

INVESTIGATING THE METHODS USED BY QUEENSLAND MATHEMATICS TEACHERS TO OBTAIN CURRICULUM INFORMATION.

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The researched discussed in this paper reports on the findings of a survey of Queensland mathematics teachers. The survey sought to determine the methods used by these teachers to obtain curriculum information. The results suggest that as a group Queensland mathematics teachers do not undertake professional development activities.

In the past ten years major curriculum changes have taken place in Queensland schools and change is still occurring. A new 1-10 syllabus has been introduced having as its lynchpin a problem solving approach to the teaching of mathematics. As a direct consequence of the implementation of this curriculum a new and different syllabus is at present being introduced into the senior high school. Each of these documents advocates the use of problem solving as the vehicle for teaching mathematics. For many teachers this represents a radical change in the way they will have to teach. Added to the change in emphasis there are also new content areas, such as discrete mathematics, being included in the curriculum. These new topics are often unfamiliar to teachers, who have been in the workforce for a number of years.

The changes to the Queensland mathematics curriculum necessitate that teachers undertake a personal program to update their knowledge in the curriculum area. It must be remembered "one cannot communicate what he does not know; one cannot communicate with maximum effectiveness what he does not understand" (Bell, 1982). In the sense it is being used here, curriculum is to be taken in its broadest sense and would include pedagogical knowledge, content knowledge, curricula knowledge, and pedagogical content knowledge. The purpose of the investigation reported here was to determine what methods were being used by Queensland mathematics teachers to gain the necessary new information and skills.

LITERATURE SURVEY

Research (Cogan & Anderson, 1977; Owen, Hall & Malcolm, 1981; Hamilton, 1983; Pearce, 1984) has identified methods used by teachers to keep up-to-date in their professional area. Included are professional journal reading, inservice programs, seminars, conferences, formal study, conversations with colleagues, and being active in professional associations or serving on curriculum committees.

In a survey of the professional journal reading habits of Australian mathematics teachers Swinson (1992) found that they are not regular readers of these journals. This finding is supported by earlier research carried out in Australia (Pryke, 1987; Owen, Malcolm & Hall, 1982; Finger, 1977) and overseas (Davis & Butler, 1986; Hurd, 1981; Cogan & Douglas, 1977). In each of these studies the findings were the same, namely, mathematics teachers do not regularly read professional journals.

Dynan and Treaquist (1985) researched conference attendance of Australian science teachers and found that 62% of those surveyed had attended three or more conferences in the previous year and a half. Also 80% of the respondents claimed the conference attendance was very valuable in contributing to their professional development. Some caution must be exercised when considering these claims as those returning the questionnaires were all participants at the Conasta conference for science teachers and perhaps could represent a biased sample. Owen, Hall, & Malcolm, (1981) conducted a survey of Victorian teachers and found that more than half of the teachers responding had attended a conference that year, and about two thirds had been involved at a seminar in their school during the period. When reporting on an investigation relating to mathematics teachers in Canada, Schroeder & Frame (1986) noted that in British Columbia only 30% of junior high

mathematics teachers had attended a conference in the previous three years. As well Schroeder & Frame found that 36% of Alberta's mathematics teachers had not participated in any inservice activity in the previous three years. No Australian data was found which gave conference attendance information for mathematics teachers.

Conversations with colleagues is often stated as a method used by teachers to gather new information related to their professional activities (Jeffery, 1984). However from an extensive survey of the literature, Pearce (1984) concluded that teachers "don't talk much to each other about the science and the art of teaching." This conclusion of Pearce is supported by the work of Bell (1982) who found that teachers did not get professional information from conversations with friends.

The review of the literature suggests that, as a group, mathematics teachers may not be keeping up with changes in their professional area. Perhaps this should not be surprising for Romberg (1989) stated that "many teachers consider current practice as basically good and see no need to change the status quo." To test the assumption that Queensland mathematics teachers undertake professional activities which would update their knowledge and upgrade their expertise, a survey of these teachers was undertaken in the second half of 1992 to determine which methods were used.

SAMPLE

A random sample of 31 Queensland high schools was selected from both city and country locations. All mathematics teachers in these schools were invited to participate in the survey. A sample of this size would be large enough to give an indication of the situation. A letter describing the project and suggesting possible benefits to teachers was sent to the mathematics coordinator at each of the selected schools. Included was a set of questionnaires and an invitation to all mathematics teachers to participate. One week later the mathematics coordinator was contacted by phone and requested to encourage staff members to complete a questionnaire.

Two hundred and fifty-seven teachers from the 31 schools returned completed questionnaires. This sample contained in excess of 80% of the mathematics teachers in those schools.

The survey sample contained both single sex and coeducational schools from both the city and country and included state and private schools. Of the mathematics teachers in the sample (i) 64% were male, (ii) 43% had less than ten years teaching experience, (iii) 63% were under 40 years of age, (iv) 54% held a bachelors degree, 14% had a diploma and 18% were undertaking further study, (v) 26% belonged to a mathematics teachers' professional association and (vi) 20% stated that they were members of a professional committee such as a state curriculum committee.

INSTRUMENT

To determine how mathematics teachers were updating and upgrading their expertise a questionnaire was developed. The questionnaire sought information on professional journal reading, conference attendance, inservice attendance, seminar participation, and membership of professional committees. The teachers were also asked how much they thought each of these activities impacted on their classroom practice. Furthermore the teachers' views were sought on what they thought was the main method by which they normally gained information about new teaching ideas and new curriculum developments.

RESULTS

The results suggest that Queensland mathematics teachers are not regular participants in professional activities which would upgrade and update their expertise. In some cases the teachers were not even aware of all of the normal avenues available for doing so. The results are similar to those found in research previously reviewed.

Like their colleagues in other states and overseas few of the teachers surveyed read professional journals. Sixty-seven percent of the sample do not regularly read professional journals. Only 14% stated that they read the most of the articles in the Australian Mathematics Teacher, the national journal. More importantly 37% indicated that they were not familiar with this journal. For the Queensland state journal only 14% regularly read most

articles and 54% were not familiar with this journal. These figures are very similar those obtained by Swinson (1993) for Australian mathematics teachers as a group.

In table 1 is displayed the statistics related to attendance at conferences, seminars and inservice programs and the impact that each is perceived to have on classroom practice.

TABLE 1
Attendance at professional meetings 1990-1991

Type	Attending %	Impact		
		none %	little %	significant %
Conference	23	32	41	6
Seminar	49	17	58	12
Inservice	62	9	60	27

It can be seen that conferences do not play a major role in the professional life of mathematics teachers. Only 23% had attended a conference in the period 1990-1991.

Fifty-one percent stated that they never go to a conference and another 34% go to less than one a year with only 13% indicating that they attend one or more each year. Moreover in excess of 70% of respondents stated that conferences had little or no effect on their classroom practice.

Though seminar participation is better than that for conferences their effect on classroom practice is not significant. Here 75% indicated that seminars had little or no impact.

While 62% had attended an inservice program during 1990-1991 46% stated that they would not normally attend such a program every year. However 52% attended at least one inservice activity each year. Though attendance at inservice activities is much higher than for conferences and seminars, only 27% suggested that the impact of these programs in the mathematics classroom is significant and 69% claimed that these have little or no impact.

When indicating their major source of new information, 69% said other teachers, 13% gave inservice programs, 5% stated journals, 3% each for conferences and textbooks and 1% stated the Education Department. These figures confirm the finding of research quoted earlier (Jeffery, 1984) namely that mathematics teachers believe that their colleagues are the major source for new professional information. The only other source of new information that these teachers thought significant was from inservice programs.

DISCUSSION

If the initial hypothesis had been that Queensland mathematics teachers do undertake professional activities in order to keep up-to-date with current developments in high school mathematics teaching, then this hypothesis should, in all probability, be rejected. However the stated purpose of this investigation was to determine the methods used by mathematics teachers to gain new curriculum knowledge. It appears that many teachers see their main source of new information as being other teachers. Perhaps this is really a "Catch 22" situation. Few of the teachers surveyed are participating in professional development activities or formal study to keep up-to-date in their field. However, presumably many of these teachers who are not undertaking such activities are the source of curriculum information for other teachers!

Many professions use their journals as a means of communicating new and interesting information and as a medium for generating discussion. If this is true for other professions why doesn't it happen for mathematics teachers? Research carried out by Swinson (1993) and others suggests that if mathematics teachers are to read these journals then school time must be allocated for their reading. Furthermore there is a better chance that teachers will read journals if the school supplies them.

Mathematics teachers in Queensland do not appear to be in the habit of undertaking professional development activities. However if the changes required by the new syllabuses are to take place, teachers need to be encouraged to undertake such activities. Conference and seminar attendance are accepted forms of professional development, yet most Queensland mathematics teachers do not undertake these activities. The employing authorities need to look for ways to encourage teachers to attend, and the obvious method is to give the teachers leave, hopefully with pay, so that they can participate. In Victoria where teachers are given paid leave they do attend mathematics conferences.

The fact that inservice programs had a higher participation rate than the other activities is not surprising. Many of these programs are developed and conducted by the employing bodies. However the higher participation rate should not cloud the fact that many of the teachers claim that these activities had little or no impact on their classroom practice.

Finally both the Education Department and the Queensland Association of Mathematics Teachers need to think seriously about their role in getting information to teachers. It would appear that teachers see these two organisations as of little use as a source of curriculum information.

How can mathematics teachers in Queensland be encouraged to undertake professional development? This is an area that offers a rich field for future research.

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