

RESEARCH REPORT

STUDENTS' IDEAS ABOUT MATHEMATICS: A COMPARISON OF THE VIEWS HELD BY MALE AND FEMALE STUDENTS IN A FIRST YEAR MATHEMATICS COURSE AT THE UNIVERSITY OF THE SOUTH PACIFIC

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Introduction

This report is a summary of a study done between 2000 and 2002 looking at first year degree students' perceptions of mathematics and its implications for teaching and learning mathematics at the University of the South Pacific (Muralidhar, 2003). Students at this university come from 12 different countries in the South Pacific region with a varied background in terms of exposure to learning experiences in mathematics. Over the last few years, enrolment numbers to various courses have gone up generally and the maths lectures and tutorials have become overcrowded. The number of mature age entrants sponsored by their workplaces has also increased. The study was undertaken to observe if any gender differences existed in students' experiences of certain mathematics courses.

At the first year level, the mathematics department at the university offers four mathematics courses, some of which are for social science students and some for students on engineering and pure mathematics degrees. MA101 – Mathematics for Social Sciences is taken by a large number of students who are enrolled for Certificate (one-year long), Diploma (two-year long) or Degree (three-year long) programmes in Social Sciences. MA102 – Mathematics for Pure Sciences (except Physics) and Engineering technology, is taken by a much smaller number. MA111 – Mathematics for students who intend to major in Mathematics or Mathematics and Physics, is taken by the smallest number of students. MA131 – Introductory Statistics – is taken by students some of whom are in the MA101 group. Although this report has been compiled using the analysis of the data collected from MA101 students, the findings have implications for changing the curricular practices in all the four first year mathematics courses. The justification for selecting participants from MA 101 is that this course has always had the largest number of enrolments.

MA101 involved four hours of lecturing and one hour of tutorial per week for 14 weeks. Students were assessed through course work that comprises

two to three short tests held during the semester and an examination held at the end of the semester. Students who encounter difficulties in coping with the mathematics courses due to lack of competence in essential mathematical skills are generally directed to receive guidance and extra support through the special learning support provided by the Centre for the Enhancement of Learning and Teaching (CELT). CELT runs some sessions in response to requests received from the Mathematics Department. CELT also runs other sessions proactively on the basis of the needs observed during the consultation. These comprise individual or small groups tutorials for students who attend the CELT Mathematics Drop-In Centre.

The data for this study was collected through open-ended activity during a lecture session in the second week of the semester. MA 101 students were asked to write what they thought of mathematics, on a sheet of paper with Mathematics written at the centre. 209 (114f: 95m) responses were received. Responses of male and female students were analysed to examine positive and negative views regarding lecturers, course coordinators and tutors and the experiences of students. Views on mathematics were classified with regard to what students considered the primary purpose of learning mathematics to be.

Some views on mathematics were held by similar numbers of male and female students, and some views were found more amongst one group than the other.

Equal numbers of male and female students viewed mathematics as a broad, abstract subject that involved critical thinking and was a bit like learning a new language. This same group saw maths as complex and tough to understand, requiring step-by-step working in solving problems and investigational activities. This group also mentioned the applicability of algebra and calculus to other fields, but questioned its relevance for the social sciences. They emphasised that the pace of tutorials made them feel lost.

Significantly more males than females saw mathematics as a practical subject requiring alertness, patience and perseverance, but important for critical thinking. Six males mentioned the importance of accuracy in maths, the fact that not all the content could be applied to real life, and the importance of trial and error methods. For this group appropriate teaching could make the subject thought provoking.

Considerably more females than males saw mathematics as a challenging subject, requiring concentration, familiarization with its formulas and symbols, and a lot of hard work because of its hierarchy of concepts. This group saw maths as time consuming compared to other subjects, and particularly dependent on good teaching. They mentioned difficulty they had in understanding the topics and preparing for exams. However this group also mentioned the possibility of solving a variety of world problems by learning

to translate words into mathematical expressions and emphasised that when basic concepts were understood learning became easier.

Generally all respondents suggested the need for students to learn to be committed to studies in order to get good grades, attend all the classes and allocate specific time to study-related tasks. Tutorial groups needed to not exceed ten members, to proceed at a slower pace and provide more opportunities for training in problem solving skills. More opportunities for discussion and ensuring understanding in maths classes were widely mentioned; the importance of creative maths teachers using a lively style emerged.

Females highlighted their need to study maths more frequently and do more examples to make the picture clearer and bring out the general applicability. Their view was that teachers should give more detailed explanations of concepts, provide more opportunity for discussion and more encouragement. Teachers' knowledge of the subject should be matched by knowledge of how to explain it. Female students saw tests as useful to diagnose difficulties and highlighted the importance of additional bridging courses and student support

Male respondents suggested that maths should be studied in the morning, that more tests should be used to reward hard work and that students should be sorted into groups according to ability and taught separately according to whether they were good, average or weak. They considered fewer tutorials and more tests would be a better form of arranging the teaching. Some also stressed the need for male maths teachers and the importance of teachers being well qualified. The need for teaching materials that related to the local situation and that brought out the practical dimensions of maths was emphasised.

The study highlighted the areas in which male and female students' views were similar – primarily with regard to the logical processes involved in mathematics and the need to provide opportunities in classes and tutorials to understand this. But the study also highlighted some important differences in approaches to learning, with more males wanting a 'tough' teaching style based on testing and academic identity of the teacher, and more female students wanting a teaching style alert to ways to develop understanding through support and encouragement.

REFERENCE

Muralidhar, S. (2003). *Students' ideas about mathematics (SIAM): Report of a qualitative comparison of the views held by male and female students in a first year mathematics course at the University of the South Pacific*. Pacific Information Centre, Publications 2003. The University of the South Pacific.

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