

THE TRAINING OF TEACHERS IN
NEW MATHEMATICS -
TV AND REGIONAL SEMINARS

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Although the title of the paper does include the term 'New Mathematics', the first thing I wish to do is to assure you that I do not intend to contribute to the already over-abundant attempts to explain this term; and I do not propose to deal with a heavy mathematical problem. I simply want to make some observations on inservice training of teachers made necessary by the revolution known as 'New Mathematics'.

Only by way of introduction I should like to remind you that our society has recently made both increased and more diversified demands upon the mathematical skills of the graduates of our schools. So extensive and diversified have these demands become that it is necessary to re-examine the whole program of arithmetic and mathematics with a view to equipping students with those skills that they are apt to need in the immediate future.

This re-examination and revision of the school mathematics program have led to major problems in retraining of teachers. How are teachers to keep up to date? Who is responsible for retraining or inservice programs? These questions have led some teachers to wonder why they ever considered the profession.

Many suggestions have been put forward with respect to the background which a mathematics teacher should have - and frankly, in spite of some well developed programs such as the CUPM program (Committee on Undergraduate Program in Mathematics), I am deeply concerned about the lack of mathematical background of many of our beginning teachers. In my position in the Faculty of Education at the University of Manitoba I am involved in teacher training and am vitally concerned with the kind of preparation we are providing for our student teachers. From the standpoint of the topic of this paper I am doubly concerned, for if the preservice training is not adequate, the inservice must go on forever. However, whatever the duration of our efforts, my concern centres on the retraining of teachers already in the field.

During the past three years two committees (one for Grades I-VII, one for Grades VIII-XII) have been working on curriculum revision in mathematics under the Curriculum Director of the Manitoba Department of Education. These committees have become deeply involved with inservice training. It has been suggested that revision committees should not necessarily become involved in this type of "extra-curricular sport"; however, experience has pointed out that revision is not fruitful unless teachers are prepared and equipped to teach the new courses. It is my purpose to report on progress being made in so equipping the teachers of Manitoba.

Two approaches or methods have been tried: (1) regional seminars or workshop series consisting of 20 hours of instruction of discussion, and (2) a television series of 26 programs followed by a centrally administered examination. I will deal with these approaches in order, perhaps not in order of importance but certainly in the order in which they are used.

The Regional Seminars

At the outset, several problems became evident:

1. If the new courses which had been designed or selected from pilot studies were to be implemented successfully, a major training program was necessary to deal with both method and content.
2. There were insufficient competent instructors to meet with several thousand teachers.
3. The shotgun approach or effect of inservice had to be avoided (many inservice programs are ineffective because they do not reach or "hit" all teachers.)
4. There were general problems of communication with teachers in that (a) reasons for change had to be made clear, (b) the authority of what to change had to be established, and (c) teacher reaction and evaluation by teachers had to be gauged or appraised.
5. A general lack of concern was noticeable on the part of teachers at any one level for the problems of those at another level (for example, the university staff were not concerned about high school and high school not concerned about elementary).

Keeping these problems in mind, inservice seminars were set up in the following manner:

In the spring of 1965 the Department of Education made each school inspector with the local superintendent responsible for arranging a 20-hour seminar for the mathematics teachers of his division. This authorization gave the programs official sanction and thus encouraged all to attend. These seminars were to be arranged at suitable times but to be time-tabled outside school hours.

The instructors were selected from a corps of pilot course teachers and committee members. These teachers had completed one year of teaching new courses under the guidance of the mathematics department at the University of Manitoba. This group served as a sounding board for difficulties and also tended to make the university instructors and the school teachers work more closely together.

The instructors were paid by the provincial department of education, and in addition to conducting the seminars they were expected to act as consultants during the following year.

The programs were designed to deal only with the highlights of the new courses and to give experience in developing a "discovery" method.

The resulting seminars were considered quite successful in some areas, while in others the response was mediocre. In all, the majority of teachers involved in new programs did receive some introduction to modern mathematics.

Teacher Training by Television

In addition to regional seminars the Manitoba Department of Education agreed in 1965 to try television as a means of extending and reinforcing the new ideas in school mathematics. By television I am not referring to closed circuit instruction, rather to the use of commercial broadcasting facilities. TV was felt to be especially useful in Manitoba for two reasons: first, there were some early hours available (morning television time which would be relatively free from competition by other programs), and second, the programs could be made available to those who were not able to attend the seminars (the teachers of the far northern schools and those who, because of family commitments, were unable to be present). After some discussion with the Canadian Broadcasting Corporation, it was decided that 10:30 on Saturday morning would be the best time for an experimental program. A program guide was produced to indicate the topic to be discussed, the date, and to give the viewer some idea of the preparation necessary. These guides were distributed to all who applied for the course.

The title of the series "Conversations in Mathematics" was chosen by Dr. Bernard Noonan of the Mathematics Department, University of Manitoba. Dr. Noonan was the driving force behind the experiment, who performed a major part of the writing as well as the camera work. "Conversations in Mathematics" has been referred to by the Manitoba Department of Education as a successful experiment in inservice teacher training by means of telecasts. It was a series of 25 telecasts with the purpose of pointing out and explaining to teachers of mathematics the unusual and possibly unfamiliar topics as they appear in the mathematics texts adopted in Grades IV, V, VI, VIII and IX in the Province of Manitoba, September 1965. While the series had been designed for teachers, each telecast was self-explanatory and could be viewed with understanding by both the student and the layman.

One of the most immediate justifications for considering the experiment successful is the fact that when the series was originally planned, 500 registrants were hoped for, whereas their final count was 3,612. These registrants were divided as follows:

Portage la Prairie	54	(2%)
Brandon	182	(5%)
Winnipeg	1455	(40%)
Other	1921	(53%)

To obtain these and other data, a registration form was sent to each of the more than 9,000 teachers in Grades I to XII in Manitoba schools. Since the telecasts were meant primarily for teachers from Grades IV through IX, the greatest response was expected to come from teachers of these grades. This proved to be the case.

Numbers alone, of course, show only interest. To achieve success, interest must be justified and satisfied. Evaluation forms which were supplied to the viewers indicated a favorable response with 59 percent giving the programs a "very good" rating. Comments attached at the end of each evaluation sheet served to further convince us that the series had achieved its purposes.

In order to test further the effectiveness of the telecasts and also to provide the viewer with a record of achievement in the televised course, 55 examination centres were set up in the province in which teachers could write a three-hour examination based on the series limited to teachers. Of the 390 teachers who wrote,

29% achieved a mark of 80% or over
41% achieved a mark of 75% or over
60% achieved a mark of 65% or over
88% achieved a mark of 50% or over.

The distribution of teachers who wrote the examination was as follows:

Portage la Prairie	0.3%	65% outside urban area
Brandon	3.1%	indicated that it was
Winnipeg	31.1%	reaching those for
Other	65.5%	which it was designed.

Since "Conversations in Mathematics" has proved such an effective teaching instrument, a brief account of events leading to its production may serve as a guide to at least one way of achieving inservice training of teachers by means of television.

Early in the fall of 1963 a decision was made to test the acceptability of a carefully selected Grade VIII mathematics text by using it in several pilot classes. To familiarize the teachers with the nature and intent of the experimental text, a course of instruction based on the text was given at the University of Manitoba and Brandon College. From this first experience it became clear that an extensive inservice teacher training program would be an invaluable aid in establishing a contemporary curriculum in mathematics in Manitoba, not only in Grade VIII but also in Grades IV, V, VI and IX where contemporary tests were to be introduced and later, of course, in the remaining grades as the revision became complete.

The two committees of revision (one for Grades I to VII and the other for Grades VIII to XII) decided independently that, as texts which proved satisfactory in pilot classes were adapted for the entire province, television - among other means - should be used as a way of reaching the very large and far-flung audience. To this end, a joint committee was formed under the chairmanship of the Supervisor of School Broadcasts to determine the nature, extent and format of an inservice teacher training course by means of telecasts. The result was 28 topics which formed the basis for "Conversations in Mathematics". It should be noted at this point that behind the determining of the nature of the course were two years of experience of eminently qualified educators, experience with a great variety of contemporary texts and in preparing teachers to use them successfully. However, good material for a television program needs a meaningful and appealing presentation to make the program effective.

In seeking to achieve these characteristics, "Conversations in Mathematics" was fortunate in that (a) it made free use of the professional, technical and production facilities of the Canadian Broadcasting Corporation, thanks to the wholehearted cooperation of that body; (b) it drew on the wide experience

in the fields of radio and television education of the Supervisor of School Broadcasts and her staff; (c) it was written, presented and reviewed by educators who had taken an active and responsible part in the selection of texts and in the inservice training courses given to teachers of pilot classes and who, at the same time, were mathematicians experienced in the use of the television medium; (d) a representative selection of its programs was previewed for comment and criticism by teachers, principals, inspectors, and representatives of CBC and various sections of the Department of Education.

In conclusion, it can be said that the contribution which "Conversations in Mathematics" has made to excellence in education in Manitoba is the consequence of a happy fusion of the experience and abilities of professional broadcasters with those of well-informed and eminently qualified educators.

From our experiment in television teaching I would make the following observations:

1. TV can be used as an effective means of carrying on inservice training, provided it is supplemented by some means of stimulating the teacher-student interaction of the classroom.
2. Careful planning of programs along with the development of a program guide makes for better viewing and learning.
3. The use of a limited number of instructors or assistants makes the series a more coherent package.
4. The topics and content must be planned and reviewed by a committee which includes teachers who are actively engaged in the classroom. I stress this point, as our experience would indicate that if the selection of material and the methods of presentation are left entirely with the professional mathematicians, the telecasts tend to become university lectures lacking in the techniques and teaching methods which are so important in the new mathematics courses. (Teaching by discovery will not be developed in a program given as a lecture.)

The classroom teacher is still the key to a good program in mathematics for our students. We must concern ourselves with the best methods of conveying the spirit of "New Mathematics" to these teachers who are very busy people. This is a big task - we cannot leave it to Dr. Donovan Johnson, to the NCTM, or to a good teachers' edition of a text; all who are involved in implementing new programs must be creative and diligent in the area of endeavor.