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RECENT CHANGES IN MEDICAL EDUCATION

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It was following Abraham Flexner's classic report on Medical Schools in the United States and Canada in 1912 that the first hard look at undergraduate medical education occured on this continent. In the next five decades a number of changes occured in medical schools and medical school teaching which profoundly influenced and changed medical education. Of these, several stand out as landmarks.

Prior to 1912 most medical schools on this continent were concerned with a vocational type of training. Following the Flexner report there was a rapid change in emphasis in medical education. This change was pioneered by Johns Hopkins and so complete and rapid was the success of this university that within two decades its own graduates reproduced it in a considerable number of schools of medicine. The changes which Johns Hopkins introduced were to develop a strong scientific basis to medicine and to develop a core of university teachers in both basic and clinical departments.

Medicine has developed from being largely empirical, to a science which depends for its understanding on a knowledge of normal human physiology and biochemistry. The aquisition of new knowledge has been phenomenal and it has been calculated that the number of new facts in medical science will double every three to five years. These new facts not only add new knowledge but indicate that previous facts and theories were erroneous. As one distinguished scientist tells his class of students "half of what we teach you is wrong but unfortunately we don't know which half." We have only to consider the new science of clinical cardiology, of understandings of metabolic processes, of knowledge of human genetics and of factors concerned with blood coagulation to appreciate this rapid increase in knowledge. The implications of this rapid increasing fund of knowledge was to indicate that if in medical education all these facts were to be communicated to the student, the course must necessarily be lengthened, or that specialization would be necessary before graduation. Fortunately the developments at Johns Hopkins and elsewhere were to turn medical education away from an attempt to communicate all these facts, away from a vocational type of training to a university emphasis, that is to stimulate the intellectual growth of the individual. Implicit in this was the recognition that intellectual growth was not "turned off" at the end of four years medical undergraduate education, but must continue throughout the lifetime of the individual if he is to provide for the health needs of his patient and provide them with the best that medical science has to offer.

In an attempt to teach medicine as a meaningful whole, Dean Joseph Wearn in 1948 initiated a change in the curriculum of Western Reserve University School of Medicine, which crossed departmental barriers and added a new dimension to medical education. Recognizing that human disease begins with a disturbance of normal cell function which then progresses to disturbed organ function, the new medical student began his medical training with a course in the biology of the cell. In this course cellular ultrastructure was correlated with function so that disturbances in both would be more readily appreciated. Following this, correlated physiology, biochemistry and anatomy courses were given. Other changes in the curriculum have been the introduction of courses in community medicine and behavorial sciences such as those pioneered by the University of Kentucky.

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Probably the most significant advance in medical education came from a more fundamental understanding of the learning process. In the early 1950's Dr. Nathanial Cantor at the University of Buffalo published three books concerned with the dynamics of learning. In his teaching Cantor had recognized the importance of communicating to the student the responsibility for his own learning. The exciting approach in Cantor's books was appreciated by several individuals in the Medical School of the University of Buffalo, including Dr. George Miller an internist and clinical investigator. During the next 10 years this group studied many aspects of the teaching-learning process and ushered in a new concept in medical education, which the recent Canadian Royal Commission on Health refers to as the "student centered" era of medical education. In 1959 Miller et al published a text "Teaching and Learning in Medical School" containing a vast amount of information about the teaching-learning process.

One of the major factors which has forced us to study the teaching-learning process has been this rapid advance in medical knowledge with its resultant accumulation in facts important for medical care. In order to make the best use of our undergraduate years it became necessary to understand how the student learns and how he learns most efficiently. This re-evaluation of the teaching-learning process has indicated the sharp difference between teaching on the one hand and learning on the other. Education has usually been concerned with teaching and programs of instruction are often designed around what knowledge there is to be incorporated into the course, what personnel there are available and what hours have been allocated. If our goal is the education of students, then emphasis on how he learns best should be one of our major interests. Given a finite intellect we all recognize that the interested or motivated student is the one who learns most efficiently. It is therefore of some importance for us to understand what motivates students. It is important that we not throw up our hands and say that the student is interested or not and there is nothing that can be done about this. The fact that a student has chosen medicine as a career indicates motivation. However he usually choses this career so that he can look after sick patients and follow up studies indicate that more than 95% become practicising physicians. If this is one of the primary motivating influences on the student then it is important that some relationship to his ultimate goal should be obvious in the courses he takes.

Most students are anxious to do well in whatever they undertake and achievement is a recognized stimulus to optimal learning as is illustrated by the saying "nothing succeeds like success". Since achievement is important to the student it is necessary to define within realistic limits what the student can do in the time at his disposal. What is really gained by giving a student more than he can do? On the other hand the encouragement that the student gets from completing his work will help to make him a more effective and efficient learner. In order to get the impetus to learning from achievement all learners require information on how close they are to reaching their goal. This feedback is vitally important to the learner as a "learning experience" where value judgements are not made. By indicating to the learner where he is in relation to ultimate goals learning is facilitated. From the studies and writing of Tyler we have recognized for many years that education consists of three phases, all interrelated. (Figure I)

OBJECTIVES

EVALUATION CURRICULA

FIGURE I

Some recent thoughts concerning these three components of the educational process may be of interest.

Medical school objectives are classically divided into overall school objectives, departmental objectives and individual teachers objectives. In general objectives are designed specifically to indicate and detail how the individual department can help the school to achieve its overall objectives. The objectives of the individual teachers being directed by the departmental objectives. In this way a co-ordinated approach within the school is achieved.

The importance of Figure I lies in its implications for the educational process that is designed. If curricula are prepared on the basis of the objectives of the school and if an attempt is made to measure if these objectives have been achieved it becomes important to state objectives in such a way as they can be translated into a curriculum and can be evaluated. Since a teacher's raison d'etre is to educate students it follows that objectives should be stated in terms of changes expected to occur in student behaviour, that they should be precise and be stated in "measurable" terms. For example it may be one of the goals of a school that the student become a critical thinker. But what is a critical thinker? If however the objective is that the student must be able to intrepret data both clinical and physiological it is possible to test him for the ability to do so. For this reason an effort should be made to avoid terms such as "basic undifferentiated doctor" since this is open to a variety of interpretations and has no intrinsic precise meaning unless it is further qualified in measureable changes expected to occur in students.

Objectives of medical education that many schools are now proposing are concentrating on three broad fields, that is attitudes, knowledge and skills. We now recognize that it is possible for students to develop new attitudes and for educators to reinforce those the student has which are desirable for a career in medicine. For instance the recognition that medical knowledge is rapidly increasing and will continue to do so, has indicated the most important contribution a school can make, is to ensure the development in the student of a desire to continue a life time of learning. This requires the development of an attitude, the appreciation of the importance of lifetime learning and a willingness to do so.

The design of a curriculum will depend primarily on the objectives of the school. In presenting this curriculum to the student a variety of methods are available, the lecture, small group seminars directed by the teacher or by the student, bedside teaching, independent learning or closed circuit television to name only a few. Each of these has advantages and disadvantages. For instance if the objective in a given period is to give the student information, lecturing may be the best method. If the objective is to allow the student to discover the significance of knowledge, the student directed seminar has advantages. It is important to decide what the aim of a given period is to be and to then select the most appropriate technique. A recent publication of the United States Public Health Service on "Effectiveness of Learning" has indicated that there is no superior method when gain of factual knowledge is tested. Jacob's study of students values in College has shown the striking differences in student attitudes in different colleges, which may indicate however that there are superior methods to communicate attitudes. These are as yet however, not clearly defined.

Finally it may be said that the ultimate goal of education is that teaching is no longer necessary but that the learner seeks out knowledge and learns by himself using resource people when they are necessary for his own aims. When a student does this and is working to his full capacity the educational purposes of a school can be said to have been successful.