What makes Mathematics lessons interesting in the middle school: Student and teacher perceptions

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Abstract

Some researchers have suggested that students in schools find mathematics classes boring, and that this attitude towards learning mathematics gets stronger as students grow older. Using reports of students and teachers, this study investigates how interest is used and developed in intermediate school mathematics classes.

Five teachers and 101 Year 7 and 8 students from a single co-educational suburban state intermediate school participated in the study. One teacher and ten student focus group discussions to explore attitudes to and uses of interest in their mathematics classrooms were audio-taped. The results of these discussions were used to develop themes that formed the basis of separate student and staff questionnaires for all participants. Further data was obtained from a mathematics class journal kept by participants, and from individual interviews with all staff and seven randomly chosen students.

The study showed that both teachers and students had similar ideas about what students found interesting, and revealed several aspects of classroom practices that heightened and/or developed interest in learning mathematics. The most notable of these were: using hands-on activities; teacher enthusiasm; group work and student progress. Mathematical content was rarely seen as interesting in itself, although probability, symmetry and transformations, geometry and problem solving were regarded as the most interesting sub-strands of the curriculum, while number, measurement and 'all of mathematics' garnered least support. Bookwork using textbooks or worksheets was usually considered boring, and activities such as external mathematics competitions and challenging or easy mathematics polarised student opinion.

Interest has a complex and generally positive association with learning. Student reports suggest that two interest factors that have the potential to be used more effectively in mathematics lessons are teacher enthusiasm and group work. The catch phase of situational interest, the aspect of interest most frequently used, was rarely developed further. This study suggests that mathematics learning will benefit from further developing interest in mathematics classes by linking situational interest factors with mathematical content, student experiences and clarity about each student's progress. Teachers need professional development and resource support for this to happen.

Preface and Acknowledgements

This thesis started as a result of my interactions with adult students taking mathematics courses. When questioned about their own learning, the vast majority of their responses related to the emotional aspect of their learning. Furthermore, when learning mathematics, satisfaction with any support received appeared to coincide with a happy and determined look in their eyes—a look of what I would call 'interest'.

I would like to acknowledge the many people who supported me throughout this study. I am very grateful to my principal supervisor, Assoc. Professor Glenda Anthony, who consistently provided ideas, encouragement and professional support in a practical and down-to-earth way. My thanks also go to Dr. Margaret Walshaw for her useful feedback. I am very grateful for the support given to me by the Dean in the Faculty of Science and Technology at EIT Hawke's Bay, Dr. Ken Whittle. Thanks also to Pete, Doug, Vivienne, Alison, Marion and Niki for the work they did so unselfishly to help me to complete my study. To Owen and my other friends and colleagues who cajoled, encouraged and inspired: many thanks for your interest, care and good humour.

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Chapter 1: Introduction

1.1 Background

More than ninety years ago, in 1913, John Dewey published a book entitled *Interest and Effort in Education.* In it he theorised about the idea of interest, and promoted the virtues of interest when learning. He described interest as "not some one thing; it is a name for the fact that a course of action, an occupation, or pursuit absorbs the powers of an individual in a thorough-going way" (p. 65). It took a long time for educational researchers to follow Dewey's lead. The study of affective variables such as interest was sidelined until recently while psychology followed the behavourist, and then the cognitive, paradigms.

Trends in mathematics education have also changed since Dewey's time. As an example, one of the current emphases in mathematics education is *problem solving* (Ministry of Education, 1992). As the problem solving process often involves intense emotional reactions, it was surprising that most of the research into problem solving in mathematics education involved cognitive factors and excluded affective ones (McLeod, 1989). The emphasis on cognition has since changed, with the scale of research into affective factors in general, and interest in particular, having increased during the last twenty years (Boekaerts & Boscolo, 2002).

Dewey's belief that interest and learning are positively related is correct. The results of the research into interest have shown that interest is also related to other affective factors of learning. This means that getting students interested in what they are expected to learn is likely to have positive effects on their learning. Conversely, bored students are likely to have a fewer positive learning experiences.

The results from New Zealand's participation in the Third International Mathematics and Science Study (TIMSS) in 1994 and 1995 and also from the National Education Monitoring Project (NEMP), show that while students often rate mathematics among their favourite subjects in middle primary school, the enjoyment of learning mathematics in schools decreases as students get older (Eley, 1999; Garden, 1996;

1997; 1998). Students appear to lose interest in mathematics as they go through school. This pattern also happens with other subjects, but appears to be more pronounced in mathematics, with many reports that mathematics is boring (Nardi & Steward, 2003; Stodolsky, Salk, & Glaessner, 1991). Furthermore, gender appears to be a factor, with the suggestion that mathematics (Young Loveridge, 1992), or maybe mathematics lessons (Boaler, 1997) are less interesting for girls than for boys.

This does not bode well for the learning of mathematics in schools, especially for girls. If teachers are to improve students' learning prospects in school mathematics then attention needs to be paid to increasing the interest of students in mathematics classes. In order to do this a useful starting point would be to find out about the current attitudes and experiences of both the students and their teachers. This would include what they find interests them in mathematics lessons and also the existing practices relating to using interest in mathematics classrooms.

My experience as a teacher suggests that if we can help increase the interest for students in learning mathematics; if we can reach the stage where we can see the light of interest in their eyes, we can make the school mathematics learning experience for our students and their teachers a more positive one.

It is for the reasons outlined above that I was attracted to this research project.

1.2 Research Objectives

It is plausible that interest has some impact on many aspects of classroom activity, including achievement as well as affective and behavioural variables. Therefore, there is potential for improvements in mathematics education in knowing more about how interest interacts with other classroom factors. As intermediate school is a time when students begin to form attitudes and beliefs that will be the foundation for their adult lives, this is a good stage of life in which to establish, or possibly increase, interest in mathematics classes.

The main aim of this study was to explore the role of interest in learning mathematics for intermediate school children.

The study was specifically designed to achieve the following research objectives:

1. To give a rich description of what intermediate school age children find interests them about learning mathematics.
2. To give a rich description of what intermediate schoolteachers believe is interesting to their students in the mathematics classroom.
3. To find out how teachers use their students' interests in teaching mathematics.
4. To find out what teachers of intermediate school students do in order to make mathematics interesting to their students.

1.3 Overview

The following chapter contains a review of the relevant literature. This review begins by justifying the study of interest in mathematics classrooms, with special attention to the intermediate school stage of development. The way the word 'interest' is used during the study is then clarified, and various forms of interest – individual interest, situational interest, and topic interest – are distinguished, discussed and developed. These concepts are then compared and correlated with other educational ideas such as achievement, learning level, self-efficacy, motivation and goals. Theoretical and practical aspects of using and developing interest within the classroom follow, with particular attention to research from mathematics classrooms. Research literature with respect to interest specifically from the point of view of students, then teachers, rounds off this literature review.

Chapter 3 describes the research design for this study. The next two chapters present the results of the research from student and teacher perspectives respectively. Chapter 6 discusses the results with emphasis on the major findings, presents conclusions and closes the study with suggestions for future research.