

Qualitative research approach towards factors associated with mathematics anxiety

Marzita Puteh, Sultan Idris Education University, Malaysia

Introduction

This study investigates the extent and nature of mathematics anxiety in primary school teacher trainees in Malaysia, and identifies the factors that are associated with it. Evidence for the nature and source of mathematics anxiety was derived from what the teacher trainees said about (a) their perceptions of mathematics; (b) themselves with regard to mathematics (self-image); (c) their feelings towards mathematics; and (d) their behaviour when doing mathematics. Hands-on mathematics was given to the teacher trainees in order to observe how mathematics anxiety affects them in an actual scenario of doing mathematics. Teacher-students relationship, teachers' style of teaching, examination pressure, parental and peer group influences were identified as the main factors contributing to the trainees' mathematics anxiety. The cultural setting for these factors emerged from the research as being of particular significance.

Malaysian attitudes towards mathematics

It is Malaysia's vision to be a fully developed country by the year 2020. By then, the intention is that the Malaysian society will have evolved into one that is democratic, liberal, tolerant, caring, progressive and possessing a competitive and dynamic economy. It is argued that establishing a scientific and technological culture will lay the foundation towards the attainment of such a society. Hence science, mathematics and technology have always been emphasised in the national development plans. Mathematics certainly means many things to many people. Davis and Hersh (1983) state that the definition of mathematics changes over time. For example one of the most important elements of the perceived reasons for learning mathematics among Malaysians is its importance as a passport to either being able to continue further education through acceptance to higher institutions or a promise to a better paid job either in the government or private sectors. Hence it is no surprise that every parent feels the need for their children to achieve excellence in this field. One of the question prompting the present research is whether the perceived important of success in mathematics in Malaysia society produces highly anxious teachers and equally anxious students who forms parts of a vicious cycle of mathematics anxiety in our schools. Recognizing that this is only one phase of a complex cycle, but one which potentially a key point for bringing about change. This is an alarming vicious cycle that need to be address seriously. Effort should be put into trying to introduce any intervention to break it. If we are serious in

producing the qualities of teachers that is personally, professionally and socially balanced, and, that is able to uphold the goals that had been set in the Philosophy of Teacher Education in Malaysia, then this mathematics anxiety must not be a deterrent for its success.

Methodology

Qualitative studies have been well-developed in the developed countries, but the situation is not the same in Malaysia. The dominant tradition has been along the positivistic orientation. A qualitative study then offers a different approach to educational research in the field of mathematics and can thus generate a range of information of a different quality to that obtained in traditional approaches. Three types of strategies were adopted to collect sound data. They were, questionnaires, interviews, observations of hands-on-mathematics and classroom observations.

Findings and recommendations

The Cycle of Attitude

Chart 1 is a schematic representation of the outcome of the research showing how various components relate to one another and form a cycle. The attitudes towards mathematics of every teacher trainee who was interviewed are made up of: their past experiences, such as their experiences of learning mathematics; the effect on them of teacher-student relationships and their teachers' style of teaching mathematics; their parents' and peers' influences regarding the subject; and the pressure that is heavily put on them by examinations. As shown from Chart 1, a number of types of evidence of attitudes towards mathematics were used. These are categorized as: their perceptions of mathematics; what they say about themselves with regard to mathematics, which was refer to as their self image; what they say about their feelings towards mathematics; and how they behaved when doing two mathematical tasks. These four main component of evidences taken from the interviews, classroom observations and discussion about their response to the hands-on mathematics pointed to the fact that these trainees experience considerable anxiety towards mathematics. Some kind of intervention must be introduced in order to help these trainees reduce if not overcome their mathematics anxiety. An awareness programme carefully built into the mathematics syllabus in teacher training colleges would introduce a different kind of feedback. Mathematics lecturers must be alerted to the existence of this mathematics anxiety among the teacher trainees so as to directly or indirectly help to minimize this and to avoid further aggravating the syndrome. Helping these students to cope with this phenomenon should be a priority in the agenda of the teacher training syllabus. In the western culture, where this phenomenon is highly documented (Tobias, 1978; Burton, 1979;

Resek and Rupley, 1980; Buxton, 1981; Minix, 1982; Bush, 1989; Skiba 1990; Coleman, 1991; Haylock, 1995), helping students to cope with this anxiety has been a major priority.

The Anxiety Cycle - The formations

As discussed earlier, these trainees, and, in fact, people generally, attach meanings to what they gather around them and these meanings reflect their individual and personal subjective experiences (Mitchell and Collins, 1991). From these experiences conclusions are drawn and beliefs are then formed. These beliefs are sometime referred to as attitudes. These attitudes are then reflected in their behaviour and this is often quite consistent. The following is how the mathematics anxiety cycle developed and continued. Staying away from any mathematics situation seems to be a solution for many who experience anxiety, as we have seen from the analysis of the data. However this will reinforce the belief that they are incapable. And each time they avoid mathematics, they confirm their lack of knowledge and confidence in that area. Hence whenever they approach mathematics, the chances are that they will fail and their expectation of failure is again confirmed.

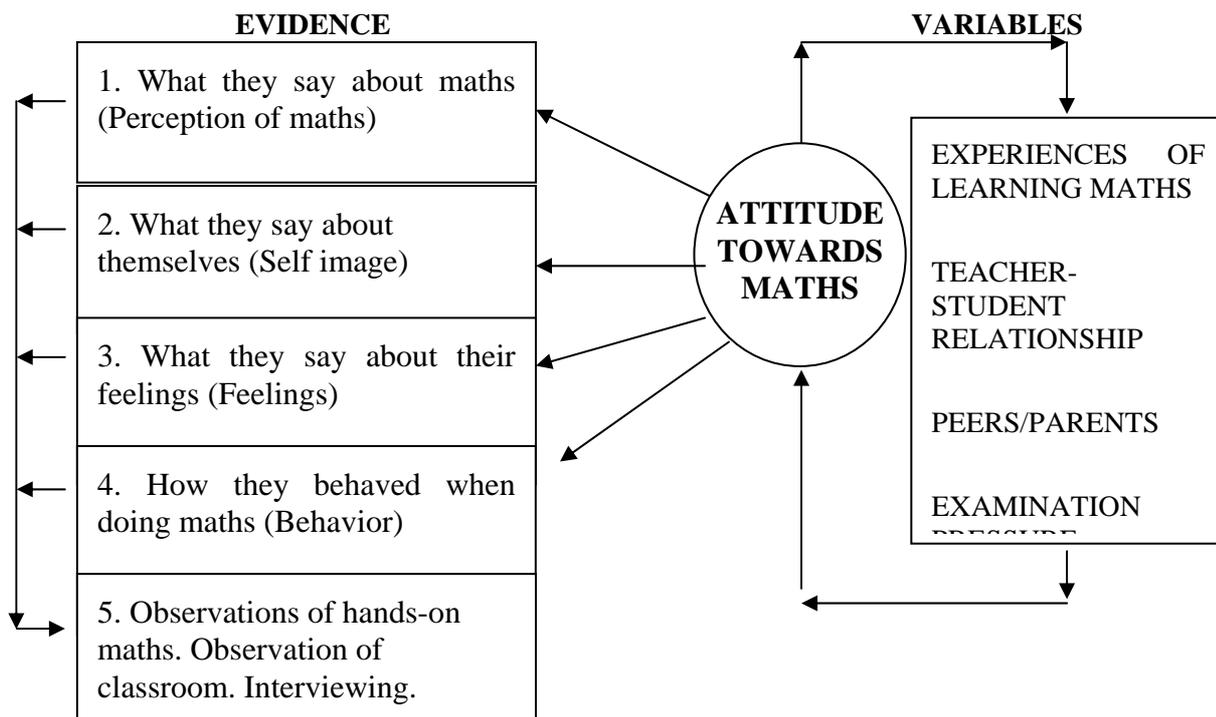


Chart 1: The Attitude and Anxiety Cycle

Chart 2 (below) is a representation of the pattern which was created for these trainees through their negative experiences.

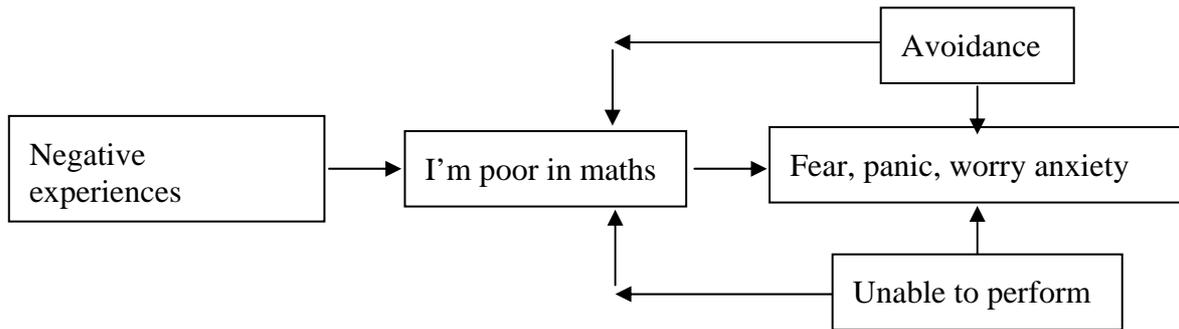


Chart 2 The Mathematics Anxiety Pattern

Chart 3 (below) is a diagrammatic representation of this Mathematics Anxiety Pattern in the Attitude Cycle (a combination of Chart 1 and Chart 2).

Hence if this process is to be remedied or even avoided, a restructuring of attitudes needs to be achieved, or as Mitchell and Collins (1991, p. 45) puts it: “The remedy for dealing with [...] math anxiety is cognitive restructuring”.

Clearly the situation is highly complex, as shown in Chart 3, but to put it in simple terms, a change of attitude towards mathematics in primary teacher trainees (Haylock, 1995) is what is basically is needed. This means a change in the predisposition to various perceptions, feelings or behaviours towards the subject. If this is to happen, the cycle that already exists in students, and especially teacher trainees, must be broken. An intervention that aims specially at helping trainees to identify and then modify and reduce their mathematics anxiety must be introduced in the process of training these teacher trainees in training colleges. The mere fact of admitting to its existence is already the road to rectifying it (Mitchell and Collins, 1991).

References

- Burton, G.M. (1979). Getting Comfortable with Mathematics, *Elementary School Journal*, 79(3), 129-135.
- Bush, W.S. (1989). Mathematics Anxiety in Upper Elementary School Teachers. *School Science and Mathematics*, 89, 6,499-509.
- Buxton, L. (1981). *Do You Panic About Maths? Coping with Maths Anxiety*, London : Heinemann Educational Books Ltd.
- Coleman, B.L. (1991). *A Study of The Prevalence And Intensity of Maths Anxiety in College Students and Preservice Teachers at a Large Southern University*, Doctoral dissertation. University of Tennessee.
- David, P.J. and Hersh, R. (1983). *The Mathematical Experience*. Harmondsworth: Penguin.
- Haylock, D.W. (1995). *Mathematics Explained For Primary Teachers*. London: Paul Chapman Publishing Ltd.
- Minix, N.A.H. (1982). *An Exploratory Study of Mathematics An Elementary School Children and its Implications for Program and Staff Development*. DAI-A 42/10, pg. 4279.
- Mitchell,C. and Collins,L. (1991). *Math Anxiety. What it is and What to do About it*. USA: Kendal/Hunt Publishing Company.

Resek, D. and Rupley, W.H. (1980). Combatting 'Mathophobia' with a Conceptual Approach Toward Mathematics, Educational Studies in Mathematics,11,423-441

Skiba, A.E. (1990). Reviewing An Old Subject : Math Anxiety, Mathematics Teacher, March, pg. 188-189.

Tobias, S. (1978). Overcoming Math Anxiety. USA: Houghton Mifflin Company.

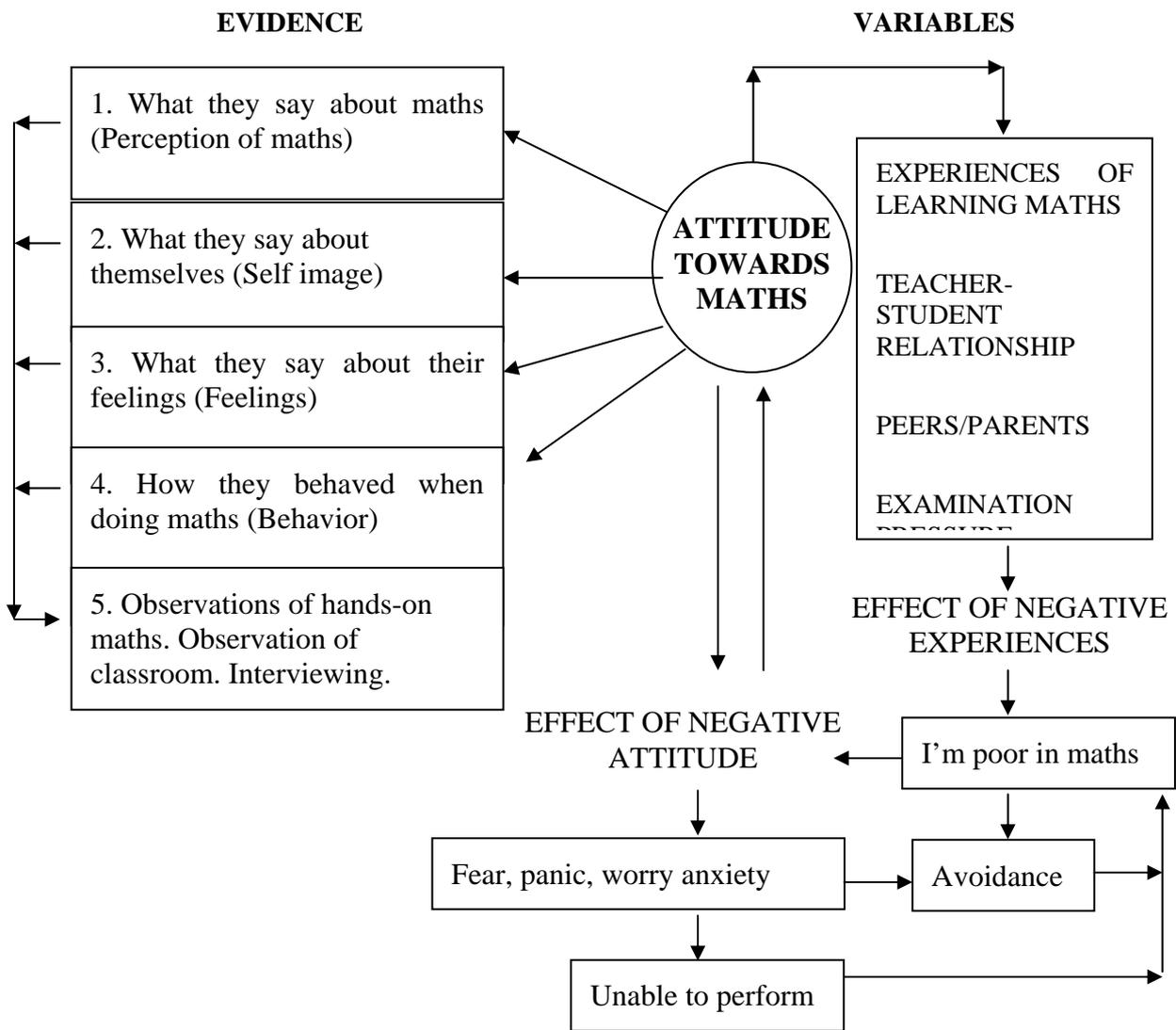


Chart 3 The Attitude and Anxiety Cycle