood in a healthy adult?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500 000</td>
</tr>
<tr>
<td>B</td>
<td>1 000 000</td>
</tr>
<tr>
<td>A</td>
<td>4 000 000</td>
</tr>
<tr>
<td>B</td>
<td>4 500 000</td>
</tr>
</tbody>
</table>
In case 1, an acceptability index of 1.00 could be considered while in case 2 it could be 0.25.

3. Comments

4.75

The ALP has little value if it is not based on a detailed analysis of each of the questions in a test, including consideration of incorrect choices just as much as of correct answers.

The validity of the estimate of the ALP also depends on obtaining independent judgements from several teachers who have paid attention to the educational objectives and the level for which the examination is intended. The quality of the estimate will be the greater the larger the number of teachers involved.

When the differences between the judgements obtained are relatively small, the extremes can serve to define a grey zone below which the results will be regarded as distinctly inadequate (failure) and above which the results will clearly indicate a success. For example, if the mean of the estimates of one teacher for the ALP of a test is 43% whereas two other teachers obtain figures of 45% and 47%, respectively, then it could be recommended that any score below 43% should be regarded as a failure, that any score above 47% be regarded as a success, while a score between 43% and 47% should be regarded as being in a grey zone. It would remain to be defined what should be done in the latter case.

If the differences between the judgements obtained by several teachers are large then the criteria of the educational objectives should be revised.

**EXERCISE**

Now..... calculate the acceptable pass level for all the MCQs you drew up on page 4.45.

Significance and form of communication of the results of a test as a whole

4.76

<table>
<thead>
<tr>
<th>Relative Criteria Tests</th>
<th>Absolute Criteria Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>distribution of scores</td>
</tr>
<tr>
<td></td>
<td>educational objectives</td>
</tr>
<tr>
<td>Pass Score</td>
<td><em>a posteriori</em></td>
</tr>
<tr>
<td></td>
<td><em>a priori</em></td>
</tr>
<tr>
<td>Form of Results</td>
<td>alphabetical or numerical scoring</td>
</tr>
<tr>
<td></td>
<td>- alphabetical or numerical scoring</td>
</tr>
<tr>
<td></td>
<td>- descriptive profile of student</td>
</tr>
</tbody>
</table>

If we have objectives that are important to achieve, that is, if there is a genuine need for them to be achieved because a meaningful consequence would result from achievement or non-achievement, then it is also important that we find out if that achievement was accomplished. We cannot do so by comparing one student with another, we can only do so by comparing the performance of each student with the performance called for by the objective.

Mager

Steps in item analysis (relative criteria tests)

4.77
1. Award of a score to each student

4.78

A practical, simple and rapid method is to perforate on your answer sheet* the boxes corresponding to the correct answer. By placing the perforated sheet on the student’s answer sheet the raw score (number of correct answers) can be found almost automatically.

* This format corresponds to a multiple-choice question test. However, the item analyses technique can also be used for other types of assessment instrument.

2. Ranking in order of merit

4.79

Assuming that the scores of 21 students have been obtained (alphabetical list on the left), this step consists merely in ranking (listing) students in order of merit (in relation to the score) proceeding from the highest to the lowest score. Let us assume the list as under A and then rank the students to obtain distribution B, ranging from 4 to 27.

<table>
<thead>
<tr>
<th>A</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td></td>
</tr>
<tr>
<td>Albert</td>
<td>7</td>
</tr>
<tr>
<td>Alfred</td>
<td>13</td>
</tr>
<tr>
<td>Andrew</td>
<td>19</td>
</tr>
<tr>
<td>Ann</td>
<td>25</td>
</tr>
<tr>
<td>Brian</td>
<td>16</td>
</tr>
<tr>
<td>Christine</td>
<td>19</td>
</tr>
<tr>
<td>Elise</td>
<td>17</td>
</tr>
<tr>
<td>Emily</td>
<td>24</td>
</tr>
<tr>
<td>Felicity</td>
<td>16</td>
</tr>
<tr>
<td>Frances</td>
<td>14</td>
</tr>
<tr>
<td>Frank</td>
<td>26</td>
</tr>
<tr>
<td>Fred</td>
<td>17</td>
</tr>
<tr>
<td>Harriet</td>
<td>11</td>
</tr>
<tr>
<td>Ian</td>
<td>17</td>
</tr>
<tr>
<td>John</td>
<td>14</td>
</tr>
<tr>
<td>Jennifer</td>
<td>21</td>
</tr>
<tr>
<td>Margaret</td>
<td>16</td>
</tr>
<tr>
<td>Michael</td>
<td>9</td>
</tr>
</tbody>
</table>
3. Identification of high and low groups

Ebel suggests the formation of high and low groups comprising only the first 27% (high group) and the last 27% (low group) of all the students ranked in order of merit.


Why 27%? Because 27% gives the best compromise between two desirable but contradictory aims:

1. making both groups as large as possible;
2. making the two groups as different as possible.

Truman Kelley showed in 1939 that when each group consists of 27% of the total it can be said with the highest degree of certainty that those in the high group are really superior (with respect to the quality measured by the test) to those in the low group. If a figure of 10% were taken, the difference between the two means of the competence of the two groups would be greater but the groups would be much smaller and there would be less certainty regarding their mean level of performance.

Similarly, if a figure of 50% was taken the two groups would be of maximum size but since the basis of our ranking is not absolutely accurate, certain students in the high group would really belong to the low group, and vice versa.
While the choice of 27% is the best, it is, however, not really preferable to 25% or 33%; and if it is preferred to work with 1/4 or 1/3 rather than with the somewhat odd figure of 27% there is no great disadvantage in so doing.

*For the rest of our analysis we shall use 33%.*

4. Calculation of the difficulty index of a question

**Difficulty index**

Index for measuring the easiness or difficulty of a test question. It is the percentage (%) of students who have correctly answered a test question; it would be more logical to call it the easiness index. It can vary from 0 to 100%.

**Calculation**

The following formula is used:

\[
\text{Difficulty index} = \frac{H - L}{N}
\]

where  
- \( H \) = number of correct answers in the high group  
- \( L \) = number of correct answers in the low group  
- \( N \) = total number of students in both groups

(Do the exercise on page 4.83.)

5. Calculation of the discrimination index of a question

**Discrimination index**

An indicator showing how significantly a question discriminates between "high" and "low" students.

It varies from -1 to +1.

**Calculation**

The following formula is used:

(Do the exercise on page 4.83.)

6. Critical evaluation of a question

4.81

This is based on the indexes obtained.

**Difficulty index**: the higher this index the easier the question; it is thus an illogical term. It is sometimes called easiness index, but in the American literature it is always called difficulty index.

In principle, a question with a difficulty index lying between 30% and 70% is acceptable (in that range, the discrimination index is more likely to be high).

\(^1\) Some authors give values between 35% and 85%.

If for a test you use a group of questions with indexes in the range 30% - 70%, then the mean index will be around 50%. It has been shown that a test with a difficulty index in the range of 50% - 60% is very likely to be reliable as regards its internal consistency or homogeneity.
**Discrimination index:** the higher the index the more a question will distinguish (for a given group of students) between high and low students. When a test is composed of questions with high discrimination indexes, it ensures a ranking that clearly discriminates between the students according to their level of performance, i.e., it gives no advantage to the low group over the high group. In other words, it helps you to find out who are the best students.

It is most useful in preparing your question bank. Using the index, you can judge questions as follows:

- 0.35 and over: Excellent question
- 0.25 to 0.34: Good question
- 0.15 to 0.24: Marginal question - revise
- under 0.15: Poor question - most likely discard

Remember that the index has an indicative rather than an absolute value.

**Uses of indexes aim: review of questions**

4.82

**EXERCISE**

4.83

Given a group of 21 students (see page 4.79). Using 33% of them to constitute a high group of 7 and a low group of 7 (33% of 21), the following table shows the answers given by those two groups (high and low) to 10 multiple-choice questions (numbered from 1 to 10 in the first column). The correct answer for each of those ten questions is given in the second column. In the 14 consecutive columns are shown the answers given by each student to each question.

<table>
<thead>
<tr>
<th>Ranking in order of merit</th>
<th>Question No.</th>
<th>Correct Answer</th>
<th>Patrick</th>
<th>Frank</th>
<th>Ann</th>
<th>Emily</th>
<th>Jennifer</th>
<th>Christine</th>
<th>Andrew</th>
<th>Frances</th>
<th>John</th>
<th>Alfred</th>
<th>Harriet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td>1</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
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<tr>
<td></td>
<td>3</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
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<tr>
<td></td>
<td>4</td>
<td>E</td>
<td>E</td>
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<td>C</td>
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<td>C</td>
<td>C</td>
<td>E</td>
<td>C</td>
<td>A</td>
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<tr>
<td></td>
<td>5</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>B</td>
<td>C</td>
<td>B</td>
<td>E</td>
<td>C</td>
<td>C</td>
<td>E</td>
<td>E</td>
<td>E</td>
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<tr>
<td></td>
<td>6</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>C</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>E</td>
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<tr>
<td></td>
<td>7</td>
<td>A</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
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<tr>
<td></td>
<td>8</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>B</td>
<td>C</td>
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<td>C</td>
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<td>E</td>
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<tr>
<td></td>
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<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>A</td>
<td>C</td>
<td>C</td>
<td>B</td>
<td>-</td>
<td>C</td>
</tr>
</tbody>
</table>

| 33% High group            |              |                |         |       |     |       |          |           |        |         |      |        |         |
|                           | 33% Low group |                |         |       |     |       |          |           |        |         |      |        |         |

**EXERCISE**

4.84

1. Calculate H - L for questions 6 to 10.

2. Calculate the difficulty index and the discrimination index for questions 1 to 5.
Check your results on the next page.

Check your answers

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Correct Answer</th>
<th>Patrick</th>
<th>Frank</th>
<th>Ann</th>
<th>Emily</th>
<th>Jennifer</th>
<th>Christine</th>
<th>Andrew</th>
<th>Frances</th>
<th>John</th>
<th>Alfred</th>
<th>Harriet</th>
<th>Michael</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
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<td>E</td>
</tr>
<tr>
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<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
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<td>C</td>
<td>C</td>
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<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>C</td>
<td>E</td>
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<td>E</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>A</td>
<td>E</td>
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<tr>
<td>5</td>
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<td>C</td>
<td>B</td>
<td>B</td>
<td>C</td>
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<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>6</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>C</td>
<td>D</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>7</td>
<td>A</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
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<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
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</tr>
<tr>
<td>8</td>
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<td>C</td>
<td>B</td>
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<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
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<tr>
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<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
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<td>E</td>
<td>C</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>C</td>
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<tr>
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<td>C</td>
<td>C</td>
<td>C</td>
<td>A</td>
<td>C</td>
<td>C</td>
<td>B</td>
<td>-</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

| High group | 33% |
| Low group  | 33% |

Conditions for the application of this procedure for item analyses, in particular:

1. it applies to relative criteria tests (the procedure leads to a choice of questions that tend to maximize variance and ensure discriminatory ranking),

2. it is applicable only to questions scored dichotomously (1; 0),

3. It should not be applied if the total number of students is very small (a minimum of 20 students could be proposed as a pragmatic criterion).

Question analysis card

4.85

To facilitate the construction of a question bank it is advisable to enter the statistical results for each question on a separate card. These cards as a whole will constitute the bank.

The front and the back of a card of this type could be as follows.

Front

<table>
<thead>
<tr>
<th>Course</th>
<th>Date</th>
<th>Nature of test</th>
<th>Group</th>
<th>Size of group</th>
<th>Chosen answers</th>
<th>Difficulty index</th>
<th>Discrimination index</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd year</td>
<td>6.72</td>
<td>MCQ</td>
<td>High</td>
<td>60</td>
<td>55 2 3 0 0</td>
<td>60</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>60</td>
<td>17 5 3 7 28</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clin. Med</td>
<td>6.72</td>
<td>MCQ</td>
<td>High</td>
<td>10</td>
<td>7 0 2 0 0</td>
<td>57</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>10</td>
<td>4 0 1 4 0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd year</td>
<td>6.73</td>
<td>MCQ</td>
<td>High</td>
<td>62</td>
<td>56 2 3 1 0</td>
<td>60</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low</td>
<td>62</td>
<td>18 8 3 8 24</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd year</td>
<td>6.74</td>
<td>MCQ</td>
<td>High</td>
<td>70</td>
<td>60 0 2 3 5 0</td>
<td>59</td>
<td>0.57</td>
<td></td>
</tr>
</tbody>
</table>
Subject | Endocrine System | Nature of question: MCQ
---|---|---
Objective tested (enabling) | Ability to explain the physiological functioning of the thyroid gland |  
Domain | Intellectual skills - Level 1 (recall of facts) |  
Question | Which of the following produces an increased secretion of thyroid hormone in a normal subject? |  
Answers | A. Administration of TSH |  
| B. Administration of thiocyanate |  
| C. Administration of propylthiouracil |  
| D. Administration of thyroxine |  
| E. Some other treatment |  
Reference | Sternberg, Chapter 2, page 112 - prepared by Mr. X in February 1972 |  

The student’s record

4.86

What should be done with all the information, collected in the course of a training programme, for the certification of the skills acquired by each student?

The student record is where all these data are collected. It has long existed in many schools, but usually in a traditional format (chronological record of the marks awarded in each examination, for each discipline taught).

To remain consistent with the philosophy of this Handbook, the proposed format for the student record is based on the professional profile.

A student record is a list of activities. Alongside each activity, spaces are set aside for the certification stamps entered by one or more accredited teachers, certifying that the student has shown evidence of having attained the predefined acceptable level of performance. By way of example, let us consider a profile that is partly defined (paediatric aspect of the work of a general practitioner) on pages 1.41 et seq.

* The number of certifications required for each activity may vary according to the level of difficulty

EXERCISE

4.87

Check your results on page 4.92.

Question 1

The administration of a test before the beginning of a learning period (formative pre-testing) has the following advantages except one:

A. To modify educational objectives of that period.
B. To provide ways for less well prepared students to catch up.
C. To modify the required pass level (mark).
D. To provide a base from which to measure real progress.
E. To exclude weak students from the learning period.

**Question 2**

All the following stages, except one, are recommended for scoring tests of the essay type:

A. Write the elements of the answer for each of the questions asked.
B. Correct the answers question by question rather than student by student.
C. Determine the pass score on the basis of a sample of answers.
D. Correct the answers while preserving the anonymity of the students.
E. Identify three levels only: honour, pass, fail.

**Question 3**

The content validity a written test is usually obtained by means of:

A. Collective and careful review of the questions.
B. Pearson's correlation coefficient.
C. Factor analysis.
D. An inter-rater reliability coefficient.
E. A mean discrimination index.

**Questions 4 to 6**

A test with 50 questions is administered to a group of 45 students. There is a choice of five answers to every question. Only one of these choices is the correct answer. One point per correct answer is allocated in calculating the total score.

**Question 4**

Assuming that none of the students have any knowledge of the test subject (i.e. they choose their answers by guessing), which of the following will be closest to the mean score of the group?

A. 0; B. 5; C. 10; D. 15; E. 25.

**Question 5**

On dividing this group of 45 students into 3 groups of 15 each, on the basis of the total score of each student it is found that, for the first question, nine students out of 15 in the high group and three out of 15 in the low group have given the right answer. For this question the difficulty index is:

A. 12%; B. 27%; C. 30%; D. 40%; E. 60%.

**Question 6**

Under the same conditions, the discrimination index is:

A. 0.12; B. 0.27; C. 0.30; D. 0.40; E. 0.60.

**Question 7**

On the basis of these indexes, which of the following decisions would you take concerning this question?
A. It should be discarded from the question bank.
B. It should be referred to a drafting committee for revision.
C. It should be retained in the bank as it is.
D. A decision other than A, B or C.

Questions 8 and 9

The following data concern a multiple-choice question set to 300 students, the correct answer being D.

<table>
<thead>
<tr>
<th>Choice of answers</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>High group (100)</td>
<td>22</td>
<td>1</td>
<td>10</td>
<td>67</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Low group (100)</td>
<td>46</td>
<td>5</td>
<td>16</td>
<td>33</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Question 8

These data show that:

A. half the students answered the question correctly;
B. all the distractors were of good quality;
C. the question was of high validity;
D. the question was not very relevant.

Question 9

In view of these data, the examination board may decide:

A. that this question should be reviewed since it is insufficiently discriminatory;
B. that this question should be discarded from the question bank;
C. that this question is of low validity;
D. none of the above.

Question 10

What could generally expected on doubling the length of a test whose mean discrimination index is 0.52 (by adding questions more or less equivalent to the previous ones)?

A. A certain increase in the reliability and the validity of the test.
B. Only a certain increase in the reliability of the test.
C. Only a certain increase in the validity of the test
D. A certain decrease in the reliability and validity of the test.
E. No effect on either the reliability or the validity of the test.

Questions 11 to 16

Use the following key in answering this series of six matching type questions:

A = traditional oral test
B = written test of the essay type
C = so-called written objective test (MCQ)
D = standardized practical test, or written and oral simulation tests (programmed examination)

Indicate the type of test most suitable evaluating each of the following performances:

Question 11
Recall of concepts.

**Question 12**

Ability to solve problems.

**Question 13**

Ability to communicate satisfactorily with the patient.

**Question 14**

Verbal expression.

**Question 15**

Skill in examining the patient

**Question 16**

Ability to make a synthesis.

**Question 17**

The system of relative criteria of competence implies the following consequences, *except one.* Which?

A. Leads to an embarrassing disagreement among those responsible for applying the resultant decisions.

B. Leads to the failure of certain students in a particularly competent group.

C. Enables one group to become the arbiter of the standards according to which it is judged.

D. Enables low group students, who are however superior to the mean of the whole group to which they belong, to pass.

E. Creates an arbitrary fluctuation in the desirable level of competence at a given moment.

**Questions 18 and 19**

The author of the following multiple-choice question was asked to establish its acceptability index.

The diameter of a normal erythrocyte (according to Wintrobe) expressed in µm (microns) is equal to:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 4.5</td>
<td>C. 7.5</td>
<td>D. 8.5</td>
</tr>
<tr>
<td>B. 6.5</td>
<td>E. 10.5</td>
<td></td>
</tr>
</tbody>
</table>

He felt that a student who knew just enough to pass should be able to reject right away choices A and E.

**Question 18**
Indicate which among the following values of the acceptability index corresponds to the author’s choice:

A. 0.10  C. 0.25  D. 0.33
B. 0.20  E. 0.50

**Question 19**

If item C was not included, what then would be the acceptability index?

**Question 20**

According to the theories about absolute or relative criteria tests, all the following statements are correct except one. Indicate which is false:

A. The calculation of the discrimination index provides a statistical datum applicable to absolute criteria tests.
B. The calculation of the acceptable level of performance (ALP) of a test is applicable to criterion-referenced tests.
C. The acceptable level of performance (ALP) of a test is equal to the sum of the acceptability indexes of each question.
D. The value of the difficulty index influences the value of the discrimination index.

**Performance assessments designed to measure competence for a job or task are inescapably imperfect because of measurement errors, and because task components can never represent the total job.**


Please

..... if you know how to define specific objectives
..... if your colleagues turn green with envy on reading your criteria
..... if you are able to choose the most suitable teaching technique
..... if you can put it into practice
..... if you are a leader
..... if your students admire you
..... if your examinations are valid
..... if your scores are objective
do not be influenced by all this..!
..... and overestimate the importance of your own subject.
do not forget relevance..!
..... the relationship between your teaching and the institutional objectives derived from community health needs.

**4.91**

**Answers suggested for the exercise on pages 4.87 - 4.90.**

<table>
<thead>
<tr>
<th>Question</th>
<th>Suggested answer</th>
<th>If you did not find the correct answer, consult the following pages again</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E</td>
<td>2.15 and 2.16, 4.65 - 4.68</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>4.36</td>
</tr>
</tbody>
</table>
Chapter 5: How to organize an educational workshop

5.01

How to organize an educational workshop

5.02

The purpose of this chapter is to facilitate the task of anyone who wishes to prepare and run an educational workshop.

It contains the basic documents (or refers to the documents) required to organize a very short workshop (lasting 3 to 4 days), known as a mini-workshop.

The chapter obviously makes no claim to qualify the reader to organize all possible types of educational workshop regardless of the educational philosophy involved. The type of workshop proposed is designed to use the Educational Handbook as its source of theory.

Nevertheless, most of the general principles involved are also valid for longer workshops.

This chapter responds to a need often expressed by those attending workshops run by WHO: the wish to pass on knowledge of the systematic approach to educational problems to their colleagues by means of a short meeting.

The method proposed itself uses the systematic approach. It also stresses educational principles such as the following:

- allowing the participants to prepare and select the objectives to be reached will increase their motivation;

- giving the participants an active role will make teaching more effective;
- providing the participants with regular opportunities to see the progress they are making will increase learning speed and improve the quality of the knowledge and skills they acquire.

---

**Attention!**

This chapter has been prepared for teachers who have attended at least one educational workshop, and thus know how such meetings operate, and are familiar with the Educational Handbook.

This chapter is designed for use in a wide range of local contexts. This means that any user should always remember to make allowance for the cultural, educational and occupational background of participants. Modifications may therefore be contemplated, worked out, put into effect and, most important, evaluated. However, a user with no special training in educational science is not advised to introduce significant changes right away.

It is better to use the proposed system as it stands and be prepared to amend it in the light of experience (particularly as a result of feedback from participants).

**What the term workshop implies**

5.03

A workshop is a meeting during which experienced people in responsible positions come together with experts and consultants to find solutions to problems that have cropped up in the course of their work and that they have had difficulty in dealing with on their own. Participants themselves select the objectives they wish to reach and help in choosing the problems for group work.  

1 These problems and objectives are occasionally selected (in most cases by correspondence) before the workshop begins, to allow the participants time to prepare for it. However, this does not apply to a mini-workshop.

An essential feature of the workshop is complete active involvement by each participant: the whole point of attendance is to work and to learn from practical experience.

One of the commonest methods used in workshops is group discussion of selected problems, the size of the group being small enough to encourage full participation by each member and large enough for each member to gain from the experience of the others. There is nothing magical about a small group but it does offer each member an opportunity to make his own contribution. It gives participants the chance to discuss and solve the problems of greatest interest to them. The fact that each member can find something in the experience of others that has a bearing on the questions of most interest to himself will make his work more meaningful.

The workshop method makes everyone (organizers and participants) responsible for helping to find solutions to the problems selected. Participants may have to act as group leaders or rapporteurs. The organizers are generally there to be consulted by participants and to help them where necessary (not to give lectures or impose solutions).

The workshop programme makes provision for plenary sessions, discussions in small groups and other activities but does not follow a strict hour-by-hour timetable. On the contrary, the programme adapts itself to the way the work is going. For example, a plenary session will be held whenever there is a need to pool the results of group discussion, to clarify a point for all participants or to introduce some activity that requires unanimous approval.
A mini-workshop is a short workshop (lasting three or four days in the case described in this document).

Aims of an educational mini-workshop

5.03

The workshop aims at introducing participants to a systematic approach to educational problems. They must, so to speak, not only be made hungry for more (i.e. anxious to carry on learning about the subject and increasing their skills) but also be given food for the journey (documentation containing enough references to enable them to make progress after the workshop is over).

The workshop aims at stimulating a given proportion of participants to wish to reach at least the objectives set out in the Educational Handbook (see pp. 12 and 13) in the course of the ensuing year.

It has been found from experience that some participants may go far beyond these aims and embark on activities such as:

- defining X% of the specific objectives for the subject they teach;
- replacing X% of traditional lecturing by a more suitable method;
- starting a bank of examination questions that meet the criteria of objectivity, validity, etc. (X questions);
- calculating the discrimination index or acceptable level of performance for X% of the examination questions;
- etc.

How to plan a mini-workshop

5.04

You have already had first-hand experience, as a participant, of an educational workshop and you have decided to organize and run a mini-workshop yourself in order to let your colleagues know about the systematic approach to educational problems. This will involve a great deal of work. The following checklist has been drawn up to help you.

Only those items considered essential appear on this list. Not all of them may be applicable in your case and you may also find that some items you need are missing.

Unless you start work at least six months beforehand you will be increasing your chances of failure.

The greater the flexibility and adaptability of equipment and staff the greater the chances of success.

One of the aims of the workshop is to meet the needs of the participants. Your apologies will be no use to them if something goes wrong. On the other hand, they will be favourably impressed if, when something unforeseen does happen, corrective measures are taken to keep the workshop running smoothly.

No matter what you do the unexpected will always happen!

It is a tragedy that as soon as normally responsible adults come into contact with education they expect to be told what to do and what to learn... Teachers play along with this and find it much easier to meet these expectations than to
create the conditions in which students will take responsibility for their own learning.

B J Ed. Tech. Jan. 76
N. Farnes

The success of a workshop will depend largely on the way it is planned and on the arrangements made before the opening session.

Action checklist

<table>
<thead>
<tr>
<th>No. of days</th>
<th>Action to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.05</td>
<td></td>
</tr>
<tr>
<td>days</td>
<td>see page</td>
</tr>
<tr>
<td>- Decision to organize a mini-workshop</td>
<td></td>
</tr>
<tr>
<td>5.06</td>
<td>Open a file</td>
</tr>
<tr>
<td>5.06</td>
<td>Define the general objectives and aims of the workshop</td>
</tr>
<tr>
<td>-365 to -180</td>
<td>Find a source of funds</td>
</tr>
<tr>
<td>5.06</td>
<td>Have a draft budget approved</td>
</tr>
<tr>
<td>5.06</td>
<td>Set the dates for the workshop</td>
</tr>
<tr>
<td>5.06</td>
<td>Choose the place to hold the workshop</td>
</tr>
<tr>
<td>5.06</td>
<td>Book a meeting room and accommodation for the participants</td>
</tr>
<tr>
<td>5.07</td>
<td>Define the criteria for selecting participants</td>
</tr>
<tr>
<td>5.07</td>
<td>Appoint a Committee of Sponsors</td>
</tr>
<tr>
<td>5.07</td>
<td>Choose the assistant organizers</td>
</tr>
<tr>
<td>5.08</td>
<td>Take account of the working language</td>
</tr>
<tr>
<td>BEFORE -120</td>
<td>Start the procedure for inviting participants, informing them of the aims of the workshop and sending them doc. 1 (Working methods), and doc. 2 (Theme of the workshop)</td>
</tr>
<tr>
<td>-140</td>
<td>Select the participants from those applying</td>
</tr>
<tr>
<td>-45</td>
<td>Inform participants that they have been selected, and</td>
</tr>
<tr>
<td>-30</td>
<td>Send them the documentation (Educational Handbook)</td>
</tr>
<tr>
<td>5.15</td>
<td>Arrange for document reproduction equipment to be available</td>
</tr>
<tr>
<td>5.16</td>
<td>Prepare a checklist of the equipment required</td>
</tr>
<tr>
<td>Time</td>
<td>Task</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>5.16</td>
<td>Inform the press</td>
</tr>
<tr>
<td>-8</td>
<td>5.16 - Review the list of participants</td>
</tr>
<tr>
<td>-2</td>
<td>5.17 - Arrange the room and inspect the premises (with equipment checklist)</td>
</tr>
<tr>
<td>5.18</td>
<td>Call a meeting of the assistant organizers and review the programme for the workshop</td>
</tr>
<tr>
<td>-1</td>
<td>5.18 - Have a friendly drink</td>
</tr>
<tr>
<td>0</td>
<td>5.18 - Background organization of the workshop</td>
</tr>
<tr>
<td>5.19</td>
<td>5.19 - timetable of work</td>
</tr>
<tr>
<td>5.22</td>
<td>5.22 - functioning of the workshop</td>
</tr>
<tr>
<td>DURING</td>
<td>5.24 - organizing the breaks</td>
</tr>
<tr>
<td>5.25</td>
<td>5.25 - immediate evaluation (doc. 3)</td>
</tr>
<tr>
<td>+10</td>
<td>5.24 - Send a letter of thanks to the assistant organizers</td>
</tr>
<tr>
<td>+15</td>
<td>5.24 - Prepare a report on the workshop</td>
</tr>
<tr>
<td>+30</td>
<td>5.24 - Send the report to the participants</td>
</tr>
<tr>
<td></td>
<td>5.24 - Send the report to the responsible authorities</td>
</tr>
<tr>
<td>AFTER</td>
<td>+180 to 365 - Start long-term evaluation</td>
</tr>
<tr>
<td></td>
<td>5.24 - Start long-term evaluation</td>
</tr>
<tr>
<td></td>
<td>5.24 - Start long-term evaluation</td>
</tr>
<tr>
<td></td>
<td>5.24 - Start long-term evaluation</td>
</tr>
<tr>
<td></td>
<td>5.24 - Start long-term evaluation</td>
</tr>
</tbody>
</table>

**Open a file**

5.06

Correspondence relating to the planning, running and evaluation of a workshop will soon reach proportions that call for proper filing. A suitable system might be a loose-leaf file with the following subdivisions:

- Budget
- Workshop site
- Selection of participants
- Selection of assistant organizers
- Documentation
- Equipment checklist
- Publicity, press, etc.
- Evaluation

**Aims of the workshop**
In the particular case of an educational workshop, the aims have already been described on page 5.03. If the workshop has different aims, it is then necessary to define them explicitly.

**Funds**

Whatever social and political system you are working under you will need a budget. The person or persons who will ultimately be responsible for authorizing the expenditure involved will need at least one estimate. To work this out the following simple formula is suggested:

\[
E = (T + S) N \times 1.25
\]

- **E** = Estimate
- **T** = Costs of return travel \(^1\) per participant
- **S** = Living expenses (accommodation, food)
- **N** = Number of participants

\(^1\) Before working this out, read the section on choosing the place for the workshop on this page.

In other words, travel costs and living expenses will amount to 80% of total costs, leaving the remaining 20% to cover the other expenses (room, reproduction of documents, etc). Where necessary add a percentage corresponding to the annual rate of inflation.... and get your budget approved.

**Date of the workshop**

As the workshop will nearly always be attended by teachers, this should be taken into account when setting the dates of the workshop in order to avoid clashing with their professional commitments (e.g. sitting on an examinations board, annual congress).

You should also check whether the dates coincide with public or religious holidays, sports events or political meetings, as these may create problems with regard to reserving hotel rooms.

It is recommended that the first day of the meeting should not immediately follow a non-working day (such as Sunday, or Friday in Moslem countries), so as to ensure that at least one working day will precede the opening of the workshop.

**Choosing the place for the workshop**

(over 6 months before D-day)

It has been found from experience that, to make sure participants will attend on a full-time basis, the workshop will have to be held in a place far enough away from where participants live to enable them to take part in all activities without interruption and prevent them from being able to go home after the sessions or, more importantly, return to their laboratories or their patients.

This obviously implies a substantial financial investment but one that is justifiable from the point of view of cost/effectiveness.

The place chosen should preferably be secluded but agreeable and the conditions comfortable enough for participants to be able to recall with pleasure their first full-time plunge into the depths of the systematic approach to education.

**Booking a meeting room and hotel accommodation**

(6 months before D-day)
Waste no time in making the necessary bookings. Do it in writing and insist on written confirmation detailing the conditions you have specified, particularly as regards the meeting room (see p. 5.17 for details).

Ensure that the meeting room will be available 24 hours a day throughout the workshop. Wherever possible, a visit to the premises is recommended before making a final decision. If the meeting room is too small, too noisy, badly ventilated or poorly lit, the workshop may suffer irreparably.

Criteria for selection of participants

5.07

Number of participants

It has been found from experience that as many as 35 participants (seven groups of five) can be handled by one organizer. By following the maxim the less you teach the more they learn, it should be possible to increase the number of participants still further. However, there are no strict rules and it is advisable not to have more than about 15 participants for a first trial.

The number of participants is in practice limited by what the organizer feels he is capable of coping with and by what the participants think they need in the way of help from the organizer.

The documentation provided for the mini-workshop should enable each participant to progress by his own efforts and with the help of the stimulation provided by other participants rather than with the help of the organizer.

Type of participant

Homogeneity

Although it is not necessary to have all the same kind of participants for a mini-workshop, since this type of workshop is mainly intended to provide a stimulus to the individual, it is advisable to select participants who will be in a position to work together after the workshop is over and who, by forming a critical mass, will have a greater chance of success.

On the other hand, in the light of experience it is not recommended that a workshop designed as an introduction to a new approach should be attended by a mixed group representing several professions (for example: physicians, nurses, dentists, medical assistants, sanitary engineers, etc.). The educational mini-workshop is going to force each participant to question many concepts that had previously seemed firmly established. This process is hard enough without increasing frustration by insisting that it is carried out outside the peer group.

The aim at this stage is not to create team spirit. It may be necessary to organize a mixed group later on in order to reach this goal.

Voluntary participation and willingness to innovate

Attendance at the workshop should be voluntary and each participant should already have demonstrated his desire for change by having adopted new methods of his own. He should preferably be in a position of responsibility or be likely to acquire responsibility.

In cases where some of the documentation is not yet available in the national language, or if assistant organizers who do not speak the national language have to be called on, allowance must be made for this and participants selected who can at least read the language used in the documents available.
## Please Note! Important!

*To be accepted as a participant it is absolutely essential that:* applicants are aware they will be full-time participants for the duration of the workshop and *undertake to abide by this provision.*

### Committee of Sponsors

Setting up a Committee of Sponsors will not only give you an opportunity of honouring influential members of official circles but will also draw the attention of such circles to the action you have initiated and encourage them to follow it up. It is important that people in administrative positions (such as Rectors, Directors of Health and Deans) should be represented on such committees, which will be called on to apply the selection criteria defined earlier.

### Selection of assistant organizers

(4 months before D-day)

If you have already attended a workshop of this kind yourself, do not be afraid to take sole charge of a group of about 15 participants.

However, if you do not have enough confidence in yourself yet, call in a more experienced consultant, preferably from another school or faculty, and this will allow you to take a rather larger group (20-25).

In subsequent meetings with larger numbers of participants you are strongly advised to take on two (for 20 participants) or three (for 30 participants) assistant organizers (from those attending an earlier workshop). You will have to make sure at least four months before the workshop starts that they will be able to come, so as to give them time to make further study of the documents, in particular the *Educational Handbook.*

You are advised to choose assistant organizers belonging to disciplines other than those represented by the participants, to prevent the proceedings turning into a discussion of their subject by experts rather than a consideration of the methodology of education.

The assistant organizers will have the task of finding answers to questions put by the participants and of channelling any questions that they cannot deal with themselves to the principal organizer.

### Working language

Apart from the *Educational Handbook,* the remaining documents (1, 2 and 3) are short enough to be translated into the language of the participants of the workshop. At any rate all discussions, whether in small groups or in plenary session (unless outside consultants are used), *may obviously be carried out in the national language.* Make arrangements for any translations to be done at once.

1 Which has been translated into Arabic, Bulgarian, Czech, Farsi, French, German, Hungarian, Indonesian, Italian, Polish, Portuguese, Romanian, Russian, Serbo-Croat and Spanish.

### Invitation to the participants

(4 months before D-day)

It is now time to start the procedure leading up to the final selection of participants (see page 5.15). Where possible a demand for places in excess of the number you have decided on (page 5.07) should be created so that you will be able to correct the situation if there are any last minute cancellations.
You are therefore advised to get in touch right away with the colleagues you wish to contact. A personal letter will generally be preferable to posting up a notice, but your decision here will depend on local customs. What information should be sent out at this stage? The main points to be covered are:

(a) aims of the workshop - prepare a letter of invitation based on the content of p. 5.03 as adapted to the target population.

(b) what is implied by the term workshop - you may annex to your letter the text on page 5.03.

(c) working methods of the workshop (document no. 1).

(d) theme of the workshop (document no. 2).

The text of the last two documents mentioned (1 and 2) will be found on the pages that follow. The required number of copies can be made by means of a stencil if you do not have access to other methods of reproduction such as an electronic stencil or a fast photocopying machine, for which the pages of this document may be used as originals. In any case the pages should be renumbered and the place and dates of the workshop should be mentioned on the cover page of each document under the title Workshop in educational planning.

Your letter of invitation should also mention that full-time participation is essential (see box, page 5.07) and indicate any language stipulations.

Lastly, you should set a deadline for applications (45 days after the date of dispatch of the letter of invitation), mentioning that each successful applicant will be informed of his selection at the latest 45 days before the start of the workshop and that the basic documents will be sent to him at that time (under separate cover if you have a limited budget).

Workshop in educational planning

Document 1

Working methods of the workshop

5.09

Working methods

5.10

The working methods proposed for this meeting may be somewhat different from those you are used to. It does not mean that these are new methods: they have been widely used outside the university and their effectiveness has been experimentally tested. They derive from the application of recent education theories. If they were to be identified by their main characteristic one would say they put emphasis on active participation of the learner while in traditional systems he is maintained in a relatively passive role. The aim of the methods is to encourage you to develop a critical and constructive attitude and to find solutions for your own problems. Practical exercises raising specific problems that simulate real situations will lead you to propose valid solutions. Generally speaking, the working methods used in the workshop will enable you to put the educational principles recommended in the Educational Handbook into practice.

1. Free choice of personal objectives

To ensure that the workshop fully meets your educational needs you will be invited to select the objectives you wish to reach by the end of the workshop (see p. 5.19). The meeting’s programme of work will be organized on the basis of the choices made (p. 5.20).
2. Preliminary reading assignments (concerning objectives chosen)

To provide you with the theoretical knowledge in the field of educational planning that you may need to find solutions to practical problems and attain the objectives you have chosen, you will be invited to read certain documents (see p. 14). It should be made clear at this point that there will be no lecturing on the part of the organizers, not even a short introduction to.... Study of the recommended texts will be your own responsibility.

3. Clarifying sessions

These are generally held as the first working session of each day. Their aim is to ensure that participants have a clear idea of what they are to do in the hours that follow and that any instructions have been understood. They are not intended, however, to be in-depth discussions, which will be held either during working groups or during summing-up sessions.

4. Practical exercises

These exercises, which are described in detail in the *Educational Handbook*, are to be done individually at first. Then discussion will start by comparing each participant’s proposed solutions. This exchange of views may take place in pairs before extending to the entire small group; if the exercise implies that each one within the group has a specific task related to a common goal, it is up to the group to get organized. This task distribution will not be done by the organizers. Group dynamics will operate with its highs and lows, periods of tension and relaxation as in all human endeavours.

5. Group presentation

Plenary sessions will be held as often as necessary, depending on the programme of work based on the personal objectives chosen by the participants. Their aim will be to allow group solutions to be presented, not for the purpose of judging groups but to compare ideas for possible consensus under the leadership of a participant or, exceptionally, an organizer.

6. Preview of next working day

Each day before closing a short period will be reserved for a preview of the following day’s activities and a reminder of the aims of reading assignments.

Any changes of programme will be called to the participants’ attention.

7. Individual consultations

In view of the biological principle of individual differences it is most likely that participants will progress at different rates, desiring to study in more or less depth certain questions, or be interested in differing applications of the theories and methods proposed during the workshop. The organizers will therefore make themselves available on request for individual consultations on subjects of special interest.

8. Formative evaluation

8.1 Pre-test - To help direct your efforts and inform you of your own progress during the workshop, an evaluation process is proposed. Details are given on page 9 of the *Educational Handbook*. This test will help you to identify the educational areas which may need attention. The object of the pre-test is not to find the right answer but simply to register that you have not found it. The purpose of the workshop is to help you to find it, either during the workshop itself or in the ensuing months. The post-test will enable you to measure your progress as time goes by.
8.2 Daily personal evaluation - You should assess your own progress each day. This will give you an opportunity of modifying the objectives you chose (para. 1) on the first day.

8.3 Daily group evaluation - At the end of each daily session, time will be set aside for joint assessment of the extent to which the working methods used have helped you towards reaching the objectives you have selected, and for proposing any change in the functioning of the workshop.

8.4 Evaluation questionnaire - Shortly before the end of the meeting you will be invited to express your opinion on the organization of the workshop by means of a questionnaire (document 3, p. 5.25). The results will be analysed during the last session.

8.5 Long-term evaluation - To help you assess the benefits you will continue to reap from this workshop, you will be asked to define explicitly the professional objectives you expect to reach within the next twelve months in relation to the experience acquired during the workshop. It is recommended that all participants meet twelve months after the workshop to assess what they have achieved.

These various aspects of the working methods that will be used during the workshop will be clarified during the first session.

You may now start preparing for the workshop in whatever time you have available.

1

- If you want to get a general idea of the field that will be explored during the workshop, study document no. 2 (Introduction to Educational Planning).

2

- If you want to select the personal objectives you would like to reach by the end of the workshop, refer to pages 11-13 (Identification of your needs as an educator) of the Educational Handbook, which you will be sent if you are selected to participate.

3

- If you want to go still further, you can use the Educational Handbook to pursue the objectives you have selected.

Good luck

Workshop in educational planning

Document 2

Theme of the workshop: introduction to educational planning

5.13

Note to organizer of educational workshop

5.14

It is suggested that in preparing this document you use the text on the educational spiral (pp. 1.06 and 1.19) or the section on planning and conducting an educational programme (pp. 3.05 - 3.10).
The theme of the workshop will therefore be the health manpower training process, covering the four main stages (see the Educational Spiral, p. 1.06):

- definition of relevant educational objectives
- planning of an evaluation system
- development of an effective educational programme
- application of a valid system of evaluation

Selection of participants

5.15

(2 months before D-day)

The deadline for applications has now expired and you should convene the Committee of Sponsors. They will choose from among the applicants those who correspond most closely to the criteria defined earlier (see page 5.07). Your function will be to make sure that the Committee follows these rules properly.

In addition to the number of participants decided on, the Committee should select some reserves (20-25% extra) to provide replacements in the case of last-minute cancellations.

Confirmation of participants

(45 days before D-day)

It is now time to write to the applicants who have been selected, reminding them of the conditions of participation (full-time attendance compulsory) and of the place and dates and sending them the Educational Handbook, with a recommendation that they reread p. 5.12 if they wish to start work.

In point of fact, distribution of the Handbook could just as well wait until the start of the workshop since it is not essential to study it beforehand. However, it has been found from experience that many participants complain at the time of final evaluation that they were not given all the documentation before the workshop (including those who would not have had time to read it). In short, although it is not essential for participants to receive the Handbook one month before the workshop, there is no reason why they should not have it and there may be some advantages.

Staff and equipment needed for document reproduction during the workshop

(One month before D-day)

It will be extremely useful to have a secretary or typist available during the meeting for typing the documents resulting from group work. Since participants generally wish to have access to the results of their colleagues’ work, equipment for fast, good quality reproduction will also be needed. Each document should have a reference number for ease of consultation.

The secretary can also help with logistic matters (hotel rooms, problems concerning transport, finance, etc.) on the participants’ arrival, thus freeing the organizers to spend more time on purely educational activities.

Now is also a good time to make copies of page 5.20, which each participant will need on the first day, and of document 3, Evaluation of the workshop by the participants, which you will distribute towards the end of the workshop (see p. 5.25).

Select participants who are most likely to benefit from the workshop. Be consistent in maintaining contact with them.
Now is the time to order however many copies you need of the *Educational Handbook for health personnel*, unless your national authorities already have a stock that you can use.

### Equipment checklist

5.16

(One month before D-day)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>already there</th>
<th>to be brought</th>
<th>checked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note pads (one for each participant + 20%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pencils (one for each participant + 50%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubbers/erasers (one for each table)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pencil sharpeners (one for each table)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-hole punch (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adhesive tape (2 rolls, incl. one wide)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stapler (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste paper baskets (one for each table)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projection screens (2) or white wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardboard envelope files (2 for each participant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead projectors (2)</td>
<td></td>
<td></td>
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<td>Spare projector lamps (2)</td>
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<td>Electric extension flex (6 metres)</td>
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<td>Electric adapter plugs (2)</td>
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<tr>
<td>110/220 V transformer (check local voltage)</td>
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<tr>
<td>Transparent cellulose sheets (50)</td>
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<tr>
<td>Marker crayons for writing on cellulose sheets (water-soluble) (12)</td>
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<tr>
<td>Blackboard or, preferably, large flip-chart</td>
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<tr>
<td>Photocopying machine (fast)</td>
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<tr>
<td>Dictionary</td>
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<tr>
<td>Extra copies of <em>Educational Handbook</em> (20%)</td>
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You will find this list useful for checking what you should bring with you to the workshop and for making sure the day before the workshop begins that *everything* is in place.

### Press relations

Depending on the local situation, it may be worth deciding to inform the press. If so, it is always best to prepare a press release yourself rather than leaving this task to a journalist, no matter how conscientious he may be.

If you invite the press to interview the participants (for example when the *group photograph* is being taken) the best time for this will be during the break (see p. 5.24) on the last day (or the last day but one). This is also a good time to invite your superiors, those providing funds and other dignitaries. *Never* choose the first day for this, as the participants are likely to be in a state of considerable confusion!

### Review of the list of participants
(one week before D-day)

In some cases there will be cancellations. As these occur you should get in touch with the applicants selected as reserves to fill the empty places. Make sure once again that participants have all the documentation required and that they know the date and place of the workshop.

**Check regularly what you have done and what remains to be done.**

**Arrangement of the room**

5.17

**(2 days before D-day)**

The meeting room should be arranged so as to:

- allow participants to sit at small tables in groups of three to five;

- allow the use of an overhead projector (two would be preferable so that two documents can be compared).

The arrangement shown above is suggested for 15, 25 or 35 participants.

During plenary sessions, participants just have to turn to face the organizer. Make sure that everyone has a good view of the projection screen and the discussion leader.

It has been found from experience that the noise threshold (in group discussions) is quite bearable and that *this arrangement is preferable to separating groups in different rooms*. It allows for much more flexibility in organizing the sessions.

Make sure that the room is not too near a source of noise (restaurant, school, demolition site, etc.).

The less the meeting room looks like a classroom the better.

Make sure that each participant has enough table space to lay out his documents and that it is well lit.

The overhead projector does not require a darkened room, but you should still make sure the *day before* the workshop starts, at a time when natural daylight is at its brightest, that the picture projected is clearly visible. Make sure that there is at least one electric power point that works and have an electric extension flex and spare projector lamp available. In addition have a stock of transparent cellulose sheets and marker crayons (erasable) available so that participants, or you yourself, may illustrate any remarks that may be made in plenary sessions.

Use the checklist of the equipment you will need during the workshop when making your last inspection of the room the day before the meeting starts (page 5.16).

**Coordination of assistant organizers**

**(2 days before D-day)**

All assistant organizers should be on the spot without fail *at least two whole days* before the start of the workshop and should have been told how important this coordination period is.
The principal organizer should make sure that each assistant organizer knows what is expected of him during the workshop and is prepared to carry it out.

The two days preceding the workshop will therefore be a sort of dress rehearsal for what is expected to happen during the workshop.

Each assistant organizer ought to give an account in his own words of the part he thinks he can play.

All organizers will need to be thoroughly familiar with the documentation for the workshop and these two days provide a good opportunity for organizers to exchange views and prepare the way for working together smoothly. Several informal meetings will probably be useful, one of which should be in the room in which the workshop is to be held.

The organizers must also decide what criteria to apply (mixing of disciplines, grades, sexes, natural leaders, heavies, etc.) in dividing the participants into groups (of three to five) and assigning them places, which should be marked by name-cards.

The evening before

In theory all the participants will have arrived and have their hotel rooms. Before supper, it is recommended (if finances allow) that you organize a friendly drink to break the ice and enable participants and assistant organizers to make themselves known to each other. This should be as informal as possible.

D-day is here....

Although it is in the nature of a workshop not to have a strict hour-by-hour timetable, in the case of a mini-workshop some details may be given on the procedure it is recommended to follow, at least for the first day. The first hours of the first day are of crucial importance. The working atmosphere will change in the course of the three days: roughly speaking the first day will be one of confusion, the second one of productive thought and the third one of stunned realization that there is much more to learn than appears at first but that it is worth making the attempt and that this is only the beginning...

With regard to the rate at which the subject matter is dealt with in the time available, each participant should be left to work at his own pace and according to his own system of priorities. On the other hand, as the participants form themselves into working groups, a common tempo will be established.

Programme preparation

5.19

In order to prepare a working programme for the workshop that is relevant to your own needs in the field of education, you are invited to choose from among the objectives listed on pages 12 and 13 (divided into four main themes) those that interest you and that you would like to achieve by the end of the workshop.

As the duration of this workshop is limited, try to be realistic in your choice. Some of these objectives may require only a few minutes’ work; others several hours to allow for study of the documents made available to you (see suggested texts, p. 14).

To make it easier to choose, rearrange the objectives listed in order of importance to you. Once you have made your choice, fill in page 5.20 and hand it to the workshop organizer.
In the light of what you have selected, a programme of work can be drawn up. You will be given a list of the participants who have chosen the same objectives as yourself, so as to facilitate the organization of small working groups engaged in common activities (see example, p. 5.21).

Some of the objectives may be achieved more easily by group work. These objectives are marked on pp. 12 and 13 and p. 5.20 by an asterisk*.

It is natural that you should have some difficulty in making your choice at this early stage in the meeting. Do not hesitate to consult an organizer ... and above all remember that if necessary you can always modify your choice during the workshop.

Circle the number corresponding to each objective you have chosen.

5.20

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|   | 1| 6*| 11*| 16| 21| 26*| 31| 36|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   | 2*| 7*| 12| 17| 22| 27*| 32*| 37|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   | 3*| 8*| 13| 18*| 23| 28*| 33*| 38|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   | 4*| 9*| 14| 19*| 24| 29*| 34*| 39*|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   | 5*| 10*| 15| 20*| 25*| 30| 35*| 40|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

* Work in small groups is recommended for these objectives. Individual work will usually be appropriate for the others.

Additional Objectives (optional)

By the end of the workshop I should like to be able to:

Name: ............................................................
(block capitals)

Hand a copy of this page to the organizer of the workshop before the break in the first session.

How to prepare a working programme based on the objectives selected by the participants

Example of a proposed programme prepared on the basis of the objectives selected by participants in a workshop.

5.21

The length of the arrows indicates the percentage of participants who have chosen any one objective. The actual number is circled.

First day: first session

5.22

8 to 10.30 am

1. Opening
In your opening remarks you will of course formally welcome the participants, thank those who have made the workshop possible, recall the overall aims of the workshop (see page 5.03) and relate it to the local teacher training situation. Make clear too that the workshop offers each participant a golden opportunity for uninterrupted thought on problems that are universally admitted to be important but are frequently neglected; that no-one there is any cleverer than anyone else; that the workshop belongs to the participants and will be what they make of it; and that the third day will not be the end of the workshop but rather the start of a long and exciting process. These remarks should not take more than five minutes.

2. Clarification of documents

Go on without a break to this item. Ask the participants to turn to document no. 1 (Working Methods) and go through it page by page and paragraph by paragraph asking them if there are any points they would like clarified. If there are no questions on a paragraph, describe its central theme without going into details. If a question is raised, ask whether any other participant would like to clarify the point concerned. Do not forget (and remind participants where necessary) that the object of the exercise is to clarify obscure points and not to discuss the subject matter in depth. There will be time for such discussion throughout the rest of the workshop either in small working groups or, occasionally, in plenary session.

It has been found from experience that there is no point at this stage in a clarification session for document no. 2 (Theme of the workshop). The necessary definitions and detailed explanations are dealt with in the exercises designed to help achieve the workshop objectives.

It will now be between 8.45 and 9.15 am and time to pass on to the next item.

3. Programme preparation

The (individual) programme of work for each participant will now be prepared. Ask participants to turn to page 5.19 of the Handbook (Programme preparation) and make sure that the text of the first page has been understood. Next, mention that the 40 objectives listed are the same as those in the Educational Handbook and that the cross-references to the relevant pages of the Handbook given on page 14 are intended to facilitate selection of objectives. The selection made should be indicated by filling in page 5.20 and handing it in to the organizers by 10.30 am at the latest. During the break, using the information produced in this way, you will draw up a list of participants who have chosen identical objectives so that they may form themselves into groups for joint work (see example p. 5.21).

The first plenary session will now be over and the time will be between 9 and 9.30 am. From this point until the start of the break (10.30 to 11.00) it will be the task of the assistant organizers to deal individually with any requests from participants. Towards 10.00 am make a rapid tour of the room to see how the participants are doing and by about 10.15 remind them if necessary that they have 15 minutes left for handing in page 5.20.

First break

(10.30 to 11.00 am)

This is when the organizer will draw up the list (on a flip chart) of the participants who have selected identical objectives so that they can form groups for joint discussion. The list will enable the organizer to prepare a draft programme of work for the rest of the workshop. Any objective that has attracted the interest of one-third of the participants should be dealt with in plenary session. Since each presentation will require preparatory work by groups of participants (no more than five per group), enough time should be allowed for
this (either during morning sessions or in extra sessions held in the afternoons or, exceptionally, the evenings). Since you have the gift of being everywhere at once, you should also make sure that coffee, tea or other drinks, and rolls and sandwiches are available to the participants.

**First day: second session**

5.23

11.00 am to 1.00 pm

At about 10.55 am invite the participants to come back to the room. Present the draft programme (see example, p. 5.21) and as soon as it has been accepted tell the participants that they can start working (on an individual basis at first) through the list of objectives they have selected; that if they wish to find out what they know, they should now take the pre-test (at least on the first chapter of the *Handbook*); that they may call on you if they need any help; that they may subsequently, if they wish, start exchanging their work and discussing it with other participants, whom they may choose from the list given on the flip chart (which you may now have reproduced for general distribution).

Until then take no other action apart from being available to give help if necessary.

At 12.55 pm you will have a few minutes left to congratulate participants on their dedication and keenness and reassure them if they are feeling completely confused about what is happening that things will be better tomorrow and even better the day after tomorrow. Lastly, invite them to spend the afternoon continuing to clarify their ideas by further reading on any points worthy of attention and tell them that you will be available for individual consultation.

It will now be 1.00 pm. Wish everyone a pleasant lunch and confirm the time and the aims of the next activity on the programme that has been approved.

Another scenario may be imagined in which by 8.30 am the participants have settled down to a poker game. This would indicate that you need to review your planning procedures, including the method of selecting participants (page 5.07).

**First day: afternoon session**

Begin by reminding participants of the time of the next plenary session. Make sure that each small group knows what it is supposed to be doing, then give no further help unless asked. You can, however, go around the room taking a friendly interest in what each person is doing: adapt your attitude to the reactions shown by the participants. See that each group has a supply of transparent cellulose sheets and marker crayons.

Ten minutes before the time set for a session, check that each group is almost ready. As for the general organization of a plenary session, all you need to do is to present the transparencies prepared by each group, using the overhead projector, and encourage discussion.

Fifteen minutes before the end of the last session of the day, call for everyone’s attention. Invite the members of each group to discuss among themselves the positive and negative aspects of this first day and ask for a verbal report from a spokesperson for each table (daily evaluation).

**Second (and third) day**

Start the day with a short feedback session (15 minutes) taking into account the comments made by each group during the evaluation session at the end of the first
day. Next, mention that as on the previous day there will be a plenary session at the end of the day for evaluation of the day’s work and invite everyone to set to work. The participants will then start organizing their work themselves and your task will be to help them do this. In the event of one (or several) working groups forming and wishing to submit the results of their work to the others, further short plenary sessions may be held on request. Make sure that, should this happen, there are enough transparent cellulose sheets and marker crayons for participants to make their reports using the overhead projector.

At the end of the session, after evaluation of the day’s work, invite participants to draw up for the following day a list of the professional objectives they wish to reach during the next 12 months in the light of what they have learned during the workshop, and ask them to fill in the evaluation questionnaire (document no. 3) and return it to you by 8.30 next morning at the latest (page 5.31 will tell you how to analyse the results of the questionnaire).

**Last day**

5.24

(Don’t forget to have a group photograph taken during the break, unless it has already been done.)

After a short period for feedback, remind the participants that it is very important to devote most of this last day to finalizing the individual professional objectives to be reached during the next 12 months. (See document no. 1, paragraph 8.5.) These should be the subject of exchanges of views between participants and of group discussion before being handed to the organizers. The last half-hour of the last day should be given over to an evaluation session (in the light of the analysis of the questionnaire/document no. 3), ending with a few closing remarks dealing mainly with the future.

**Letters of thanks**

(10 days after the workshop)

It is now time to thank everybody who has helped you, including those who have provided funds for the workshop, the members of the Committee of Sponsors and the assistant organizers, if any. Inform them in the letter that they will shortly be sent the report on the workshop.

**Report on the workshop**

(15 days after D-day)

Even if the purpose is only to inform those who have provided the funds for the workshop or to help participants to inform other colleagues, it is a useful exercise to prepare a report during the weeks following the workshop.

The report will contain:

- an introduction giving a brief description of the local context which led to the organization of the workshop;

- the general aims of the workshop;

- a description of the operation of the workshop mentioning how participants adapted to the working methods;

- some selected samples of the results of individual or group work;

- the list of documents used during the workshop;
- the results of immediate evaluation, including an analysis of the questionnaire (document no. 3);
- the list of participants (with their addresses).

Long-term evaluation
(at the latest one year after D-day)

Long-term evaluation is essential since it is the only way to measure the actual impact of a workshop.

It will be based on an assessment of the extent to which each participant has reached, failed to reach or exceeded all or some of the professional objectives he set himself at the end of the workshop (see page 5.23). An assessment of this kind may be made by means of questionnaires, by individual interviews or, preferably, by bringing all participants together again for a one-day meeting. A report summing up the results of long-term evaluation is well worth preparing and distributing.

It will not be much use and may even be counterproductive to upgrade the teaching skills of educators if this merely makes them more effective at teaching concepts that are of limited relevance to what health personnel need to learn to work productively in their country’s health services system; the result of improving educators’ skills could even be to fill the health professions with people who are better than others at doing what they ought not to be doing.

Workshop in educational planning

Document 3

Evaluation of the workshop by the participants

5.25

Instructions for questions 1 - 35

Use the following code to indicate the extent to which you agree or disagree with each of the statements made below:

Code 1 Strongly disagree
2 Disagree
4 Agree
5 Agree strongly

The difference between 1 and 2 or between 4 and 5 is one of degree only.

Example:

If you want to express your complete disagreement with the statement, circle the figure 1 as follows 2 4 5

Please feel free to make any comments you think necessary (making reference to the number of the question) in the space reserved for the purpose on the last page.

5.26

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<th>Aspects relating to the planning of the workshop</th>
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245
| Q.1 | I was given sufficient information on the aims of the workshop before my arrival | 1 2 4 5 |
| Q.2 | I was given sufficient information on the methods of work | 1 2 4 5 |
| Q.3 | The planning of the workshop reflected the educational principles that were discussed there | 1 2 4 5 |
| Q.4 | It was clearly explained to me at the start how I was to choose my objectives for the workshop | 1 2 4 5 |
| Q.5 | I feel that the programme drawn up during the first session took my own choice of objectives into account | 1 2 4 5 |
| Q.6 | The goals of the workshop appeared to me to be of immediate interest for my professional activities (education component) | 1 2 4 5 |
| Q.7 | It was clear to me from the start of the workshop that I was expected to play an active part in it | 1 2 4 5 |

### II Aspects relating to the relevance and utility of the working methods

| Q.8 | I found the documentation provided of an acceptable quality | 1 2 4 5 |
| Q.9 | Enough documentation was provided to allow me to take an active part in the discussion of the subjects concerned | 1 2 4 5 |
| Q.10 | The information given in the *Educational Handbook* helped me to reach the objectives I had chosen for the workshop | 1 2 4 5 |
| Q.11 | The working methods used during the workshop encouraged me to take an active part in it | 1 2 4 5 |
| Q.12 | I have had the opportunity during the workshop of putting new knowledge into practice (exercises) | 1 2 4 5 |
| Q.13 | Spending time on individual work during the workshop helped me to learn | 1 2 4 5 |

### III Aspects relating to the way the workshop was run and to the attitude of the organizers

| Q.14 | The organizers displayed a satisfactory open-mindedness | 1 2 4 5 |
| Q.15 | The general atmosphere of the workshop was conducive to serious work | 1 2 4 5 |
| Q.16 | The organizers gave me the opportunity for critical comment | 1 2 4 5 |
| Q.17 | The organizers made use of any critical comments I made during the workshop | 1 2 4 5 |
| Q.18 | The organizers made every effort to help me reach my objectives for the workshop | 1 2 4 5 |
| Q.19 | The way the workshop was conducted was in line with the educational principles it discussed | 1 2 4 5 |
| Q.20 | The attitude of the organizers was conducive to free learning | 1 2 4 5 |

### IV Aspects relating to the organization of activities in the time available

| Q.21 | I consider that enough time* was given for individual or group discussions with the organizers | 1 2 4 5 |
| Q.22 | Enough time* was devoted to clarifying the documents | 1 2 4 5 |
| Q.23 | Enough time* was given for discussion in small groups | 1 2 4 5 |
| Q.24 | Enough time* was given for practical exercises | 1 2 4 5 |
| Q.25 | Enough time* was given for individual work | 1 2 4 5 |
Q.26 Enough time* was given for the presentation of work in plenary session

Q.27 During the workshop I was given the opportunity of working at my own pace

**V Aspects relating to the benefits gained by the participants**

Q.28 The workshop helped me to improve my knowledge of education theory

Q.29 The workshop helped me to develop a favourable attitude towards the systematic approach to educational problems

Q.30 The workshop has encouraged me to put the knowledge I have gained into practice after the workshop is over

Q.31 The workshop will help me to encourage my colleagues to learn and make use of new educational methods

Q.32 The workshop has increased my confidence in my ability to achieve my personal objectives in the medium term (within one year)

**VI Aspects relating to evaluation of the workshop**

Q.33 I felt that the pre-test and the follow-up test helped me to make a useful assessment of the knowledge I gained

Q.34 The pre-test was a useful exercise and showed the advantages of this technique

Q.35 The practical exercises showed the usefulness of feedback during the learning process

Q.36 I found the daily evaluation sessions useful

* All questions asking for an opinion on the time spent on an activity must be considered in relation to the total time available for the workshop. If you wish to comment on the length of the workshop as a whole, please do so using p. 5.30.

Further comments and suggestions

With regard to the planning of the workshop, its method of work and the attitude of the organizers, note below and give actual examples of:

(a) The factors that impressed you most favourably

(b) The factors that impressed you least favourably

(c) Total length of the workshop too short adequate too long

Note for the organizer on how to analyse the answers to this questionnaire
A very simple analysis may be carried out as follows.

Take an uncompleted questionnaire and mark beside each question the answers given by each participant. For example, for 30 participants, the answers to question 7 might be:

Q.7 It was clear to me from the start of the workshop that I was expected to play an active part in it

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In other words, two participants considered that they did not understand from the start that they were expected to play an active part in the workshop while the 28 others understood this. Multiplying the number of answers by the corresponding coefficient gives a total of:

\[(2 \times 2) + (10 \times 4) + (18 \times 5) = (4 + 40 + 90) = 134\]

The satisfaction index is calculated by multiplying this number by 20 (i.e. 100 divided by the maximum coefficient 5) and dividing it by the number of participants, in this case 30. This gives:

\[134 \times \frac{20}{30} = 89.3\]

It is recommended that you then make a note of any questions with a satisfaction index below 60%. If there are none, identify the five questions with the lowest satisfaction index and then the five questions with the highest satisfaction index. Let the participants have these results at the final evaluation session on the last day of the workshop.

1. Write down the objectives you hope to achieve during the year following this workshop, so that you can assess the progress made.

2. Write down, for each of these objectives, a working timetable that will enable you
Keep a copy of this page and give the original to one of the workshop organizers.

**Afterwards ...**

5.33

Do not succumb to the illusion that everything is now going to be different in the institution where you work. Do not think that from one day to the next conservative elements will turn into reformers, passive elements into active ones or opponents into supporters.

First, if you manage to persuade at least 20% of those taking part in the workshop to make a lasting and visible change in their teaching habits during the ensuing year, you may consider the workshop to have been a success. This will not be the case if all you do is record how many participants expressed satisfaction during the evaluation on the last day of the workshop (even if the figure is 100%).

Secondly, your work is not yet over. Do not let the seed you have planted with so much effort wither away. Continue to stimulate your colleagues in responsible positions in your teaching institution to see that those participants who improve their teaching methods are rewarded in some way.

......If this is impossible, do something about it yourself - congratulate them - it will always be appreciated.

**A workshop**

Don’t think it will change nothing

Don’t believe it will change everything

**Recapitulative answer sheet for post-test**

5.34

The questions appear on pages: 1.73 - 1.76, 2.45 - 2.47, 3.93 - 3.96 and 4.87 - 4.90.

**Chapter 6: Index and glossary**

6.01

**Index and glossary**

6.02

* Adapted from Roger T. Lennon, Test Department, Harcourt, Brace and World Inc. Revised by J.-J. Guilbert (WHO); G. and L. Masse, ENSP, Rennes (France); B. Pissarro, University of Paris (France) and J.C. Chancerel, University of Neuchtel (Switzerland).

This glossary of technical terms used in test and measurement, psychology and education is intended primarily for persons with limited training in test and measurement rather than for specialists. The terms defined are those most commonly found in test manuals and simple research reports. In the definitions,
niceties of usage have sometimes been sacrificed for the sake of brevity, and, it is hoped, clarity.

The terms and definitions included are purely ad hoc, for the purposes of this Handbook alone; they represent only the view of the author and do not necessarily have any validity outside the context of the Handbook. There is not complete uniformity among writers in the measurement field with respect to the use of certain technical terms; in cases of varying usage, either these variations are noted or the definition offered is the one that the writer feels is the best.

A

Absolute criteria test 13, 4.02, 4.73-4.76, 4.90

Acceptability index 4.74-4.75, 4.90

Acceptable level of performance

Also called acceptable pass level (or minimum pass level). See also Criterion 13, 1.47, 1.55-1.56, 1.62-1.63, 1.66, 1.68, 2.04, 2.21, 2.46, 4.02, 4.29, 4.33-4.34, 4.37-4.38, 4.55-4.64, 4.74-4.75, 4.76, 4.90

Act

Action performed by a person 1.02, 1.30, 1.61-1.64, 1.66, 1.70, 1.71.

Act, professional

Corresponds to a practical skill; the knowledge of how to do something and adoption of the appropriate attitude 12, 1.02, 1.21, 1.49-1.55, 1.66, 1.68, 1.70, 1.74, 2.21-2.22, 3.07-3.09, 3.33, 3.41, 4.02, 4.30

Active methods

As opposed to the conventional methods described by Jean Piaget as receptive; an educational situation whereby the student assimilates the curriculum independently and progresses by means of individual exercises, the role of the teacher being limited to guidance of the student in choosing his/her educational objectives and monitoring of his/her performance. See also Non-directive method 3.21, 3.26, 3.77, 3.94-3.95

Activity

Group of acts and tasks performed by a person 6, 7, 12-13, 1.02, 1.22-1.23, 1.25-1.29, 1.32-1.33, 1.39-1.48, 1.53, 1.66, 1.70, 1.74-1.75, 1.78, 2.12-2.16, 2.45-2.47, 3.02, 3.05-3.10, 3.16-3.17, 3.24, 3.31-3.35, 3.37-3.38, 3.52, 3.61-3.63, 3.65, 3.71-3.72, 3.86, 3.96, 4.04, 4.07-4.09, 4.13-4.14, 4.24-4.25, 4.30-4.31, 4.42, 5.26

Affective

Concerning the feelings; affectivity is the combination of acts and tendencies which expresses feelings towards others; it is situated primarily on the level of interpersonal relationships. It is often employed to qualify attitudes. The word affect is a neologism used by psychologists to designate an affective state. See also Attitude 13, 2.46-2.47, 3.06-3.07, 4.02, 4.12

Aim

The end envisaged; a teaching or educational goal, the result expected from a programme 4, 6, 12-13, 1.02, 1.05, 1.06, 1.11, 1.21-1.23, 1.47, 1.56, 1.66, 1.75, 2.02, 2.15-2.19, 2.28, 2.34, 2.36, 2.37, 2.46, 3.02, 3.06-3.07, 3.16, 3.73,
Aptitude

A combination of abilities and other characteristics, whether inborn or acquired, known or believed to be an individual’s ability to learn in some particular area. Thus, musical aptitude would refer broadly to that combination of physical and mental characteristics, motivational factors and conceivably other characteristics, which is conducive to acquiring proficiency in the musical field. Some exclude motivational factors from the concept of aptitude, but the more comprehensive use seems preferable. The lay person may think of aptitude as referring only to some inborn capacity; the term is no longer so restricted in its psychological or measurement usage. See Skill

Arrangement of meeting room (for educational workshop) 5.17

Assessment See Evaluation

Attitude

The internal disposition reflected by one’s behaviour with respect to persons, events, opinions or theories. In the Handbook it is used almost invariably to denote a relatively constant disposition of feeling towards someone (personal relations) 12, 1.02, 1.21, 1.49-1.54, 1.66, 1.68-1.70, 1.74, 1.78, 2.21, 2.30, 2.46, 3.05-3.10, 3.16-3.17, 3.19, 3.32, 3.41, 3.44, 4.29, 4.31-4.34, 5.26-5.29.

See also Human values

Audiovisual aids See Media

B

Bedside teaching 3.41

Behaviour

The total reactions (of an individual) accessible to external observation. Thought and understanding are implicit aspects of behaviour which are observable not directly but solely by inference from other observable types of behaviour. 13, 1.04, 1.21-1.23, 1.50-1.53, 1.69, 1.73, 2.11-2.13, 2.21, 2.33-2.34, 2.45-2.47, 3.05-3.10, 3.16-3.18, 3.24, 3.31-3.35, 3.74, 3.93, 4.02, 4.31

Blackboard 3.43, 5.16

C

Central tendency, error of 4.69

Certifying evaluation 12, 1.20, 1.66, 2.02, 2.15-2.16, 2.19, 2.45, 2.46, 3.13, 3.76, 3.94-3.95, 4.19, 4.54, 4.65-4.66

Checklist (of action to be taken for educational workshop) 5.04, 5.05, 5.16, 5.18

Checklist (of equipment for educational workshop) 5.06, 5.16

Classification

Systematic division into classes 1.50-1.53

Coefficient of correlation (?)
A measure of the degree of relationship, or going-togetherness between two sets of measures for the same group of individuals. Two coefficients of correlation are used in psychology, first the Pearson (r), developed at the beginning of the century by the British statistician Karl Pearson, and, secondly, Spearman’s correlation coefficient (\(\rho\)). The first is more powerful, but the data observed must be normally distributed and their variances must be homogeneous. Furthermore, the calculation takes longer unless a computer is available. The second, whose formula is:

\[ D = \text{difference between ranks}; \ N = \text{number of pairs} \]

(\(D = \text{difference between ranks}; \ N = \text{number of pairs}\) is less powerful but does not assume any preliminary condition of the data and is easier to calculate. Unless otherwise specified, correlation usually means coefficient of correlation, which ranges from -1 to +1; a coefficient of 0 indicates complete absence of relationship while 1 denotes perfect correspondence. It is recommended that a statistics manual or a statistician be consulted before using these formulae. See Correlation.

**Coefficient of reliability**

The coefficient of correlation between two forms of test, between scores on repeated administration of the same test, or between halves of a test, properly corrected. These three coefficients measure somewhat different aspects of reliability. See, for example, Kuder-Richardson formula 2.34.

**Competence**

The professional ability required to carry out certain functions. Recognized aptitude to perform a specific act. Competence is a potential which is realized at the moment of performance 7, 11, 13, 1.06, 1.21-1.23, 1.36-1.37, 1.47, 1.66, 2.18, 2.36, 2.46, 3.02, 3.05-3.10, 3.16-3.17, 3.22, 3.31-3.35, 3.40-3.41, 3.73-3.78, 4.02, 4.07-4.09, 4.11-4.12, 4.21, 4.31, 4.35, 4.47-4.49, 4.80, 4.88-4.90, 5.02, 5.07.

**Completion item**

Test question requiring completion of an unfinished sentence or phrase 12-13, 15, 2.02, 2.27, 2.38, 4.02, 4.29, 4.36-4.38, 4.66.

**Concept**

A general and abstract mental representation of something; a conceptual model 12-13, 1.02, 1.36, 1.50-1.53, 2.02, 2.33-2.37, 3.02, 3.04, 3.05-3.10, 3.31, 3.42, 3.65, 3.69, 3.71-3.73, 3.75-3.76, 3.78, 3.80, 3.93, 4.25, 4.36, 4.43, 4.68-4.69, 5.07.

**Continuous evaluation** 2.15-2.16, 4.65-4.68.

**Contract** See Programme/contract.

**Contrast error** 4.69.

**Coordinator, qualities of** 3.82.

**Contributory objective** See Enabling objective.

**Correlation**

Relationship or going-togetherness, between two scores or measures. The existence of a high correlation between two variables does not necessarily indicate that one has any causal influence on the other. See also Coefficient of correlation.
Criterion

A standard by which a test may be judged or evaluated; a set of scores, readings, etc., that a test is designed to predict or to bring into correlation. See also Validity 12-13, 1.02, 1.22, 1.32, 1.41, 1.55-1.56, 1.61-1.64, 1.66, 1.69-1.71, 1.73, 1.75, 2.04, 2.12, 2.14-2.15, 2.20, 2.34, 2.38, 3.09-3.10, 3.33-3.34, 3.60, 3.70, 3.74-3.75, 3.88, 3.94, 4.02, 4.07, 4.10, 4.30, 4.32-4.34, 4.73-4.77, 4.84, 4.88-4.90, 5.03, 5.07-5.08, 5.15

Curriculum

Plan worked out in advance fixing the order or the timetable of a group of educational activities 3.05-3.15, 3.78-3.85

D

Defects (limitations and outside factors affecting tests and examinations) 12, 2.02, 2.28-2.31

Demonstrations 3.40

Diagnostic evaluation. See Formative evaluation

Diagnostic test

In education, a test used to diagnose or locate specific areas of weakness or strength and to determine the nature of the weaknesses or deficiencies; it yields measures of the components or sub-parts of some larger body of information or skill. Diagnostic achievement tests are most commonly prepared for assessing skills. See Formative evaluation

Diascope. See Overhead projector 3.44, 3.94, 4.20, 5.16

Difficulty index

The percentage of a specified group of students that answers an item correctly. Also called Facility index 13, 15, 4.02, 4.74, 4.77, 4.80-4.85, 4.87-4.90

Discrimination index

The discriminating power of an item 6, 13, 15, 2.34, 2.36-2.37, 2.47, 4.02, 4.74, 4.77, 4.80-4.85, 4.87-4.90

Distractor

Any of the incorrect choices in a multiple-choice question 2.28, 4.39, 4.46, 4.75, 4.88

Distribution (frequency distribution)

A tabulation of scores from high to low or low to high, showing the number of individuals that obtain each score or fill in each score interval 3.62-3.64, 4.24, 4.69, 4.79

E

Education

Action or process of encouraging the formation and development of a person’s physical, intellectual and moral faculties 7-9, 13, 1.04-1.06, 1.20, 1.22, 1.25-1.28, 1.36-1.37, 1.43, 1.50-1.53, 1.66, 1.73, 2.02, 2.05, 2.12, 2.15, 2.33-2.34, 2.39, 3.02, 3.05-3.10, 3.13, 3.16-3.17, 3.33, 3.39, 3.65, 3.75,
3.80-3.82, 3.86-3.88, 3.93, 4.03, 4.10, 4.14, 5.02-5.14, 5.25-5.28

**Educational**

Directed towards education. Used to qualify the objectives defining student behaviour 7-9, 12-13, 1.02, 1.04-1.06, 1.19-1.20, 1.22-1.23, **1.29-1.32**, 1.36-1.39, 1.44-1.45, 1.47-1.48, 1.50-1.53, 1.55-1.56, 1.60-1.62, 1.64-1.69, 1.71, 1.73, 1.78, 2.02, 2.05, 2.16, 2.23, 2.26, 2.33, 2.38, 2.45, 3.02-3.10, 3.13, 3.31-3.32, 3.60-3.61, 3.65, 3.69-3.70, 3.73-3.76, 3.80-3.81, 3.88, 3.94-3.96, 4.02-4.04, 4.10-4.11, 4.30-4.34, 4.66, 4.73, 5.02, 5.13-5.14

**Effectiveness**

Capacity to produce the desired result. *See also Efficiency* 1.04, 1.66, 2.33-2.34, 3.02, **3.05-3.10**, 3.31-3.35, 3.39, 3.70, 3.71-3.72, 3.95, 4.08-4.09, 4.23, 4.73, 5.02, 5.06, 5.10

**Efficiency**

Capacity to produce the desired result at least cost. A system that is efficient is preferable to one that is merely effective as there will be no waste of resources **2.34**, 2.37, 3.34, 3.39, 3.70

**Enabling objective 1.55**

**Epidiascope 3.43-3.44**, 3.94

**Equilibrium (of an examination) 2.33-2.37**

**Equivalent form**

Any of two or more forms of a test that are closely parallel with respect to the nature of the content, the difficulty of the items included and their discriminating power, and that will yield very similar average scores and measures of variability for a given group. Used for studies on reliability of a test **4.66**

**Error of measurement** See **Standard error**

**Essay question. See also Modified essay question** 15, 2.02, 2.22, **4.36-4.37**, 4.89

**Evaluation**

Provides the basis for value judgments that make better educational decision-making possible. Includes a measurement component and a judgment and decision component 12-13, 15, 1.02, 1.04-1.05, 1.19-1.20, 1.22, 1.32, 1.37, 1.39, 1.41, 1.47, 1.49-1.52, 1.56, 1.66, 1.73-1.74, **2.02-2.09**, **2.11-2.23**, **2.27**, **2.29**, **2.33-2.34**, **2.38-2.47**, 3.03, **3.05-3.10**, 3.13, 3.15, 3.33, 3.40, 3.65-3.66, 3.81-3.82, 3.93, 3.95, **4.02-4.15**, **4.27-4.32**, 4.42, **4.47-4.49**, **4.66-4.69**, **4.73-4.74**, **4.81**, **4.88-4.90**, 5.06, 5.11, 5.14-5.15, 5.23-5.25, 5.28, 5.30, 5.32

**Explicit**

Stated in a sufficiently clear and precise manner, so as to leave no doubt. *Opposite:* implicit, confused, equivocal, ambiguous, obscure 1.22, 1.51-1.52, 1.62, 1.78, 2.45-2.46, 3.32, 3.65

**F**

**Factor**
In mental measurement, a hypothetical trait, ability or component of ability that underlies and influences performance on two or more tests, and hence causes scores on the test to be correlated. The term factor strictly refers to a theoretical variable, derived by a process of factor analysis from a table of interrelationships among tests; but it is also commonly used to denote the psychological interpretation given to the variable, i.e. the mental trait assumed to be represented by the variable, as verbal ability, numerical ability, etc. 12, 1.21-1.23, 1.47, 2.02, 2.29-2.30, 2.34, 2.47, 3.34, 3.63-3.64, 3.80, 3.93, 4.11, 4.69

**Factor analysis**

A group of statistical methods for analysing the intercorrelations among a set of variables (for example, test scores). Factor analysis uncovers factors which explain the common characteristics of and the differences between the examinees and the questions. Factor analysis has contributed to the understanding of the organization or components of intelligence, aptitudes and personality, and it has pointed the way to the development of tests of the several components. Factor is used in its mathematical sense and is not intended to express a causal relationship 4.87

**Feedback**

An informative reaction to the message of teaching. It is useful not only as a means of checking but also as a means of increasing the student’s learning activity 2.16, 2.18-2.19, 3.25, 4.66, 5.28

**Field work** 3.41

**Final testing** 4.65-4.67

**Flannelboard** (flannelgraph) 3.44, 4.20

**Follow-up evaluation See Formative evaluation**

**Follow-up test** See Post-test

**Formative evaluation** 12, 1.20, 1.66, 2.02, 2.13-2.16, 2.19, 2.45, 2.46, 3.13, 3.65, 3.74, 4.19, 4.68, 5.11

**Function, professional**

Set of activities (directed towards the same aim) that a person performs to fulfill his or her role in society 6, 12, 15, 1.02, 1.06, 1.19-1.20, 1.22-1.23, 1.30-1.39, 1.45-1.46, 1.48, 1.66, 1.73, 2.27, 2.42, 3.06-3.07, 3.17, 3.29, 3.31-3.35, 3.37-3.38, 3.60-3.61, 3.73, 3.75-3.76, 3.79, 3.89, 3.97, 4.04-4.05, 4.11, 5.07

**G**

**Goal** See **Aim**

**Groups, high and low** 4.80-4.81, 4.83-4.85, 4.88

**H**

**Halo effect**

An interference effect created by the idea the examiner has already formed of a student on the basis of previous test results 4.69

**Human values** 1.67, 4.35
Incident analysis 1.21-1.22, 4.47-4.48

Indicator, health
Indirect measure of the level of health of the community.

Institutional objectives See Objectives, general

Instruction
Process of communicating knowledge and training the mind of a person

Integrated learning 3.67, 3.71-3.77

Integrated teaching 3.71-3.72

Integration
To join parts together to form a consistent whole. Coordination of different learning/teaching activities with a view to the harmonious functioning of the educational process and more effective training of personnel. See Integrated teaching and Integrated learning 3.05-3.11, 4.08

Intellectual process
Process of thinking in general ideas or concepts; process of using knowledge, interpreting data, solving problems, etc. 1.49-1.55, 1.66, 2.21-2.22, 2.27, 4.02, 4.43-4.46

Interpretation of data 1.51-1.53, 2.27, 4.02, 4.43, 4.45

Interval testing 13, 4.02, 4.65-4.67

Item
A single question or exercise in a test 2.36, 4.77

Item analysis See Question analysis

K

Knowledge 9, 12, 1.02, 1.06, 1.21-1.23, 1.47, 1.49-1.52, 1.55-1.57, 1.66, 1.69-1.70, 1.73-1.76, 2.12, 2.15-2.16, 2.21, 2.28-2.29, 2.31, 3.05-3.10, 3.16-3.17, 3.19, 3.32-3.34, 3.62-3.63, 3.74, 3.81-3.82, 3.93, 4.35, 4.40-4.42, 4.44, 4.46, 4.66, 4.87-4.88, 5.22-5.23, 5.26, 5.27-5.28

Kuder-Richardson formula

Formula for estimating the reliability of a test from information about the individual item in the test, or from the mean score, standard deviation and number of items in the test. Because the Kuder-Richardson formula permits estimation of reliability from a single administration of a test, without the need to divide the test into halves, its use has become common in test development. It is not appropriate for estimating the reliability of speed tests. The Kuder-Richardson formula (No. 21) is as follows:

\[ k = \text{number of questions in test} \]
\[ M = \text{arithmetic average of scores obtained by the student} \]
S = standard deviation of scores.

L

Law of effect, Thorndike’s 2.13, 2.45

Learning 6, 13, 1.19, 1.29, 1.49, 1.52, 1.66, 1.73-1.76, 1.79, 2.03, 2.12-2.16, 3.02, 3.05-3.11, 3.16-3.17, 3.21-3.29, 3.31-3.35, 3.39-3.58, 3.60-3.77, 3.83-3.90, 3.93-3.96, 4.05, 4.07, 4.12-4.13, 4.24-4.25, 5.26-5.28

Lecture

A lesson given orally by a teacher, with virtually no student participation. It could be, and often is, distributed in printed form. This lack of real participation is the main characteristic of the lecture in its traditional form 1.76, 3.16, 3.39-3.40, 3.70, 4.25

Leniency, errors of 4.69

Logical error 4.69

M

MCQ See Multiple-choice question

Machine-scorable (machine-scored) test

A test that can be scored by means of a machine. In taking tests that are to be scored by machine the examinee records his answers on separate answer sheets. The machine rapidly distinguishes between right and wrong answers and can combine groups of responses in order to yield total or part scores or carry out an item analysis with difficulty and discrimination indexes 4.48

Matching item

Type of multiple-choice item calling for the correct association of data given in one list with those given in a second list. There are several types: simple matching, excluded term matching, causal relationship, quantitative comparison, relative variation 4.40-4.41, 4.89

Media, teaching 3.32, 3.40-3.46

Modified essay question 12-13, 15, 2.02, 2.27, 2.38, 4.02, 4.29, 4.36-4.38, 4.66

Motivation

The conscious and unconscious forces that determine behaviour (independently of any moral consideration) 1.48, 2.13, 2.18, 3.05-3.10, 3.24-3.25, 3.60, 3.74, 3.93, 5.02

Multiple-choice question (MCQ)

A test item in which the examinee’s task is to choose the correct or best answer from several given answers or options (distractors) 12-13, 15, 2.02, 2.27-2.28, 4.02, 4.29, 4.36, 4.39-4.46, 4.47-4.49, 4.66, 4.74-4.75, 4.85, 4.88-4.90

Multiple response items

Type of multiple-choice question in which two or more of the given choices may be correct and where there is generally a code permitting only one answer to be given on the answer sheet 4.90
The symbol commonly used to represent the number of cases in a distribution, study, etc. 3.61, 4.80, 4.82

**Non-directive method**

Teaching method whereby the teacher gives no direction but adopts an attitude which encourages students asking for advice to work out solutions to their problems themselves 3.16

**Norm-referenced test** See Relative criteria test

**Objective, contributing**

Description, having all the elements of a specific educational objective, of the theoretical knowledge needed to implement a professional task 12, 15, 1.02, 1.56, 1.62, 1.66, 1.69, 3.53

**Objective test**

A test in the scoring of which there is no possibility of differences of opinion among scorers as to whether responses are to be scored right or wrong. It is contrasted with tests such as the traditional essay examination to which different scorers may assign different scores, ratings or grades. Examples: MCQ, programmed examination, restricted response test. See these terms

**Objectives, educational** 8, 12-13, 15, 1.02, 1.04-1.05, 1.07, 1.19-1.23, 1.29-1.31, 1.36-1.39, 1.41-1.44, 1.47-1.48, 1.50-1.52, 1.55-1.56, 1.60, 1.61-1.64, 1.65-1.66, 1.68-1.69, 1.71, 1.73-1.75, 1.78, 2.02, 2.04-2.05, 2.07-2.08, 2.11, 2.15-2.16, 2.20, 2.23, 2.25-2.26, 2.33-2.34, 2.38, 2.45, 3.02-3.03, 3.05-3.10, 3.13, 3.15, 3.32, 3.39, 3.41, 3.60-3.61, 3.69-3.70, 3.71-3.72, 3.74-3.76, 3.79-3.82, 3.88, 3.94-3.96, 4.02-4.04, 4.10-4.14, 4.19, 4.29-4.30, 4.32, 4.34, 4.66, 4.73-4.76, 5.14

**Objectives, general** 12, 1.02, 1.30-1.31, 1.36-1.39, 1.45-1.46, 1.73, 2.44, 3.79, 4.10

**Objectives, institutional** See Objectives, general

**Objectives, intermediate** 1.30-1.31, 1.36, 1.41-1.43, 1.45-1.46, 2.44, 3.60, 3.78, 3.81, 4.04, 4.10

**Objectives, learning** 1.29, 1.73, 3.31-3.32

**Objectives, specific** 12, 1.02, 1.30-1.31, 1.41, 1.55-1.56, 1.58, 1.61-1.62, 1.64, 1.66, 1.68-1.71, 1.75, 1.78, 2.02, 2.04, 2.44, 3.60-3.61, 3.69-3.70, 4.24, 4.47, 4.50, 5.03

**Objectives, teaching** 1.29

**Objectivity** 12, 1.78, 2.02, 2.30-2.31, 2.33-2.35, 2.37, 2.46-2.47, 4.68, 5.03

**Observational rating scale** See Scale

**Obstacles to change** 2.43, 3.91

**Oral examination** 2.02, 2.22, 2.28-2.30, 4.35, 4.89

**Organizational diagram**
A diagram or chart showing the structure of a complex organization, representing its various components and the relationships between them. The organizational diagram shows the place and responsibilities of each department or section 12, 1.20, 2.02, 2.40, 2.42, 2.44, 3.92.

**Overhead projector**

An apparatus for projecting images from transparencies onto a screen so that they are visible in ordinary daylight. Also called Diascope 3.44, 3.94, 4.20, 5.16

**P**

**Peer learning**

The process of students assisting in the teaching/learning system; an educational method which actively involves peers in the planning, implementation and evaluation of the educational process 1.48, 3.17, 3.35, 3.67, 3.75, 4.23

**Performance**

Accomplishment of an act (task) by a person. It is not used in the Handbook in the sense of establishing a record. Individual result obtained in carrying out a task, depending largely on aptitude and motivation. Level of performance = degree of individual success 13, 1.20, 1.55-1.56, 1.62, 1.66, 1.68, 1.73, 2.04, 2.13, 2.21, 2.25-2.27, 2.30, 2.33, 2.46, 3.24, 3.31-3.35, 3.75-3.76, 4.02, 4.04, 4.09, 4.29, 4.33-4.34, 4.37-4.38, 4.55-4.64, 4.68, 4.73-4.76, 4.81, 4.89-4.90, 5.03

**Post-test** (follow-up test) 4.65, 4.67-4.68, 5.11

**Practicability.**

General simplicity of use of a method (for teaching or evaluation) 2.25, 2.33-2.35, 2.38, 3.70, 4.46

**Practical tests** 13, 2.22, 2.30, 4.29-4.30

**Practical work** 3.41

**Practice effect**

The influence of previous experience with a test on a later administration of the same test or a similar test. Usually there is an increase in the score on the second testing, attributed to increased familiarity with the directions, kinds of question, etc. Practice effect is greater when the interval between testings is short, when the materials in the two tests are very similar, and when the initial test is a relatively novel experience for the subjects 4.24

**Pre-final feedback comprehensive testing** 13, 4.65-4.67

**Prerequisite level test**

In education, a test that measures the extent to which an individual has acquired a certain level of competence needed to undertake some new learning activity successfully. For example, a prerequisite level test in pharmacology shows whether a student has reached a level whereby he or she may profitably begin a course on therapeutics. Also called Readiness test 13, 1.56, 1.69, 4.02, 4.50, 4.65-4.67

**Pre-test**

Test which shows to what extent a student has acquired certain competences (knowledge and skills) expected from a course before the commencement of the
corresponding teaching 9, 10, 13, 4.02, 4.65-4.67, 4.87, 5.11, 5.22-5.23, 5.28

Priority health problems 12-15, 1.02, 1.04-1.05, 1.07, 1.09-1.11, 1.17-1.18, 1.20, 1.47, 1.66, 1.78, 2.05, 2.07, 2.17, 3.03, 3.15, 3.34, 3.47-3.48, 3.52, 3.79, 3.83-3.84, 4.03-4.05, 4.07, 4.11, 4.71-4.72

Problem-based learning 1.66, 3.47-3.48, 3.51-3.55, 3.66, 3.75-3.76


Professional profile 3, 12, 15, 1.06, 1.19, 1.28, 1.31, 1.32, 1.33, 1.37, 1.38, 1.41-1.46, 1.65-1.66, 2.07, 3.13, 3.19, 3.55, 3.59, 3.77, 3.80, 3.97, 4.86

Programme
A series of planned educational activities a student is to go through with the assistance of teachers 13, 1.04-1.05, 1.20, 1.24, 1.29, 1.47, 1.50, 2.03-2.05, 2.08, 2.14, 2.44, 3.02-3.03, 3.05-3.15, 3.22, 3.67, 3.73, 3.77, 3.78-3.85, 3.86, 3.88-3.90, 3.92, 3.96-3.97, 4.02, 4.03, 4.05-4.09, 4.13

Programme/contract 3.75-3.76

Programme preparation (for educational workshop) 5.05, 5.19-5.22

Programmed examination 13, 15, 4.02, 4.29, 4.47-4.64, 4.89

Programmed teaching
Method of instruction consisting of a system of graduated questions with an immediate check of the answer; the right answer is needed in order to answer the following question correctly. Such teaching can be automated by using, for example, teaching machines or computers 3.39-3.40, 3.96, 4.47-4.64

Project 2.22, 4.29-4.30

Prospective (studies) - concerning the future; research on the future evolution of mankind; predictions on future conditions 1.22, 1.47, 3.13

Proximity error 4.69

Psychomotor See Skill

Q

Question (or item) analysis
The process of evaluating a single test item by any of several methods, in particular by determining its difficulty index, discrimination index and often its correlation with some selected criteria 13, 4.02, 4.77-4.85

Question analysis card 4.85

Question bank 4.81, 4.85, 4.88

Questionnaire (for evaluation of workshop) 4.18-4.20, 4.23-4.25, 4.27, 5.11, 5.23-5.24, 5.25-5.31

R
Random sample

A sample of the members of a population drawn in such a way that every member of the population has an equal chance of being included. This method precludes any bias or selection. The purpose of using the method is, of course, to obtain a fairly representative sample of the total population, so that the sample findings may be generalized to the whole population. Random sampling has also the following advantage: in accordance with the calculus of probabilities, formulae are available for predicting the relative frequencies, or parameters, such as the mean or standard deviation of the sample, from the true values of the relative frequencies or parameters in the total population; conversely, the limits within which are very probably situated the relative frequencies or parameters of the population from which the sample is drawn can be estimated from the relative frequencies or parameters observed within the sample. There are various methods, in particular random number tables, for drawing such a sample in practice 3.61-3.62

Range

The difference between lowest and highest scores obtained in a test administered to a given group 4.79

Rank ordering

The process of arranging students in order of merit as determined by scores obtained in one or more tests 1.22, 2.45-2.46, 4.74, 4.77, 4.79-4.80, 4.84

Raw score

The first quantitative result obtained in scoring a test (for example, the number of right answers, number of errors, or similar, direct, unconverted, uninterpreted measure) 9, 4.25, 4.26, 4.77-4.79

Recall item

An item that requires the examinee to supply the correct answer from memory. This item differs from the recognition item in which he or she need only identify the correct answer. For example, Claude Bernard published the 'Introduction to the Study of Experimental Medicine' in...? is a recall item, whereas Claude Bernard published the 'Introduction to the Study of Experimental Medicine' in (a) 1785, (b) 1815, (c) 1865, (d) 1905 is a recognition item in the form of a multiple-choice question 4.36-4.38, 4.39

Relative criteria test 13, 4.02, 4.73-4.76, 4.90

Relevance

Quality of being perfectly appropriate to the object pursued. In the context of the Handbook, the extent to which training programmes correspond to the health problems of the community and the resources available 12-13, 15, 1.02-1.03, 1.06-1.07, 1.09-1.10, 1.23, 1.31-1.32, 1.39, 1.41, 1.44, 1.47-1.48, 1.55-1.56, 1.60, 1.65-1.66, 1.71-1.73, 1.78, 2.02, 2.25, 2.33-2.34, 2.36-2.37, 2.39, 2.47, 3.02, 3.65, 3.70, 3.73, 3.83-3.85, 3.88-3.90, 3.94, 3.97, 4.36, 4.68, 4.88, 5.26

Reliability

The extent to which a test is consistent in measuring whatever it has to measure; dependability, stability, and relative freedom from errors of measurement. Reliability is usually estimated by some form of correlation coefficient (see Coefficient of reliability, Standard error) 12, 2.02, 2.30-2.31, 2.33-2.37, 2.46-2.47, 3.34, 3.74, 4.68, 4.87, 4.89
Representative sample

A sample that corresponds to or matches the population of which it is a sample with respect to characteristics important for the purposes of the investigation 1.22, 3.61-3.64

Restricted response test See Modified essay question

Role, professional

The functions fulfilled by a person 1.66

Role, teacher’s 3.31-3.35, 3.39, 3.47-3.48

Role playing

Group learning/teaching technique in which students learn to approach a problem situation by acting out freely the roles of the protagonists in the situation 3.41

Safety evaluation 4.65, 4.67-4.68

Scale

Continuous series of programmed values in which data are situated in order to assess them with respect to a whole. Also called Observational rating scale 1.55, 1.74, 2.21, 4.02, 4.23-4.25, 4.31-4.34, 4.36, 4.68-4.69

Score See Raw score

Scoring, alphabetical or numerical 2.25, 2.31, 2.35, 3.09, 4.36, 4.46, 4.48-4.49, 4.69, 4.76, 4.79.

Selection (of students) 4.31

Self-learning package 13, 3.02, 3.42, 3.52, 3.60-3.66, 3.94-3.95

Seminars 3.39

Sensorimotor See Skill

Short open-answer question. See Modified essay question

Simulation 2.22, 3.41-3.42, 4.19, 4.35, 4.46

Skill, professional

Can be an intellectual skill (cognitive domain), a communication skill (affective domain) or a practical skill (sensorimotor or psychomotor domain, referring simultaneously to sensitivity, sensation and motricity) 12-13, 1.02, 1.21-1.23, 1.48-1.54, 1.55-1.56, 1.68-1.70, 1.74, 1.78, 2.21-2.22, 2.30, 3.05-3.10, 3.19, 3.22-3.23, 3.65, 3.73-3.78, 4.02, 4.08-4.09, 4.12, 4.30-4.31, 4.71-4.72

Slides 3.44, 3.60, 3.94

Spearman-Brown formula

A formula giving the relationship between the reliability of a test and its length
This formula:

\[ r^{tt} = \text{coefficient of reliability} \]
\[ r = \text{coefficient of correlation between the two halves of the test} \]

permits estimation of the reliability of a test lengthened or shortened by any amount, from the known reliability of a test of specified length. Its most common application is in the estimation of reliability of an entire test from the correlation between the two halves of the test (split-half reliability).

**Specification table** 12-13, 1.39, 2.02, 2.38-2.44, 3.02, 3.70, 3.88, 3.96, 4.02, 4.70-4.72

**Specificity** (of a test) 2.34, 2.36-2.37, 2.47

**Stages** (of assessment) 13, 4.02, 4.65-4.68

**Standard error**

The standard error is the standard deviation of a sampling distribution. The use of the standard error is very important when the sampling distribution follows the normal distribution law (i.e. when the sample is drawn at random and is sufficiently large: for example, n>30 in the case of the sampling distribution of a mean).

Its formula is as follows:

\[ E = \text{standard error} \]
\[ S = \text{standard deviation} \]
\[ r^{tt} = \text{coefficient of reliability} \]

*See Kuder-Richardson formula*

**Student record** 4.86

**Summative evaluation** *See Certifying evaluation*

**Supervision**

Guidance and monitoring of activities of health personnel to ensure an acceptable level of performance 1.20, 1.66

**System**

A coherent group of interacting abstractions and components forming both a theoretical structure and practical method. Subsystem: part of a system 12-13, 1.02, 1.04-1.07, 1.12-1.15, 1.17-1.18, 1.20, 1.74, 4.11, 4.19

**Systematic approach**

Theory highlighting the interdependence of the components of something seen as a whole; approaching the elements of a problem by considering them as an interdependent whole 1.12-1.14, 1.72, 3.16, 3.86, 3.93, 5.02-5.04, 5.27

**Systems analysis**

Process of studying an activity by mathematical means in order to define its goals and purposes and to discover ways of accomplishing it more efficiently; a
constructive method in three phases: collection of data, analysis, and synthesis leading to solving of problems 1.22, 2.33, 3.86

T

Task, professional

A specific piece of work that has to be done 6, 8, 12-13, 1.02-1.06, 1.19-1.24, 1.29-1.32, 1.47-1.49, 1.50-1.55, 1.61-1.64, 1.66, 1.68-1.70, 1.73-1.76, 1.78, 2.25, 2.27, 2.40, 3.05-3.06, 3.12-3.15, 3.31-3.35, 3.60, 3.65, 3.73-3.76, 3.78, 3.97, 4.05-4.06, 4.08-4.09, 4.30, 4.32-4.36, 4.48-4.49, 4.66, 4.73, 4.76, 4.90, 5.02, 5.10, 5.32

Task analysis 1.21-1.22, 3.06-3.07

Taxonomy

Classification into categories according to a given system. See Classification

Teaching

Helping a person to know how to act, think or feel 6, 12-13, 15, 1.02, 1.06, 1.19-1.23, 1.29, 1.37-1.39, 1.47, 1.49-1.53, 1.56, 1.58, 1.73, 1.78, 2.02, 2.12-2.16, 2.19, 2.33-2.34, 2.36, 2.46, 3.02, 3.05-3.10, 3.13, 3.16-3.21, 3.24, 3.29, 3.31-3.35, 3.39-3.46, 3.65, 3.69-3.72, 3.74-3.76, 3.79-3.82, 3.86, 3.88, 3.95-3.96, 4.02, 4.06-4.08, 4.10-4.14, 4.25, 4.42, 4.47, 4.66, 4.73-4.74, 5.02-5.03, 5.32

Teaching methods

All the means applied in a rational manner to produce a specified educational result 13, 1.20, 1.47, 1.50-1.53, 1.66, 1.73, 2.28, 3.02, 3.39-3.46, 3.65-3.66, 3.69-3.70, 3.88, 3.95, 4.23, 5.32

Teaching techniques See Teaching methods

Test

Exercise, examination or work on the basis of which a judgement can be made as to a student’s intellectual, practical or communication skills 9, 10, 12-13, 2.02, 2.13, 2.19, 2.22, 2.25-2.31, 2.40, 2.47, 3.09, 3.24, 3.31, 3.70, 3.75-3.76, 3.88, 4.02, 4.29-4.30, 4.35-4.36, 4.39, 4.41-4.42, 4.46-4.48, 4.65-4.68, 4.70, 4.73-4.77, 4.80, 4.87-4.90, 5.10-5.11, 5.28

Test(s), advantages and limitations of See Defects

Time factor 1.47, 2.34, 2.37, 5.28

Transparency

Sheet of transparent cellulose or acetate film (thermosensitive or otherwise) which can be written or drawn upon. The image can then be projected onto a screen by an overhead projector without darkening the room 7, 3.44, 3.46, 5.16

Tree of actions and concepts 3.59-3.60

Tutorials 3.39

V

Validity 8, 12, 2.02, 2.33, 2.35-2.39, 2.46-2.47, 4.87-4.89
Chapter 7: Bibliography

7.01

Bibliography

7.02

The list of references has been kept intentionally short and is divided into the following categories:

1. Health needs and resources, organization of health services, functions of health personnel and analysis of tasks.

2. Psychology of education, medical education and education in general.

3. Educational objectives.

4. Programme planning.

5. Teaching methods and techniques.

6. Evaluation, test and measurement.

Note, however, that many of these references concern several fields.

If you would like a more detailed and comprehensive list of references, you may apply to the WHO representative in your country, to the WHO Regional Office, or directly to:

Organization of Health Services Delivery
World Health Organization
1211 Geneva 27
Switzerland

1. Health needs and resources, organization of health services, functions of health personnel and analysis of tasks.

7.03

An integrated concept of the public health services in the African Region.
Brazzaville, WHO Regional Office for Africa, 1970 (AFRO Technical Papers, No. 2).


### 2. Psychology of education, medical education and education in general.


3. Educational objectives


4. Programme planning and evaluation


5. Teaching methods and techniques

7.05


Chastonay, P. et al. (1992) L’arbre des concepts. MEDUCLS.


6. Evaluation of students, test and measurement


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EDUCATIONAL HANDBOOK

7.08

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COMMENTS

Thank you for your cooperation

Back Cover

This Handbook is designed primarily for teachers and trainers of health personnel. It provides practical advice, in fairly simple language, on how to organize educational programmes in order to facilitate learning by students and produce health personnel competent to respond to community and individual health needs.
The book is not intended to be read from cover to cover but should be read selectively according to individual interests and needs. The many exercises throughout the book help to make it valuable also for self-learning.

The presentation of the text is original; the imaginative format is intended to capture the reader’s attention and to ensure active reader involvement without sacrifice of substance.

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