MATHEMATICS AND MODERN LEARNING THEORY - *H. L. Larson*

Teachers of mathematics should evaluate their individual teaching method in the light of past and present developments in learning theory.

A brief review of four major learning theories indicates that all have one common structure. The teacher and the textbook reign supreme, and the student is given little incentive for individualization. However, modern research on learning theory has opened up a whole new era. The teacher and the textbook must be regarded less as authorities based upon *Absolutes*, but more as guidance persons.

The oldest of all learning theories is Mental Discipline, which suggests that the student's mind is like a muscle and merely needs exercising. Thus, rapid calculation and long addition columns are used. However, there was a backlash known as the period of the Romanticists. This philosophy, originated by Rousseau, claimed that man was born innocent and good. The job of the school and home was to see that his environment was kept pure so that the child could develop by doing what comes naturally. But this theory didn't work either as various kinds of anarchy set in. Technology required more of the hardware scientists with mathematics than the schools were producing.

Then came the theories arising out of Herbart's philosophy. The mind of man was like a receptacle, and the teachers manned the filling stations. Lecturing, work assignments and more lectures became the prime teaching method. The student presented himself before the teacher with the attitude: "Here I am, now teach me how to beat the system." Obviously the accent of mathematics teachers, like their peers, was on content - the student as a person was of lesser consideration. This theory, too, has been found to be wanting.

The Stimulus-Response theorists believed the human mind consisted mainly of neurons, ganglia and other physiological components that required certain kinds and frequent stimuli from external sources in order to obtain certain responses. Skinner's teaching machine has made considerable impression on teaching. But it also has had limited appeal.

However, modern learning theory would have us believe that a man is the product of both his genes and his interaction with environment. This places more emphasis upon the individual to build his own life style and have less faith in the absolutes handed down to him - because everything real is relative anyway. And changing, too!

Mathematics teachers might utilize this theory in a way similar to that which is described in the following example (this lesson was observed by the speaker in a public school system):

The teacher began with his Grade V class by insisting that students put away their rulers. Then he urged them to watch while he took a book and "measured" the length of a table. At first the response from his class was slow. He kept repeating, "How long is the table?", using also his hand, and a window stick. Finally the class began to catch on with real interest.

The teacher was attempting to isolate the major concepts of measurement: (a) arriving at a suitable first unit, (b) deciding on what to do about the piece at the end (precision). This was the first leg of the abstracting process called Analysis. In order to focus the students' attention on the roots of the concept, standard units were never mentioned. This is the second leg of abstracting called Differentiation - getting rid of distractions not necessary to understand the concept. Finally, the students were led into generalizing by leaving the linear aspect and getting into other dimensions. From there, students had the roots of the concept as tools for pursuing, on their own, other forms of measurement.

Little purpose is achieved by turning the students loose for self-study without first giving them some inspiration through basic concepts. This is about all teachers have time for anyway. In keeping with modern learning theory, students are given much more time to individualize if teachers concern themselves with isolating and teaching merely the roots of concepts.

Constitution of the Mathematics Council

as amended to September 26, 1970

The Constitution of MCATA was amended at the 1970 Annual Meeting. The amended Constitution is printed here for the information of members.

NAME - The name of this organization shall be THE MATHEMATICS COUNCIL OF THE ALBERTA TEACHERS' ASSOCIATION (MCATA).

OBJECT - The object of this organization shall be to promote and advance the teaching of mathematics throughout the province, especially in elementary and secondary schools.

MEMBERSHIP - (a) Any member of The Alberta Teachers' Association, or non-member covered by the Teachers' Retirement Fund.
(b) Any certificated teacher in private schools.
(c) Any member of the University of Alberta or Department of Education.

FEES - Membership fees may be established by resolution at the annual general meeting of this council.

FINANCES - The Executive Committee shall have power to collect fees and to make expenditures. A financial statement shall be submitted to the annual general meeting.

OFFICERS - The officers of this council shall consist of a president, a vice-president, a past president, a secretary and a treasurer, to be elected for a term of one year, by distributed ballot, and a member appointed by the Executive Council of The Alberta Teachers' Association.

EXECUTIVE COMMITTEE - The Executive Committee shall consist of the officers, one member from the faculty of education from a university in Alberta, one member from the Department of Mathematics of a university in Alberta, one member from the Department of Education and six directors to be appointed by the officers from the following: editor of the annual, editor of the newsletter, film coordinator, the chairmen of committees, the presidents of regional councils, members at large, provided that each university representative be appointed for a two-year term and also that the two university representatives not be from the same university and provided that the directors be appointed to ensure that the executive committee includes at least two representatives of each of elementary, junior high and senior high school teachers.

COMMITTEES - The Executive may appoint from time to time such committees as are necessary to carry on the work of the council.

LIAISON - Any communication regarding policy which this council wishes to make with any organization, government department, or other agency, within or without the province, shall be conducted through the Executive of The Alberta Teachers' Association or other regular channels of the Association.

REGIONAL COUNCILS - The Executive Committee of this council shall encourage the establishment of regional councils and shall have authority to determine regional boundaries and to establish regulations governing the organization of regional councils, consistent with this constitution.

REPORTS - The Executive Committee shall submit annually a written report of its activities to The Alberta Teachers' Association, prior to December 31.

AMENDMENTS - After three months' notice of motion to amend the constitution has been given to each member, this constitution may be amended by two-thirds majority vote of the members present at any annual general meeting of this council, subject to ratification by the Executive Council of The Alberta Teachers' Association.

GENERAL MEETINGS - The Mathematics Council shall hold an annual general meeting each year. At least 30 days' notice shall be given for all general meetings.