Anxiety in Mathematics Learning Among Secondary School Learners: A Comparative Study between Tanzania and Malaysia

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Abstract

Mathematical anxiety affects all aspects of teaching and learning mathematics. This study aimed to compare mathematical anxiety levels and its impacts on performance between Malaysia and Tanzania secondary schools mathematics learners. The study was performed using correlation survey. The instrument used to measure students mathematics Anxiety was Mathematics anxiety scale 24- Item MARS-A from 98-item MARS-A. The t-test results revealed that there were higher mean scores in test related anxiety in Malaysian students (2.56) than Tanzanian students (2.33) suggesting that the Malaysian students are more anxious than Tanzanian students. The results also showed no significant difference between gender and mathematical anxiety in both countries. Furthermore, the findings showed that the senior students (form 3) were more feared mathematics compared to junior students (form 1) in both countries. Interestingly, almost all results revealed negative and significant correlation between anxiety and students grades in Malaysia and Tanzania. This study suggests that the students’ performances are impacted with mathematics anxiety. This paper contributes important information for mathematical anxiety and achievement which is a key challenge in educational arena, developing nations in particular.

Keywords: Anxiety; Learning; Achievements; Gender; Tanzania; Malaysia

1. Introduction

Ministry of Education Malaysia (2002) stated that the teaching and learning of mathematics are vital in concept building and skill acquisition as well as the inculcation of good and positive values. Therefore, the Curriculum Development Centre has arranged the mathematics curriculum in such a way to enable teachers to implement an enjoyable, meaningful, useful and challenging teaching and learning environment. At the same time, it is importance to ensure students show progression in acquiring the mathematical concepts and skills. In addition, the following have to be taken into consideration in teaching primary and secondary mathematics (Ministry of Education Malaysia, 2002, p. 4):

- The skills or concepts to be acquired in the learning area or certain topics;
- Ensuring the hierarchy or relationship between learning areas or topics has been followed accordingly; and
- Ensuring the basic learning areas have been acquired fully before progressing to more abstract areas.
Thus it can be observed that mathematical basic skills or concepts acquired in lower form are vital for students to progress to upper form in secondary school. However, although much pedagogical considerations were being given in the teaching and learning of mathematics, generally mathematical performance of secondary school students have yet to be improved. Yet the importance of mathematical knowledge and skills is inarguably pertinent as it touches many aspects of life. Mathematical knowledge and the ability to use this knowledge are critical in pursuing or entry into occupational fields. Whilst pedagogical factors are emphasized in increasing mathematical performance among learners, myriads other psychological, cognition, environmental, social factors may need to given due emphases. Psychologically, factors such as beliefs, attitudes, motivation, regulation of learning, learning styles, cognitive styles anxiety, self-efficacy and alike have been shown contributing to mathematical performance. Therefore this study will focus on mathematical anxiety in understanding of teaching and learning mathematics.

Mathematics anxiety seemed to be a problem to many learners. Mathematics anxiety is defined as a discomfort state created when students are required to perform mathematical tasks (Cemen, 1987). Main characteristics of this discomfort state include dislike, worry, and fear, with specific behavioural manifestations such as tension, frustration, distress, helplessness, and mental disorganization when handling mathematical tasks (Richardson & Suinn, 1972). Moreover, feelings of anxiety can lead to panic, tension, helplessness, distress, shame, inability to cope, sweaty palms, nervous stomach, difficulty breathing, and loss of ability to concentrate (Posamentier & Stepelman, 1990).

Mathematics anxiety has affected all aspects of mathematics teaching and learning directly or indirectly. Mathematics anxiety could develop as a result of students’ prior negative experiences learning mathematics in the classroom or at home (Rossman, 2006). Thus teachers should play an important role in reducing the level of mathematics anxiety among their students. Parents and educators alike may be the source for learned response of children with mathematics anxiety. Lending support and providing positive mathematics learning environment may alleviate mathematical anxiety among learners (Shields, 2006).

On the other hand, there is no general consensus among the scholars on its causes and effects. In fact, mathematics anxiety is more than a dislike toward mathematics (Vinson, 2001). Thus, it should be regarded from a larger perspective as a complex construct of “affective, behavioral and cognitive responses to a perceived threat to self-esteem which occurs as a response to situations involving mathematics. Mathematics anxiety has been found to be related to a range of concerns and problems in the learning of mathematics.

Massive failure of mathematics subject is a global issue as well as a critical issue in developing nations such as Malaysia and Tanzania. Malaysian education system is more advanced compared to Tanzania, modern teaching facilities and ICT are not uncommonly used in mathematics learning-teaching processes (Keong et al, 2005). However, anxiety remains a key factor affecting mathematics achievement in Malaysian secondary schools (Zakaria and Nordin, 2008; Davrajoo, 2007). Tanzanian mathematics and science students face a serious shortage of qualified teachers, reference books and technology. To date, this is the first study examining the impact of anxiety on mathematics learners in Tanzania. The main objective of the study was to compare aspects of mathematics anxiety between Malaysian and Tanzanian secondary learners and their influence on students’ mathematics performance. The findings will help to improve understanding of mathematics learning with regards to mathematics anxiety in developing nations.

2. Methodology

A correlational survey study was employed. The instrument used to measure mathematics anxiety is Abbreviated 24- Item MARS-A from 98-item MARS-A which was adopted from Richardson and Suinn (1982). The self-reported questionnaire to assess students level of anxiety towards mathematics learning consist of four subscales namely mathematics learning anxiety, general anxiety and test-related anxiety. A four-point Likert scale (1 = strongly disagree to 4 = strongly agree was used to assess learners’ agreement with activities related to mathematics learning. Cronbach's Alpha reliability index for anxiety measurement was 0.83, thus considered rather high based on Cohen’s rule.
The target population for this study was secondary school students who are taking Mathematics as a compulsory subject in secondary education in Zanzibar, Tanzania and Kuala Lumpur, Malaysia.

Descriptive and inferential analyses were conducted utilizing the PASW 18 statistical software. Throughout the data analyses, alpha level of 0.05 was used as priori.

3. Results and Discussion

3.1 Description of mathematical anxiety of Tanzanian and Malaysian students

This study assess mathematical anxiety based on four sub-categories viz-a-viz (teaching anxiety, general anxiety, test anxiety and overall anxiety). Table 1 shows the mean scores for each anxiety subscale between Malaysia and Tanzania. Malaysia schools learners showed a relatively high mean of 2.56 (SD = 0.65) compared to Tanzania 2.33 (SD = 0.75) in test related anxiety. There was significant difference in test-related anxiety between learners of the two countries t (410) = 3.43, p = .001. However there were no significant differences in mean scores on mathematics learning anxiety, general anxiety and the overall anxiety measure between learners of the two countries. The findings indicated that Malaysian students have higher level of anxiety compared to Tanzania students and significantly on test related anxiety.

Contrary to Tanzania, Malaysian schools have shifted from traditional teaching method to integration of new technology for enhancing student understanding of basic concepts in mathematics. It is reasonable to assume that Malaysia students might experience both technological and mathematics learning anxiety. It was argued that the level of anxiety that is initially evoked by a technology-based learning environment may be somewhat higher than when the same task is presented in a conventional manner (Sieber et al, 1977). Another possible explanation of higher mathematics anxiety among Malaysian students is that they were more aware on difficulties of mathematics compared to Tanzanian students. Other explanations may be highlighted are learning environment, curriculum, and each nation target performance as encultured in the school learning environment.

Table 1: Comparison of overall anxiety and three subscales of anxiety between Malaysia and Tanzania

| Variables               | Group     | N    | M    | SD   | SE   | t     | Sig. Value |
|------------------------|-----------|------|------|------|------|-------|------------|
| Learning anxiety       | Malaysia  | 202  | 1.85 | .57  | 202  | -.290 | .77        |
|                        | Tanzania  | 219  | 1.87 | .68  | 219  |       |            |
| General anxiety        | Malaysia  | 203  | 1.61 | .65  | .045 | .176  | .86        |
|                        | Tanzania  | 217  | 1.60 | .73  | .05013 |      |            |
| Test-related anxiety   | Malaysia  | 202  | 2.56 | .65  | 202  | 3.430 | .00        |
|                        | Tanzania  | 214  | 2.33 | .75  | 214  |       |            |
| Overall anxiety        | Malaysia  | 201  | 2.08 | .50  | .03577 | 1.522 | .12        |
|                        | Tanzania  | 205  | 2.00 | .60  | .04229 |      |            |
3.2 Gender and mathematical anxiety among Tanzanian and Malaysian students

Results presented in Table 2 & 3 show the impact of gender on mathematics anxiety among learners in secondary schools in Tanzania and Malaysia. Findings indicated that there were no significant differences (p> 0.05) between male and female students in Tanzania on their overall anxiety [ t (203) = -.43], learning anxiety [ t (217) = .59], general anxiety [ t (215) = .04] and test-related anxiety [ t (212) = -.90 ]. These findings indicated that mathematics anxiety and its subscales are not gender biased. Similar findings were reported among learners in secondary schools (Karimi and Venkatesan, 2009; Zaslavsky, 1994). However there is significant impact of gender on general anxiety among Malaysian learners [ t (201) = 2.02, p< .04 ]. Otherwise, there is no differential impact of gender on the overall anxiety, learning and test-related anxiety measures.

Table 2: Differences by gender in Tanzania

| Variables                | Group   | N   | M    | SD   | SE   | t     | Sig. Value |
|--------------------------|---------|-----|------|------|------|--------|------------|
| Learning anxiety         | Male    | 109 | 1.90 | .74  | .07  | .59    | .55        |
|                          | Female  | 110 | 1.84 | .63  | .06  | .59    | .55        |
| General anxiety          | Male    | 106 | 1.60 | .77  | .07  | .04    | .96        |
|                          | Female  | 111 | 1.59 | .70  | .06  | .04    | .96        |
| Test-related anxiety     | Male    | 104 | 2.28 | .77  | .07  | -.90   | .36        |
|                          | Female  | 110 | 2.37 | .74  | .07  | -.90   | .36        |
| Overall anxiety          | Male    | 100 | 1.98 | .63  | .06  | -.43   | .66        |
|                          | Female  | 105 | 2.02 | .57  | .05  | -.43   | .66        |

Table 3: Differences by gender in Malaysia

| Variables                | Group   | N   | M    | SD   | SE   | t     | Sig. Value |
|--------------------------|---------|-----|------|------|------|--------|------------|
| Learning anxiety         | Male    | 98  | 1.87 | .59  | .06  | 0.50   | .61        |
|                          | Female  | 104 | 1.83 | .55  | .05  | 0.50   | .61        |
| General anxiety          | Male    | 99  | 1.70 | .70  | .07  | 2.02   | .04        |
|                          | Female  | 104 | 1.52 | .58  | .05  | 2.02   | .04        |
| Test-related anxiety     | Male    | 99  | 1.70 | .70  | .07  | -1.58  | .11        |
|                          | Female  | 104 | 1.52 | .58  | .05  | -1.58  | .11        |
| Overall anxiety          | Male    | 97  | 2.08 | .53  | .05  | -0.20  | .84        |
|                          | Female  | 104 | 2.09 | .48  | .04  | -0.20  | .84        |
3.3 Level of students and mathematics anxiety among Tanzanian and Malaysian students

Table 4 and 5 present the levels of mathematics anxiety of learners from two different level that is, the Form One learners versus the Form Four learners in Tanzania and Malaysia, respectively. Interestingly, the high score means were found among Form Three students compared to Form One (fresher) in Tanzanian schools in all anxiety subscales. Furthermore, there was a significant difference (p < 0.01) between Form One and Form Three in test related anxiety.

In the case of Malaysia schools, similar trends have been observed. Relatively high mean scores were associated with the Form Three students. Additionally, except for general anxiety, the remaining anxiety subscales (learning, test-related and overall anxiety) indicated significant difference (p<0.01) between the two forms. These findings suggest that senior students have more fear on mathematics compared to junior students in both countries. The results also clearly showed that the difference between Form One and Form Three is more pertinent in Malaysia than Tanzania. This difference might be contributed differential learning environment between the two countries, possibly with regards to curriculum, pressure to succeed and impacts mathematical knowledge on the real–life situations. We presumed that Malaysian students are more challenged as compared to Tanzanian students.

Table 4: Differences by level of students in Tanzania

| Variables         | Group   | N   | M    | SD   | SE  | t   | Sig. Value |
|-------------------|---------|-----|------|------|-----|-----|------------|
| Learning anxiety  | Form 1  | 112 | 1.78 | .66  | .06 | -1.99 | .04        |
|                   | Form 3  | 107 | 1.96 | .70  | .06 |     |            |
| General anxiety   | Form 1  | 109 | 1.55 | .71  | .06 | -1.02 | .30        |
|                   | Form 3  | 108 | 1.65 | .75  | .07 |     |            |
| Test-related anxiety | Form 1  | 112 | 2.19 | .67  | .06 | -2.69 | .00        |
|                   | Form 3  | 102 | 2.47 | .82  | .08 |     |            |
| Overall anxiety   | Form 1  | 107 | 1.90 | .55  | .05 | -2.55 | .01        |
|                   | Form 3  | 98  | 2.11 | .64  | .06 |     |            |

Table 5: Differences by level of students in Malaysia

| Variables         | Group   | N   | M    | SD   | SE  | t    | Sig. Value |
|-------------------|---------|-----|------|------|-----|------|------------|
| Learning anxiety  | Form 1  | 98  | 1.73 | .49  | .05 | -2.958 | .00        |
|                   | Form 3  | 104 | 1.96 | .61  | .06 |     |            |
| General anxiety   | Form 1  | 99  | 1.51 | .55  | .05 | -2.130 | .03        |
|                   | Form 3  | 104 | 1.70 | .72  | .07 |     |            |
| Test-related anxiety | Form 1  | 99  | 2.44 | .63  | .06 | -2.732 | .00        |
|                   | Form 3  | 103 | 2.68 | .64  | .06 |     |            |
| Overall anxiety   | Form 1  | 98  | 1.97 | .46  | .04 | -3.325 | .00        |
|                   | Form 3  | 103 | 2.20 | .51  | .05 |     |            |
3.4 Relationship between mathematics anxiety and its subscales with students' grades

Table 6. Correlation matrix of anxiety subscales and students' grades (bolded = Malaysia; unbolded = Tanzania)

| Spearman's rho | Learning anxiety | Test-related anxiety | General anxiety | students' grade |
|----------------|------------------|----------------------|-----------------|-----------------|
| Correlation   | 1.000            | .716**               | .467**          | -.333**         |
| Coefficient   |                 |                      |                 |                 |
| Sig. (2-tailed)|                 | .000                 | .000            | .000            |
| N              | 219              | 210                  | 213             | 219             |
| Correlation   | .573**           | 1.000                | .311**          | -.255**         |
| Coefficient   |                 |                      |                 |                 |
| Sig. (2-tailed)|                 | .000                 | .000            | .000            |
| N              | 201              | 214                  | 209             | 214             |
| Correlation   | .459**           | .280**               | 1.000           | -.123           |
| Coefficient   |                 |                      |                 |                 |
| Sig. (2-tailed)|                 | .000                 | .000            | .070            |
| N              | 202              | 202                  | 217             | 217             |
| Correlation   | -.316**          | -.266**              | -.303**         | 1.000           |
| Coefficient   |                 |                      |                 |                 |
| Sig. (2-tailed)|                 | .000                 | .000            | .000            |
| N              | 202              | 202                  | 203             | 223             |

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6 shows the correlation index of mathematics anxiety with students' grades between Malaysia and Tanzania. In Malaysia the students' grades were negatively significantly correlated (p < 0.01) with all subscale anxiety i.e learning anxiety (r = -0.31), test anxiety (r = -0.26) and general anxiety (r = -0.30). For Tanzania schools the students' grades were negatively significantly correlated (p < 0.01) with teaching anxiety (r = -0.33) and test anxiety (-0.25) (p < 0.01). Contrary to Malaysian, the Tanzanian learners grades was not significantly correlated with general anxiety (r = -0.12, p > 0.01). The results clearly demonstrate that the more anxiety student have the more they fail mathematics. Furthermore, the findings reveal that the Malaysian students are more anxious compared to Tanzanian students. The obtained data from this study highlight that anxiety has significant impacts in mathematics achievement in both countries.

4. Conclusions and recommendations

The study presents the status of mathematics anxiety among secondary school learners between Malaysia and Tanzania. Relationship between gender, mathematics anxiety and students grades have also been examined. Based on the findings the following conclusions are drawn;

i. Malaysian students showed comparatively more anxious on mathematics compared to Tanzania students.

ii. Students' performances from both countries are significantly affected by psychological factors, in particular anxiety.

iii. Gender status did not show significant influence on mathematics anxiety in Malaysia and Tanzania.
iv. The senior students (Form Three) showed relatively high level of anxiety compared to junior students (Form One) in both countries.

v. There is a great need to conduct more studies in order to explore more regarding to other factors such as learning/teaching techniques on mathematics anxiety in relation to mathematics performance in developing Nations.

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