Educational sciences and medical education*

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1. *Problems of medical education*

Medical education is more and more being influenced by social change. It is being affected by changing social needs, advances in scientific knowledge, population explosions and organizational and communication problems as never before in history.

In this transitional period we are uncertain about the objectives of medical education in modern society. We have our doubts about the content of the curriculum and we are not sure how to teach medical sciences and how to organize medical education. Indeed, when we make decisions we are not always sure what their consequences are going to be.

Faced with the modern explosion in knowledge we see the impossibility of extending the content of existing curricula further. There was a time when this could still be done, but what today would be the financial, personal and social consequences if the medical course were lengthened? And are we convinced that lengthening training will improve the quality of future physicians? Another important need is to improve communication between physician and patient, between medical and auxiliary personnel and between hospital and patient. What kind of professional attitudes do we need? What is the best form of organization for medical care systems? Is it necessary to differentiate as much as we do between the training of medical and auxiliary personnel?

In view of the expansion of social needs and the differences between the needs of the various age and social groups we have to ask ourselves what the consequences are for medical education, for manpower planning, for selection procedures and the entire philosophy behind medical education.

In many cases it is doubtful whether the existing medical systems can cope with the concepts involved, the problems, integration, differentiation, socialization and organization in medical education. Fortunately in many countries there are medical schools or faculties aware of the need for reform. But it is apt to take a long time before awareness of problems leads to action.

2. *The educational sciences*

In such situations it is understandable to ask others, in this case, the educational sciences, to assist. However, the educational sciences in the broadest sense cannot solve the problems. They are, all of them, educational sociology, educational psychology, educational economics, comparative education and didactics in various stages of development. A superficial analysis of the internal problems of these rather young sciences shows differences of philosophical background, of methodological approach and in their conceptions of their own functions. But, in spite of these difficulties, it can safely be said that under

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certain conditions the educational sciences can be useful. If they cannot solve the problems of medical education, they can at least contribute to their solution.

The research findings of the educational sciences can help medical education in reaching sound decisions, help in the training of medical teachers and improve teaching methods. Educational sociology and social psychology can analyze social backgrounds and social processes in relation to educational tasks. The economics of education can aid in the solution of financial and manpower questions. Comparative education is useful in the systematic comparison of medical systems and didactics can assist in inproving teaching methods and the structure of medical curricula.

3. *Conditions under which the educational sciences can assist medical education*

3.1. *Sound educational research*

In matters of education a constant dialogue between educational scientists and specialists in a certain field is necessary for research and practical purposes. Educational research influences practical educational situations and innovation in education involves so many scientific problems that the assistance of educational scientists is essential.

In its short history, educational research has shown a number of methodological and functional shortcomings. These can be avoided in the future, if its method of research and the relevancy of its work are improved.

3.2. *Collaboration between medical profession and educationists*

The second condition is that members of the medical profession should consult educational scientists in the early stages of new developments. It is impossible for educationists to do sound work in medical education when the educational patient is almost dead.

To quote Kerlinger 'Educational research can perform no miraculous cures of educational ills. Educational research brings into being no brave new world of education. But properly nurtured it can go a long way toward helping us to understand principles of learning and growth, methods of instruction, curriculum problems, and values and attitudes that influence learning processes and educational environments, in a few words, the fundamental principles that underlie educational processes'[1].

Against this background it is necessary to consider the objectives, content, structure, process and organization of medical education.

4. *The objectives of medical education*

It is necessary to specify educational objectives if we want to improve education and measure its results. In the past there were many general objectives, but they were not based on empirical studies. However the great difficulty is still the problem of validation. Smith and others propose the following five criteria:

(1) objectives must be conceived in terms of the demands of the social circumstances;
(2) they must lead towards the fulfilment of basic human needs;
(3) they must be consistent with democratic ideals;
(4) they must be either consistent or non-contradictory in their relationship with one another;
(5) the objectives must be expressed in behaviouristic terms.

Even with these, validation criteria are not altogether satisfactory, but they are useful, especially the last one. Bloom, Krathwohl *et al.* developed taxonomies of educational objectives, which describe desired student behaviour and indicate the content through which this behaviour is to be developed. They classified behaviours in the cognitive and the affective domain. The main levels of cognitive behaviour are: knowledge, comprehension, analysis, application, synthesis and evaluation. The five levels in the affective domain are: receiving, responding, valuing, organizing and characterization.

In medical education we also need to analyze the psychomotor domain. Where objectives are concerned we also have to raise the problem of differentiation. Are we thinking of a private physician, a member of a team, a research worker or specialist? We cannot do much, even with Bloom's taxonomy, if we make no advance in organizational, social and scientific decisions. Perhaps some kind of matrix should be developed for medical education. Where general practitioners are needed to care for the sick, the list of priorities in the different fields will differ from those for the education of a team specialist in medical research.

The development of a medical educational matrix assumes close collaboration between the two sciences.

5. *The content of medical education*

According to Flexner the content of medical education lies in a combination of basic sciences, basic medical sciences and clinical sciences. The danger is that if we add new fields like the social, technological and behavioural sciences to the existing curriculum without reorganizing the structure of medical education, integration will not take place. Here we need to ask some fundamental questions:

(1) are medical schools or faculties able to give anything more than basic medical teaching?
(2) is it perhaps worthwhile not to think in terms of a complete training during the university period?
(3) is it possible to reorganize pre-medical education?

In the face of social, human and scientific developments we dare not neglect psychological, sociological, educational and technological subjects in a modern medical curriculum. And changes in teaching methods and content alone will not meet the challenge of the content problem as it confronts us above.

6. *The structure of medical education*

Even if we accept a certain content we have to find a structure for that content. Every structure seems to involve certain educational assumptions. For instance, the underlying principle of past and present curricula is that general information comes before specific information and after the information period, should come practical application. This structure was perhaps satisfactory in the days when the training of general practitioners was the main aim of medical education. To impart a certain amount of information and skills were then the most important tasks of the medical school. Today, new factors have to be borne in mind: student interests, the scientific knowledge explosion, differences in social needs, the function of research in medicine, the relation between the basic sciences and the medical sciences, career aspirations, manpower requirements. It may be that parallel systems combined with several specialized streams (practical, social, theoretical, technological) will prove more useful. Within such a system it is worth thinking of educational units where the practical application of the teaching forms the core of the programme from the very outset.

7. *The process of medical education*

Having analyzed the objectives, the content and the structure the educational processes must now be considered. What kind of students do we need? Is it possible to predict their results? What effects do differences in social background have? Is it possible to change attitudes in a desired direction? Which teaching methods are the most fruitful? What is the effect of programmed instruction, films, computer-based instruction and close-circuit television? Educational research findings on the whole show little difference between the results of the use of different teaching methods. Where results are concerned, the average pre-medical grade reached seems the best and most consistent predictor of success in the medical school if success is to be measured by grades.

With regard to teaching methods, it would

seem necessary first to analyze the functions of lectures, tutorials and practical classes. The general functions are: orientation, analysis, and synthesis. The specific functions of lectures are to introduce, to select, to inspire and to stimulate. Individualization, socialization and integration are more the specific functions of tutorials. The functions of practical classes can be specified as observation, exploration and verification.

If we relate this functional approach to the needs of the students and to the instructional potential of the teachers, it may be possible to discover adequate teaching methods for the different educational situations. A pluralistic approach seems to be more realistic.

Examination procedures are of great importance. Educational sciences can help to develop adequate tests. Essay and objective tests are already well-known. In future attention should be paid to developing tests in the affective and psychomotor domain.

Nor should we forget the possible influence of internal and external social factors and climates. Miller wrote that 'sociological studies of medical education carried out over the past decade have provided persuasive evidence that the attitudes and expectations which students bring to medical school with them, the frequent conflicts between student and faculty goals that often convert an educational programme into undeclared warfare, the internal forces that result from informal student groupings, the complex process of professionalization, and the necessary adaptation to living with uncertainty that is part of the physician's life all contribute potential impediments to the achievement of desirable objectives. However, if they are understood, they may also be utilized to facilitate the learning process'[2]

8. *The organization of medical education*

In discussing the structure of medical education proposals were put forward for internal reorganization. In medical education there is much isolation and fragmentation. Would it be possible and is it necessary to integrate serveral sciences, different departments and paramedical training? The standard of nursing and of administrative and medical care must directly influence the quality of medicine in the future. It may be very useful to train, say, nurses to some extent together with physicians, at least in selected social, behavioural, clinical and technical courses. Other categories of personnel should also follow some of these training courses. A job analysis of, say, practitioners might lead to the conclusion that much of their work could also be done by highly skilled paramedical workers. A second reason for joint training is to promote teamwork in the practice of medicine. It is also important for nurses and others to have the opportunity to improve their professional status.

9. *Future exploration*

The improvement of educational research and the improvement of educational practice are related.

For that reason it would be of great value in future if educationists and members of the medical profession worked together in field experiments. The following are some of the fields that could usefully be explored further:

(1) *Analysis of the existing system* including analysis of the capacities and the interests of students; of the teaching behaviour of teachers in the different sciences; of the objectives, content, structure, organization, process and the context of the system.
(2) *The design of alternative systems.* Comparative analyses are required.
(3) *Experimentation with new systems:* training of teachers; information; development of instruments; research design, etc.
(4) *Controlled development and evaluation of new systems.*

Without excluding other approaches these kind of experiments are needed to discover relevant regularities in the educational sciences and to improve medical education as a system.

Noten

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