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FACTORS AFFECTING EIGHTH GRADE STUDENTS' MATHEMATICS ACHIEVEMENTS IN TIMSS 2015 IN ABU DHABI EMIRATE

by

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Abstract

This study aimed to identify the factors affecting mathematics achievement of Abu Dhabi 8th grade students in Trends in International Mathematics and Science Study (TIMSS, 2015) and to determine mathematics teachers' perceptions of TIMSS in Abu Dhabi Emirate schools. The study sample consisted of 4838 students in 8th grade (2172 girls, 2666 boys), 220 teachers from Abu Dhabi, who attended TIMSS 2015, and 156 principals from the respective schools. Study data was obtained from TIMSS 2015 students, teachers, school questionnaires, as well as cognitive test scores for mathematics. Additional data from 522 mathematics teachers from Abu Dhabi was gathered through a perception questionnaire to examine their perception of TIMSS in four areas viz. Mathematics Teachers' Practices and TIMSS, Mathematics and Instruction, Readiness of Students for TIMSS, and School and Classroom Environment.

Principal component analysis (PCA) was applied to reduce the number of item-wise variables into a few composite variables for students, teachers, and school questionnaires from TIMSS 2015. Prior to further analyses, the suitability of the PCA was assessed. Correlation matrix inspection showed that all the variables had one correlation coefficient greater than 0.7. The Kaiser-Meyer-Olkin (KMO) overall measures were 0.77 for the school questionnaire, 0.94 for the student questionnaire, and 0.88 for the teacher questionnaire, and Bartlett's sphericity test was statistically significant ($p<0.05$), indicating that it was likely that the data could be factorized. The five factors from the school questionnaire were General School Resources, School Discipline and Safety, Parental Support, Principal Experience and Education, and Library and Instruction Resources. The five factors from the student questionnaire were Mathematics in School, Students' Safety and Behavior, Attitude towards Mathematics, School and Classroom Environment, and the effect of Internet and Tablets (Technology for Students). The factors from the teacher questionnaire were - School Emphasis on Academic Success, Teaching Mathematics to the TIMSS Class, Resources and Time, Mathematics Topics Taught to TIMSS and Mathematics Assessment of TIMSS. Multiple regression models have been implemented. The models are statistically significant, indicating that it is suitable for the data. This also demonstrates a significant linear relationship between students' achievement in TIMSS and the variables and factors related to students, teachers, and school-related factors. In the meantime, basic diagnostic tests such as the normality test, the autocorrelation test, the heteroscedasticity test, the multicollinearity test, and the outliers test were carried out, and all conditions were satisfactorily met, making the results of the model robust, valid, and not misleading.

One-Sample T-tests, Independent Sample T-tests, and ANOVA tests were performed for each component variable of teacher perceptions. The results showed a statistically significant difference in the overall perception of TIMSS-related practices by teachers. The independent T-test showed no significant difference between male and female teachers in mathematics teaching practices of TIMSS, and neither were their perceptions of student readiness of TIMSS significantly different. The result, however, showed they had significantly different perceptions of the school and classroom environment. In addition, statistically, results showed no significant difference between public and private schools in the practice of mathematics teachers for TIMSS. Still, the difference was significant in views regarding student readiness for TIMSS and the school and classroom environment. Performance indicators showed that students' results in TIMSS tended to fall annually. Thus, there is a need to enhance and improve activities related to the student, teacher, and school-related factors by creating an ideal learning environment for students to improve their academic achievement in TIMSS.

Keywords: Multiple regression model, ANOVA, T-test, PCA, TIMSS, Eighth Grade, Mathematics Achievement, TIMSS 2015.