

Investigating Math Self-Efficacy and Math Anxiety Regarding Gender, A-Level Math Entry Grade and Mathematics Achievement

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Abstract

Although mathematics is perceived as an indispensable pre-cursor to success in modern society, many students still grapple with a genuine fear of mathematics and feel anxious when engaging in mathematical tasks. One of the affective factors that can affect math anxiety is learners' belief in their own ability which is termed self-efficacy. In this study we aimed to investigate how math anxiety and math self-efficacy varied across gender, A-level math entry grade and recent mathematics score and how math anxiety and math self-efficacy related in the context of students in Mayuge District, Uganda. We collected data from 60 advanced level (A-level) mathematics students from two secondary schools in Mayuge District. Their study of mathematics was not compulsory but rather by choice. The participants filled a Mathematics Self-Efficacy and Anxiety Questionnaire (MSEAQ). Data were analyzed using descriptive statistics, independent sample t tests, one-way ANOVA, Pearson's Linear Correlation Coefficient (PLCC) and linear regression. Descriptive statistics indicated a high level of math self-efficacy and a low level of math anxiety among the students. Independent sample t tests revealed no gender differences in math self-efficacy and math anxiety and ANOVA suggested no differences in math self-efficacy and math anxiety for the A-level math entry grades and recent mathematics scores. PLCC revealed a strong significant negative linear correlation between math self-efficacy and math anxiety with $r = -0.782$. Meanwhile, regression analysis suggested that math self-efficacy explained 60% of math anxiety among A-level students in Mayuge District. A recommendation was made.

Keywords: Entry Grade, Gender, Math Achievement, Math Anxiety, Math Self-Efficacy

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1. Introduction

Although mathematics is perceived as an indispensable pre-cursor to success in modern society, it is every so often regarded as one of the most difficult subjects at school. Many learners still grapple with a genuine fear of mathematics and feel anxious when engaging in mathematical tasks (Maloney, Waechter, & Fugelsang, 2012). Richardson and Suinn (1972) defined math anxiety as a feeling of "tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in a wide array of ordinary life and academic situations" (p. 551). Khatoon and Mahmood (2010) revealed that math anxiety occurs almost at all levels of education and concerns with negative views that develop in society. Thus, learning mathematics depends on the learners' point of view (Siswanti & Djalal, 2017). According to Ashcraft and Kirk (2001) "anxiety reaction involves attention to a preoccupation with intrusive thoughts or worry" (p. 236). Math anxiety causes students to avoid mathematics, mathematics classes, and mathematics related courses (Ashcraft, 2002). Gleason (2008) maintains that math anxiety also causes learners difficulty to learn and apply mathematical concepts, turning into a dislike and avoidance of the subject. However, there are cognitive factors that contribute to the difficulty or ease that learners experience in doing mathematics tests or courses and performing mathematics-related tasks (Olango, 2016). Consequently, in addition to cognitive domains, affective domains play a crucial role in performing mathematical tasks and these also affect mathematics learning, performance and interest in pursuing STEM majors and careers (PISA, 2012).

One of the affective factors that can affect math anxiety is learners' belief in their own ability which is termed self-efficacy (Tudy, 2014). Self-efficacy, which is defined as "beliefs in one's capabilities to organize and execute the course of action required to produce given attainments" (Bandura, 1997, p. 3) has consistently been shown to be low in highly math anxious individuals. Bandura (1992) argues that self-efficacy beliefs and individuals' beliefs about their competencies evolve during early childhood as the children encounter different experiences, obstacles, new tasks or difficult situations. Thus, Jameson and Fusco (2014) hypothesized that self-efficacy plays a role in the development of math anxiety, as individuals high in math anxiety tend to be low in this construct as well. Although mathematics is regarded as a cognitive discipline, the affective dimension should not be ignored, thus understanding the nature of motivational and emotional constructs and their relationships with demographic