Alternative in Overcoming Anxiety in Mathematics Learning

^aMohd. Rustam Mohd^{*}. ^aRameli, Hamdan Said, ^aNora Mislan, ^aNorashuha Tajuddin, ²Nguyen Thuy Van, ²Ros Ilyani Rosdi, ²Tee Tiam Chai

²Universiti Teknologi Malaysia

*Corresponding author :ruise_thumbb@yahoo.com

Abstract

Math anxiety is an affective variable that directly or indirectly impacts the life of students and teachers who apply mathematical knowledge and skills in everyday life. The negative effects of math anxiety include disturbance during the process of learning mathematics, career selection, and survival. Studies have recommended various methods to minimize the negative effects of math anxiety. This paper also discusses few alternatives to reduce the negative effects of math anxiety on school students. The alternatives include inculcating positive thinking against negative talk and building support group; building assessment strategies, using effective learning style, minimizing the element of competition, active teacher and parental support and classroom structure. This study concludes that math anxiety can potentially disturb the learning process itself. Therefore, all stakeholders including effective learning for students in mathematics.

Keywords: mathematic learning, math anxiety, overcoming alternatives

INTRODUCTION

In dealing with academic issues at school, one of the subjects that often gets most attention is mathematics. Students are taught with the basic of mathematics in primary schools while the teaching of mathematics emphasizes the understanding of concept and problem solving in secondary schools (KPM, 2010; KPM, 2006). While going from one level to the next level of study, students go through different learning experiences which either makes them feel excited or bored and not even interested in exploring mathematics knowledge at a higher level. Therefore, it is important for teachers to ensure that the students internalize the concepts and skills of mathematics at the lower level to be applied at the higher level of education. This is in line with the recommendations by the Malaysia Ministry of Education (KPM, 2006) regarding the process of teaching which emphasizes skills and concepts that should be developed based on the identified learning topics and the relationship between the skills and the learning topics before promoting students from one level to the other.

Students' mathematical achievement has often been the focus of many education systems around the world. Failure in mathematics is seen as a critical global issue in many countries. Research has indicated that in Malaysia, math anxiety is a major factor influencing mathematics achievement among high school students (Zakaria and Nordin, 2008; Darvajoo, 2007). Often intellectual ability is associated with math achievement. This brings to limelight another aspect of the affective element in students' learning. Teaching and learning of mathematics is affected directly and indirectly due to math anxiety that exists among students. Many studies indicated that the occurrence of math anxiety was due to the past life experience (Tobias, 1990; Dossel, 1993; Newstead, 1995, 1998; Miller and Mitchell, 1994; Gutbezahl, 1995; Levine, 1995); social force and family expectations (Kober, 1991; Sells, 1980; Siti Hamad and Rohani, 2010; Brannon, 2002; Eccles and Jacobs, 1986; Yee and Eccles, 1988; Poffenberger and Norton, 1959); negative attitudes and thoughts towards mathematics (Miller and Mitchell, 1994; Gutbezahl, 1995; Levine, 1995; Newstead, 1995); method of teaching (Sieber et al., 1977; Marzita, 2002; Briggs, 1993; Briggs and Crook, 1991; Tobias, 1978); influence of peers (Aiken, 1970); situation and instrumentality of test or examination (Marzita, 2002); poor curriculum (Lazarus, 1984; Burton, 1979; Bush, 1991; Ferguson, 1986) and also myth of mathematics. The myth were include aptitude or ability of mathematics is born naturally; mathematics does not require creativity but only need logical and rational thinking; there are magic key in solving mathematics problems; to be good in mathematics, one should be well versed in the calculation and boys are always outperformed girls in mathematics (Marzita, 2002; Arem, 2003).

Math anxiety has a negative effect on students mathematics learning. Students who experience math anxiety hardly pursue mathematics courses, particularly advanced mathematics. They avoid being involved with jobs that require quantitative skills and do not like to teach mathematics if become a teacher (Hambree, 1990; Ma, 1999; Ho et al., 2000). Anderson (2007) found that a high level of anxiety results in avoidance of engaging with tasks involving mathematics. Many studies have shown the relationship between math anxiety with negative learning effects, including low student achievement (Erden and Akgul, 2010; Anderson, 2007; Stubblefield, 2006; Ho et al., 2000). The elements of math anxiety need to be considered by educators during teaching and learning of mathematics. It is necessary to ensure that students acquire the knowledge and skills of mathematics effectively. In

this case, not only teachers rather family members as well as the students, can play their roles in addressing this issue.

ALTERNATIVES IN OVERCOMING MATH ANXIETY

To overcome math anxiety different alterneatives can be explored and used by teachers and parents toghether. This current paper presents five key alternatives that can be effectively used to overcome math anxiety among high school students.

Think positively and build support group

Mathematics-related negative talk is one of the elements that can reduce student motivation to learn mathematics. Negative talk can be divided into two which are self talk uttered by the students themselves and spoken from others, such as teachers, family members or friends. Among the expressions often students uttered are "mathematics is a very boring subject" or "I could not achieve good results in mathematics". Meanwhile, the negative talk from others include "You are very dumb in mathematics" or "You are not going to succeed in mathematics". These talks should be removed from the students thinking. In this case, students should be encouraged to think positively, be optimistic and talk about the benefits of mathematics (Paul, 2000).

In addition, students need to avoid themselves from being surrounded by those who love to talk negative about mathematics. They should be aware that these people can be found anywhere and they do not only use negative words but also annoying intonation and gestures (Arem, 2003). What students should do is to consider the negative behavior as a challenge. Therefore, to avoid this from becoming a barrier to excel in mathematics, students need to create a support group by mingling with people who have positive attitude towards mathematics. The support group should not only made up of friends who perform well in mathematics but also a mathematics teacher or counselor at school (Arem, 2003). In this way, positive attitude and enthusiasm of students towards mathematics can be formed.

One way that students can against the negative talk is by using positive and encouraging language such as "I am interested in mathematics" or "I feel great while doing mathematic question". Students need to believe in their abilities to succeed and this belief is the energy and momentum that may led to success in achieving the goal because positive self-esteem helps to deal with difficulty effectively (Robbins, 1997).

Studies have revealed that low level of motivation due to negative talk can be decreased by nurturing passion and enthusiasm among students for learning of mathematics. Research can also be helpful in finding the causes of this problem and presenting a viable solution. This passion may energise students and increase their motivation to perform well in mathematics (Gutbezahl, 1995; Levine, 1995).

Performance of students in mathematics could be improved by providing them with opportunites to relate the use of mathematics in everyday life. In this way, students may find interesting facts or information about mathematics. With respect to attitude, students need to be optimistic and never look down their abilities since the negative thought could influence their feelings and then influence their actions (Ellis, 1998).

Build assessment strategies and using effective learning style

High expectations and test instrumentality has an impact on math anxiety. Morris (1981) felt that the test or examination should be minimized or eliminated and replace it with less threatening methods of assessment. Recently in Malaysia, exam oriented system is being replaced by school-based assessment system as an alternative to reduce the element of competition and feelings of math anxiety. However, there are schools that still implement the evaluation system based on examination to measure student proficiency. Strategies for alternative assessment then should be introduced. Among the proposed strategy are as follows:

- i. Revise every concept that has been taught
- ii. Design a test sample
- iii. Analyzing common mistakes
- iv. Observe the time limit and record important information
- v. Start by answering the simple question
- vi. Did not spend too long in a certain question
- vii. When answer to a difficult question, identify all the given information
- viii. Do not feel anxious when there are students who can complete all questions faster
- ix. After answering, check all the questions that have been answered.

Apart from the strategy mentioned above, another important element that student should wisely control is the level of anxiety. The low level of anxiety causes to feel lazy. In contrast, a high level of math anxiety could lead to losing control, feeling panicky, disordered thinking and show physical symptoms such as fatigue, diarrhea and shortness of breath (Pena et al., 2013). The goal of management of anxiety is to ensure that the feeling is placed at the appropriate level. One of the effective means of control is with proper breathing techniques.

Apart from developing and using effective assessment strategies, identifying students' learning styles is also important. Each student learns differently and has a different learning style. By knowing the most appropriate learning style, students can learn effectively which leads to decreased feeling of restlessness, fear and worry. To enable the students to know their learning styles, perceptual preference must be known in advance whether they tend to be visual, audio or kinesthetic learning style. This is important because students who are taught according to their perceptual tendencies are more receptive to teaching (Dunn and Dunn, 1978). There are seven other factors that affect learning process such as time of study, noise level, lighting, temperature, space design, food intake and preferred mode of study whether individually or in group (Arem, 2003).

Minimize the element of competition

Students should be aware of the negative effects of fear about mathematics particularly regarding their achievement. Students need to know that they should not over burden themselves with unnecessary thinking. For example, thinking too much to compete with colleagues in order to prove themselves that they are better. This will cause them to suffer from anxiety if they can not demonstrate their competency at the required level (Soini, aro and Niemivirta, 2011; Baranik et al., 2010; Brophy, 2005).

School should put more emphasis on the learning progress rather than achievement in order to encourage students to continue to put more efforts. An emphasis on the learning activities enable teachers to get feedback from students and any misconceptions can be detected and rectified. Teachers need to focus the ability of the students rather than their weaknesses or failures. Teachers should inform students that their failures are the result of their own attitude for not willing to try while their success is a result of their ability. The teachers should use test and score as a tool to raise students' motivation rather than a tool to intimidate them.

Teachers should also avoid creating unnecessary competition among students. This includes avoiding engaging in competition to compare the ability of boys and girls. This is because the competition only leads to success for some students but failure to most students. To overcome the negative effects of stereotypes, teachers should emphasize the elements of work or task to be awarded against the natural talent of students and guide them to see their progress in the learning process (Osborne, 2001).

Teachers also need to realize that much emphasis on competition causes anxiety to students and interfere the learning of mathematics. This, may affect their mathematics achievement if the feeling is not controlled. Therefore, teachers need to have the skills in controlling this situation especially when it involves assessment which is often associated with the cause of anxiety among students (Vitasari et al., 2010; Robu and Sandovici, 2012; Mohamed and Tarmizi, 2010). Teachers also need to be more sensitive and show no feeling of anxiety to the students (Newstead, 1998) because this may be transferred to the students (Baloglu, 2001).

Teacher support and classroom structure

Teacher support and classroom structure are two important elements that must be considered in attempting to reduce students' feeling of anxiety towards mathematics and the effect of competition among students. Teachers must be aware of their roles in the learning process. Classroom teaching must be implemented in an effective way possible to enhance students learning ability. Motivation, structures of classroom and classroom practices that include learning and assessment process should emphasize the elements of mastery goal orientation and not to compare one student with the other (Maehr and Midgley, 1996). This is important because the classroom structure is related with an individual achievement goal orientation which becomes the basis to claim that the practice of classroom structure influences students' individual goal orientation (Kim, Schallert and Kim, 2010; Tapola and Niemivirta, 2008; Kaplan and Maehr, 2007). This point is further reinforced by Luo, Hogan and Paris (2011) and Debaker et al. (2004) who found that the mastery-oriented of classrooms structure to be significant predictors of the students mastery goal orientation.

School environment also influences student learning. If the school does not have the conducive learning environment, student motivation to further engage in learning is affected (Salmela-Aro, Kiuru and Nurmi, 2008). This situation once again relies on the teachers to provide an environment that helps students engage in the learning process. Turner et al. (2002) noted that the achievement goal orientation adopted by students is in line with their teachers achievement goal orientation. If the students find their teachers emphasize mastery learning then they will better understand the teaching material provided (Bong, 2001) but if the teacher emphasizes competition then they will adopt to performance approach or performance avoidance goal orientation (Ryan, Gheen and Midgley , 1998).

Since there are studies reporting that male students start their schooling with a positive perception of their mathematics ability while female students focus arts and language (Jacobs, 2004) then efforts to increase student motivation should be emphasized on the aspects of self-competence or ability and also appreciate the value of a particular subject. This is important because self-efficacy is always positively correlated with higher levels of achievement (Schunk and Pajares, 2005). Jacobs study also showed that a negative perception of self competence lead to a decline in achievement. Furthermore, increased student self-efficacy prevents the occurrence of math anxiety (Lavasani, Hejazi and Varzaneh, 2011).

Teachers should give tasks that are not too hard nor too easy in order to prevent students from being too scared of failure, feel restless, and anxious towards mathematics. In contrary, teachers should give tasks that increase

students' confidence and the ability to continue with the learning activities. Too difficult task often leads to failure and causes students' to give up in continuing learning activities. Meanwhile, if the task is too easy, it would not increase student confidence (Ali Press and Partners, 2011). Consequently, the tasks given to students must be consistent with the ability of students so that they can do the task with their own efforts.

Inculcate positive attiude, perception and expectation of parents

Parents also influence their children in the learning process. Parents should be aware of the environmental factors that contribute to math anxiety among students. Family behavior has proven to influence the level of student anxiety (Cakmak and Hevedanli, 2005). Haylock (2003) and Jackson (2008) found that parents perceptions towards their children inproficiency in mathematics contributes to children's anxiety in mathematics. In addition, students who experience test anxiety are more dependent on the views and expectations of their parents. Anxiety and fear to dissapoint their parents reduce their concentration, effectiveness in organize, processing and retrieving information during assessment (Peleg et al., 2003)

Parents should also be aware that math anxiety is experienced due to differences in student motivation based on gender that also comes from the perception of parents. There is strong empirical evidence linking parents or guardians influence in the issue of gender difference in motivation (Jacobs, 2004; Jacobs et al., 2005). Parents belief on their children abilities have a strong influence on children's self-confidence and their academic ability (Bleeker and Jacobs, 2004). For example, Jacobs et al. (2005) in their study show that parents belief in their children mathematics ability influence children ability. Therefore, parents who underestimate their daugther mathematics ability will likely cause them feel anxious to face failure. This may lead to the worrying situation if they feel that they can not compete with male students (Jacobs, 1992).

CONCLUSION

Math anxiety is an affective variable experienced by many students at schools. Several alternatives must be considered in minimizing this restless feeling. Mathematics knowledge and skills are required not only as an indicator for the selection of students into higher education levels but also useful in their careers and throughout life time. Accordingly, whatever elements that can hinder students' learning and mastery of mathematics knowledge and skills need to be addressed effectively. Based on the above described alternatives, we can conclude that arents and teachers or the school can play an effective role to slove this problem.

Student must be sensible in controlling extreme feeling of fear while learning mathematics. Students must change their negative attitudes towards mathematics as it will encourage mathematics avoidance situation which eventually leads to a loss of self-motivation to learn mathematics. Instead, students must nourish their positive attitude towards mathematics by socializing and engaging with support group.

Parents should trust their children mathematics abilities. They should not compare the mathematics abilities or achievement of one child with that of another. They should also avoid placing high expectations on their children. As discussed earlier, too much concern of their own mathematics abilities would burden the children in the learning process. Parents should realize that every child has his or her own abilities with regard to mathematics. Comparing their children mathematics achievement with other relatives, friends or neighbours eventually will put much burden on them and will lead to mathematics anxiety.

Finally, the intervention can be taken by teachers in school is by emphasizing problem solving in mathematics learning and practicing cooperative learning in small groups (Ma and Xu, 2004). This is because the beliefs of students towards mathematics leads to the involvement of the students in learning mathematics. Students who consider mathematics as fun usually show good performance (Deci and Ryan, 2002).

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2nd International Seminar on Quality and Affordable Education (ISQAE 2013)

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