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Richard Grayson, B.S.

A CRITIQUE OF EDUCATION

Mr. Grayson is a senior student in the College of Medicine.

THE RECENT formation of a student-faculty committee on education has added evidence that the student body is vitally interested in the methods of medical education.

Students have always been concerned with the methods by which they are taught but it is unusual for them to find fit modes of expression. The new committee and the SCOPE offer this opportunity.

It is felt by many that the time is now propitious for the free entry of students into matters of educative procedure. It is with this background of support that I make the following propositions:

1. That the student body is seriously dissatisfied with the methods of the present system of education;
2. That the principle fault in the system is that medicine has been made into an artificially disjointed jigsaw puzzle; that the failure to provide sound, correlative education in which the basic sciences, and clinical medicine are molded around the patient (rather than around categories) has cut the efficiency of medical teaching at least in half;
3. That there exists an idolatry of didacticism;
4. And that improvements in the system can be based on sound psychological principles.

First of all, let us examine our premises. *I believe that self-education is the best way to learn.* In the last analysis, it is the student, not the teacher, who determines the efficacy of teaching. The student learns; he is not taught. But as a corollary to this, it is obvious that learning can be facilitated by the teacher. That, I believe, is the function of the teacher. It has been stated that his task is to "arouse rather than convey thought."¹ It is an unfortunate fact, however, that many times the student must learn in spite of his teacher rather than because of him.

Secondly, I would profess that the efficacy of educative procedure will be enhanced when certain principles are recognized and employed to advantage. The curriculum seems to have "just growed"; I would maintain that a far more rational procedure is to mold it into a form balanced and pleasant—mold it around the patient and use as tools the principles most likely to effect a desirable result.

PRINCIPLES OF LEARNING

What are these principles? The reader undoubtedly is thoroughly familiar with them. Nevertheless, I should like to discuss them briefly and then to offer certain proposals for improvements in the curriculum as based on these fundamental aspects of learning. There are four major headings:

- 1.) *Association*
- 2.) *Contrast*
- 3.) *Activity*
- 4.) *Repetition and Distributed Learning*

1. ASSOCIATION

This, I believe, is a guide of paramount importance on the road to knowledge. The concept of association in its relation to the process of learning is of a

fundamental nature and I consider it as the nucleus around which a curriculum should be erected. Recall for a moment the work of Pavlov who conditioned his dogs to salivate at the sound of a bell. Pavlov's dogs associated food with the bell—they developed conditioned reflexes; they learned. Hull² is said to have claimed, "The conditioned reflex is one of the most primitive of all learning and memory processes."

The next step is the application of this concept. It must be integrated into the framework of a new curriculum. I have already mentioned the disjointed nature of the present system and it is apparent even to the most casual observer that there exists a wide chasm between the pre-clinical sciences and clinical medicine. It is obvious, moreover, that clinical medicine is founded on the basic disciplines of anatomy, biochemistry, physiology, and pathology. But this spurious division is found in few places in the actual practice of medicine; why, then, should such rigidity be allowed to exert its pernicious influence in medical school? Medicine has been compartmented and categorized in the present curriculum to such an extreme degree that the forest is barely visible to the student. Consider a patient, for instance, who is a diabetic, and, suffering from acute intestinal obstruction. Is this patient to be treated by a biochemist, an anatomist, a physiologist, a pathologist, an internist, and a surgeon? Or is he to come to one doctor? And coming to one doctor, is the patient to be divided into specialties and sub-specialties? The patient is *one problem*, I maintain. *The student is trained to practice medicine. He will practice medicine in a correlative manner. He should be taught, therefore, in a correlative manner.*

MUST BREACH RIFT

The tremendous rift between these two large compartments in medical education, i.e., basic science and clinical medicine, is easily breached. For example, the first day in medical school I would present the anatomy student with a case of ulnar palsy. I would do it in such a way that he would have the opportunity to individually examine and query that patient. (The examination of a patient by remote control from the twelfth row back in a lecture hall has rarely aided either that patient or the examiner.) The student at this point is ignorant but stimulated. He is possibly struck with the realization that the anatomy of that patient's upper extremity is of utmost importance. The student then does an obvious thing. He recapitulates the history of medicine; he has seen the pathological state and he tries to determine the normal, and the why and the how of the abnormal—he goes to his cadaver and to his book. All this while he is correlating the impressions received from his various senses; he associates and he learns. Furthermore, he learns easily and he learns WELL.

The physiology student, for example, observes a patient in heart failure. He pits the edema, he palpates the enlarged liver, notes the ascites, hears the rapid heart, observes the dyspnea; he watches therapy instituted—oxygen, low salt diet, etc. Then he goes to the laboratory, to the lecture and to the book and he associates his observations with the facts concerning the physiology of the circulatory system. He builds his knowledge around a patient and he constructs his concepts well, for his memories of that patient are clear and indelible.

The same principle of association is as easily applied to the other basic sciences. The main thing, I reiterate, is that the curriculum be centered on the patient—not on the promise of a patient in future years, but on a human being. *Give the student the opportunity to correlate, to associate; train him for the practice of medicine, not for the categorizing of dusty knowledge.*

2. CONTRAST

A dialogue in Plato's *Republic*⁵ reads, "For a young person cannot judge what is allegorical and what is literal; anything that he receives into his mind at that age is likely to become unalterable and indelible; and therefore it is most important that the tales which the young first hear should be models of virtuous thought."

"There you are right, he replied, but if anyone asks where such models are to be found and of what tales you are speaking—how shall we answer him?"

Plato provided no answer for this naive query. But the premise is wrong, for to overprotect any neophyte from all supposed dangers is a pernicious policy. Consider the medical student. He above all should be given the opportunity to hear conflicting opinions, for who is to say that one thought is more virtuous than another? As an example of the present state of affairs in regard to this I recently heard, as a lecture, an excellent discussion by a very dogmatic proponent of the monophyletic theory of blood formation. Some time later, by fortuitous circumstance, I listened to an equally superb presentation by a member of another school of thought on that subject. Neither speaker, however, spoke of the opposing view except in a deprecatory manner.

LECTURES ARE ARCHAIC

The custom of lecturing, archaic and inefficient as it is, remains firmly entrenched in the curriculum. I hold that lectures have disadvantages. One of these is that the lecturer assumes the status of the "model of virtuous thought" and that this does the student an injustice. There are few absolute truths in medicine and there is much controversy. Students do not appreciate dogmatism, no matter how disguised, unless they be callow. They are stimulated by controversy. Learning, I maintain, is facilitated by contrast—another aspect of association. Another disadvantage to the lecture system is that few professors are orators of any great note and to hold the attention of a crowd of people for an hour is a task of stupendous proportions. Another is the cow-like passivity which the student must cultivate in order to be an agreeable partner to this system of education. (See under "Activity" below.)

What I am saying, in effect, is that the system of lecturing is as impotent and inefficient as a canoe would be in the middle of the Atlantic. I suggest that there is a better way to do it; I say that the idea of the clinical conference, the seminar, and the forum—the idea of multiple participants should be utilized in the lecture hall. For example, on the day that the student expects to attend a lecture on the subject of the pharmacology of digitalis, he might see something like this: A patient in heart failure is brought in. A cardiologist points out the physical findings and interprets the electrocardiogram which has been photographed, produced in multiple, and passed among the students. A clinical pathologist gives and interprets the results of the laboratory findings. A pathologist discusses what has happened to the myocardium. A physiologist discusses the changes that have occurred in the patient's circulatory system. The pharmacologist then, given the greater part of the hour, first injects digitoxin and then discusses what the effects will be in this patient and why. Meanwhile, each speaker is free to correct, differ with, add to, or emphasize what another speaker has said. This is what I think correlative teaching which embodies the spirit of contrast might mean.

3. ACTIVITY

The fact that the more passive one is, the less he learns, seems so obvious that I hesitate to discuss it. There are some, however, who evidently fail to recognize this. Dashiell³ said, "It has been clearly brought out that if the subject exerts a continuous muscular tension by pressure on a dynamometer or a stylus, his learning is facilitated . . ." He concluded, "An active attitude on the part of the subject aids rapid acquiring." It has also been said that one remembers 10% of what he hears, 30% of what he reads, 40% of what he sees and 90% of what he does.

Now, Reader, picture in your mind's unbiased eye a student. This student is sitting, enveloped in the impenetrable gloom of artificial darkness. The shades are drawn and the lights are out. A slide of something or other has been projected onto a screen. Picture him one hour later, still sitting there in the darkness. He has just seen the fiftieth projection and the drone of the Voice from

the murky depths of the lecture pit is slowly rolling to a halt. The bell rings. the lights suddenly blaze. Two minutes later the student is able to see again; he yawns and then moves on to the next slide lecture. How much will this student retain? How much of this time has been wasted? How *active* has he been?

4. REPETITION . . . DISTRIBUTED LEARNING

Repetition is necessary for permanent retention. How often and where should the material be reviewed? Woodworth⁴ said, "An economy of learning time (is found) when that time is distributed over several sittings in comparison with the results obtained when the same total learning time is concentrated into one continuous sitting." Dashiell³ corroborates this view: "For the relearning of a 12-syllable series at a given date, Ebbinghaus (in 1885) found that 38 repetitions distributed over the three days just preceding was as effective as 68 repetitions made on the one day immediately preceding. The conclusion drawn from this, that *distributed learning* is more effective than *massed learning*, has been amply borne out by other studies."

I offer no suggestion under this heading, but rather, a commendation. Our courses overlap so that most of the important material is repeated many times during the curriculum. This is a good principle and should never be neglected when revisions in the curriculum are made.

SUMMARY

In summary, several suggestions have been offered for the improvement of the methods of medical teaching. These suggestions are based on the psychology of learning, the most important principles of which are **ACTIVITY**, **DISTRIBUTED LEARNING** and **ASSOCIATION** with its corollary, **CONTRAST**. It is suggested (1.) that preclinical and clinical medicine be joined into a happy union, (2.) that lectures be replaced by some system which incorporates the **idea** of multiple participation, and (3.) that student passivity in educative procedure be avoided. The principle of overlapping courses is commended.

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