

## **A Path Model for Mathematics Achievement and Sources of Self-Efficacy**

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Researchers have constructed a number of models and confirmed that mathematical achievement is a result of inter-relation between a number of complex processes. These researchers have also pointed out that mathematics self-efficacy or students' belief in their ability to solve mathematical problems lead them to achieve good results and also they become masters in problem solving. Furthermore, Bandura (1986, 1994) points out four major sources of self-efficacy beliefs, namely, master experience, vicarious experience, verbal persuasion and physiological state. The specific objectives of this study were to examine the nature of mathematics achievement of G.C.E. (O/L) students, to examine the nature of sources of mathematics self-efficacy, to build a model between mathematics achievement, master experience, vicarious experience, verbal persuasion and mathematics anxiety.

This study was carried out by using a systematically selected sample (n=1397) which represented all the variables and adopting a multi-stage sampling method. Also, it was proved that the scales, which obtained data for the research, such as sources of mathematics self-efficacy scale (SMSES) and mathematics achievement test (MACH), have high reliability and validity.

The dependent variables being studied were the four sources of self-efficacy. The independent variable was mathematics achievement. To find the coefficients for those paths a multiple regression analysis was conducted. The specified parameter between expectation and mastery experience was significantly large, even though three other sources of self-efficacy were present. With respect to the predicted direct paths, mathematics achievement was significantly and positively predicted by mastery experience ( $\beta = 0.651$ ,  $t = 19.998$ ), verbal persuasion ( $\beta = 0.107$ ,  $t = 3.239$ ), but the effect of vicarious experiences ( $\beta = -0.110$ ,  $t = -4.314$ ), mathematics anxiety ( $\beta = -0.083$ ,  $t = -3.863$ ) were significantly and negatively predicted. The predicted accounted for 51% of variance in mathematics achievement. With respect to the predicted direct paths, mastery experience was significantly and positively predicted by vicarious experiences ( $\beta = 0.187$ ,  $t = 9.178$ ), verbal persuasion ( $\beta = 0.598$ ,  $t = 27.227$ ) But, the effect of mathematics anxiety was negatively significant ( $\beta = -0.174$ ,  $t = -10.24$ ).

The results of the path analysis revealed that mastery experience and verbal persuasion have positive and significant direct impact on mathematics achievement. But, it was proved that vicarious experiences and mathematics anxiety have negative significant direct impact on mathematics achievement. Also vicarious experiences and verbal persuasion have positive and significant indirect impact on mathematics achievement. But, mathematics anxiety has negative and significant indirect impact on mathematics achievement. The findings of the research provided evidence that by giving mastery experience, vicarious experiences and verbal persuasion to students, their mathematics achievement could be improved.