

Impact Of Mathematics Learning in School Students perspective

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ABSTRACT

Students' mathematics performance is one of the main concerns in mathematics education. Nevertheless, many students perceive mathematics as one of the difficult core subjects to be learned. This negative thinking can be due to many factors that hinder their mathematics learning. To get a better picture of the hindering elements in students' learning, this study was therefore conducted to explore the challenges, obstacles and difficulties experienced by students in the process of mathematics learning. A qualitative research using case study design was employed. A total of 150 secondary school students comprise of form four and form two students were selected through stratified random sampling technique to complete an open ended questionnaire. The respondents were required to give their response on the challenges they encounter in learning mathematics. Content analysis was carried out by identifying the themes as the major sources of challenges, obstacles and difficulties. The results of this study have great implications for practitioners and also researchers in assisting students to deal with their challenges, obstacles and difficulties in daily school life specifically in learning mathematics.

1. Introduction

Mathematics has always been given special attention in school as the nature of the subject is related to many other fields and disciplines. Moreover, students' mathematics achievement has often been the focus and is seen as a critical global issue in many countries. Besides being perceived as a tough subject, problems in mathematics learning have also been related to the lack of regulation skills among students in learning math. Self-regulation is a broad construct which covers before, during and after phases learning. Self-regulation in learning is related to the 21st century of learning competency (Wolters, 2010) thus students who are not regulated will face difficulty to overcome the obstructions or challenges they face while learning. The rapid changes of the education system and delivery method give a huge impact to students. This situation requires students to learn effectively and in a more self-directed manner (Winters, Greene & Costich, 2008). To achieve this, students need to be trained on how to enhance their skills to choose the most appropriate learning strategy (Azevedo & Cornley, 2004). Failure of doing so will affect students' motivation to learn and eventually might diminish their interest to learn. Motivation is a very important element in the learning process as it is an inducer and propeller for one to do a task successfully. Therefore, motivation is essential for an individual to successfully face challenges in academic setting. Moreover, motivation will be used by students as the attribution or determinant to their behavior in learning and performance. Behaviors that are related to academic motivation such as the desire to do difficult tasks and stay longer in difficult situations will be the determinant for students' ability in facing daily school life challenges (Masaali, 2007). Based on the above mentioned statements, the current study was conducted to explore the daily challenges faced by students in the process of learning mathematics. This

challenges also can be obstruction and difficulties experienced by students. This is significant due to the nature of advancement of current mathematics education, delivery system and also the elements that have potentials to hinder students' mathematics learning progress.

2. Students' Attitudes Towards Learning Mathematics

Learning mathematics does not only involve thinking and reasoning, it is dependent on the attitudes of the learners towards learning and mathematics. Han and Carpenter (2014) state that attitudes consist of cognitive, affective and behavioural reactions that individuals display towards an object or the surrounding based on their feelings or interest. The cognitive component of attitude is what the individual thinks or believes about mathematics. The affective component of attitude is the feeling or emotions of the individual associated with learning mathematics. Thus, the affective component is the source of driving the engagement of students towards mathematics. Furthermore, the affective aspect is also influenced by the belief formed from the cognitive component of attitude, which creates a mindset that becomes constant over time and influences the feelings of the students towards learning mathematics. As such, the cognitive and affective components of attitude are interrelated and deeply interact with each other. The behavioural aspect of attitude is the tendency to respond in a certain way towards learning mathematics. Behavioural attitude is also influenced by affective attitude. Students' feeling confident in doing mathematics is linked with being successful in mathematics, which is regarded as a positive behaviour. If students are not confident in doing mathematics, they may not experience success, and unsuccessful behaviour is regarded as negative feelings. Hence the behavioural component of attitude impacts on the cognitive component of attitude as well. When students see the

importance of mathematics in real lives, they feel engaged, confident and connected to their learning. As such, the three components of attitude, confidence, importance of mathematics and engagement are interrelated.

An important question that arises here is how can an increased level of confidence, awareness of the importance of mathematics and engagement be achieved so that students' attitudes towards learning mathematics become more positive? Teaching mathematics in a meaningful context could be the solution. Setting mathematical problems in a context can help students see the application of mathematics. In mathematics education, a range of meanings exist for the term context. According to Gilbert (2006), a context is an event that takes place in a set environment. The learning environment is the situation context and the characteristics of the task make up the task context. In this paper, like Harvey and Averill (2012), we use the term context to refer to real-life situations. The New Zealand Curriculum states that effective learning can take place in a social and cultural context that has a positive impact on students' learning. Gallian (2010) stated that games and sports are the best way to build students' engagement and confidence in mathematics. There are a number of advantages of using a sporting context to teach mathematics as most students can relate to sports and can understand the rules and meanings that are presented to them. Students enjoy sports and show a greater level of interest when sports is applied to mathematics argues that mathematics is the science of space, number, quantity and arrangement and these four elements feature in every sport, making it the most relevant context in which mathematics can be taught. Researchers have concluded that students' attitudes play a vital role in the learning of mathematics. However, only a few studies have investigated the effects of teaching mathematics in a sporting context on students' attitudes towards learning mathematics. Most of the research investigated the effects of sports on academic outcomes.

Traditional teaching method and teaching

Many studies have identified that teaching mathematics in real life contexts enhance students' enjoyment of mathematics lessons. The relationship formed between the student and the task fosters students' engagement in the mathematical tasks. By creating, exploring and verifying mathematical ideas students tend to see the importance of mathematics. In Boaler's (2002) study, students who were taught in a traditional manner viewed mathematics as a collection of procedures. In contrast, those students who were taught in a context viewed mathematics as an active and inquiry-based discipline. Dickinson and Hough (2012) worked on a project that trialled teaching mathematics in a context. The project included the views of both teachers and students on the impact of teaching mathematics in a context.

Teaching mathematics in a sporting context

Students who are taught using a sporting context may feel that the task is more enjoyable since it is different from repetitive mathematics exercises (Reys et al., 2013). Reys et al. (2013) claim that connecting mathematics to the sports fields can provide a context for measurement, estimation and tessellation in mathematics problems. If students had played a game such as basketball, then that experience could provide a

visual model to help them decide what mathematics is needed to solve the problem. Since sports are often a part of students' everyday life (Gallian, 2010), they don't have to deal with an enormous amount of information and feel more engaged in the tasks. Students feel at ease in solving mathematical problems in context because problems can be solved at different levels and in different ways (Van Den Heuvel-Panhuizen, 2005; Widjaja, 2013). Students are often able to solve problems using their own informal strategies rather than the formal procedures they are unsure of. Students are able to represent the task using their own symbols and words before carrying out further solving and interpretation (Barnes & Venter, 2008). Recently, Boyd and Hipkins (2015) confirmed in their report, which was based on Sport in Education Programme in eight New Zealand schools, that students feel more engaged and confident being taught in a sporting context. Students who were part of this project reported an increased sense of belonging and pride in their school. Afari, Aldridge, Fraser, and Khine (2013) investigated the impact of using mathematical games on college students' attitudes towards learning mathematics. A pre-post design method was used to assess students' perception of the learning environment and their attitude towards learning mathematics. Eight classes out of 33 used a games context. The students from the classes that used games found their lessons more interactive, got involved and enjoyed learning mathematics.

Mathematics Anxiety on Mathematics Performance

Mathematics anxiety has been continually found to correlate negatively with students' mathematics performance, with correlations ranging from $-.11$ to $-.36$ (Ho et al., 2000). Hembree (1990) analysed 151 relevant studies and reported an average correlation of $-.34$ for school students whereas Ma (1999)'s meta-analysis of 26 studies revealed a correlation of $-.27$. Similar results were also reported in Asia, like in China, Taiwan, and Singapore. Chiu and Henry (1990) conducted a study with 562 children from grade 4 to grade 8 and found the correlation between anxiety and performance to be significant and negative. Interestingly, although three rating scales were used, only one was given to the entire sample. Moreover, it was odd that semester grades were not collected from all the students. In 1987, Foong carried out an exploratory study with 206 secondary four express female students from a single Singapore school. She reported that both mathematics anxiety and test anxiety correlated negatively with mathematics achievement but the relationship between mathematics anxiety and test anxiety were positive and moderately strong. However, her research was conducted more than two decades ago and the instruments were all self-reported Likert-scaled questionnaires that were unable to locate students' sources of anxiety. Hence there exist this pertinent need to assess the mathematics anxiety level in students and its association with mathematical performance.

Causes of Mathematics Anxiety

The most frequently cited cause is the teacher, identified by Foong (1987) as the main source of students' tension. Highly-tensed students dread presenting solutions in front of their classmates, viewing such situations as threatening (Ashcraft, 2002). Teachers who complained of insufficient instructional time might resort to preparing their students for

assessment rather than for understanding. This creates more tension when students encounter unconventional problems or when the mathematics becomes more advanced. Researchers also claimed that anxious teachers spend lesser time teaching mathematics and are more likely to pass their phobia to their students (Hembree, 1990; Ma, 1999). Like teachers, parents could also pass their dread of mathematics to their children (Hembree, 1990). Parents who are overly-concerned about results end up pressurizing their children, more so in Asian countries. Then there exists this myth that mathematical ability is inborn or hereditary (Godbey, 1997). Others believed that females are weaker in mathematics even though researchers (Hembree, 1990; Ho et al., 2000) have found that though females tend to be more anxious, they are not necessarily weaker in mathematics. Studies on the impact of teaching methods have been inconclusive. Norwood (1994, as cited in Preston, 2008) argued that traditional methods intensified students' anxieties though he found that college students who were weak in mathematics were more at ease with lecture-based teaching. Newstead (1998) claimed that students were more nervous working in groups and Preston added that as most teachers were recipients of direct instruction, they might not enjoy teaching in the constructivist way. Next, mathematics has been viewed as an inherently difficult subject. Many students are unable to see its practicality and teachers seldom attempt to make the connections. Foong (1987) explained that due to its cumulative and sequential nature, when students missed out something along the way, it is likely that they may never fully comprehend it. Furthermore, some students have repeatedly performed poorly, leading to loss of self-confidence and increased tension. There are others who believe that mathematics is a measure of their intelligence (Puteh, 2002) and are embarrassed by their inadequate performance. Lastly, student cohesiveness within a class has been found to have a significant positive correlation with mathematics anxiety level (Taylor & Fraser, 2003). The literature review has underlined the multi-faceted and varied nature of the origins of mathematics anxiety, thus supporting the research aim to diagnose our students' anxieties.

3. Conclusion

Pressure seems to be the common challenge faced by the students in their daily learning process for the mathematics subject. Specifically, the pressure may come from teacher, school or family members who place very high expectations for students to excel in mathematics. Additionally, competitive pressure from peers and friends also contributes to students' anxiety in learning mathematics. Therefore, all parties including students need to have a good mechanism to control and minimize the pressure. Too much emphasis on the importance of getting excellent results in examination potentially makes the students to experience worry. However, it should be done to some extent by using the fear appeal elements. The use of fear appeal elements on student evaluation is believed can motivate the students to learn harder especially for less hardworking students. This can be done when teachers or parents executing it together with the explanation on the significance of evaluation for the students' future education and career prospect (Putwain & Roberts, 2009). With regard to delivery, mathematics teachers should consider alternative methods of delivery which can boost students' motivation to continue studying mathematics. Teachers need to make sure that their students see the value of each mathematical task or activity assigned to them. When the students appreciate the tasks, they will be more persistence and will be more willing to stay longer in completing the mathematics activities (Martin, 2001) because they noticed the importance of mathematics in their life. In addition, this is also an effective way in answering questions from students regarding the purpose of learning particular topics in mathematics which they feel are not useful for their future. Meanwhile, parents should put more emphasis on encouraging and motivating their children rather than setting very high expectations. Besides, teachers need to be aware of their students' individual ability in learning mathematics. They must provide supportive learning environment to allow students to learn comfortably. Finally, the students must be trained to develop a positive attitude and perception towards mathematics. This is very important because their actions are influenced by their thinking. In conclusion, all the challenges, obstacles and difficulties in learning mathematics should be addressed properly so that students can endure in the daily mathematics learning progress.

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