

Abstract

The Impact of Using A concrete and Semi- concrete Model in Teaching an Algebra Unit upon Students' Achievement and Motivation

The current study aimed at identifying the impact of using the “Hands-On Equations Model” in teaching an Algebra Unit for grade six students, upon their achievement in algebra, and their motivation to learn mathematics. The model is based on using concrete form activities (through the balance), and semi-concrete form activities (through an image of the balance)

The sample of the study consisted of four female grade six sections from Ramallah area, during the scholastic year 2013- 2014. These sections were divided into an experimental group (two sections) and a control group (two sections).

The study attempted to answer the following two main questions:

1) What is the effect of using the "Hands-On Equations Model", in its concrete and semi- concrete forms, to teach grade six students an Algebra Unit upon their achievement in Algebra. 2) What is the effect of using the “Hands on Equations” Model in teaching an Algebra Unit upon students' motivation towards learning mathematics. In order to answer the previous questions, the researcher used three instruments. The first instrument was a post-test which aimed at assessing achievement in an Algebra Unit. The second instrument was a Likert type scale which aimed at assessing students' motivation to learn Mathematics and it was only applied to the experimental group before and after the experiment. A significant growth in the motivation of students in the experimental group was observed. The third instrument

was an interview with some students and aimed at revealing the strategies used by children in confronting difficulties in solving equations.

The instruments' validity of the first and second instruments was established through reviewing it by twenty graduate students in education, and two professors of education. The researcher used the test and re-test method to assess the reliability of the first instrument (the achievement test), and found that the correlation coefficient was 0.75. Statistical analysis for the second instrument (the motivation scale) showed that the questionnaire's internal consistency (Cronbach Alpha) was 0.78. Both reliability values are acceptable in Experimental Research.

The researcher used students' scores in the standardized test conducted by the Directorate of Education at the end of the first semester (2013-2014), as an alternative to a pre-test, in order to establish the equivalence of the experimental and control groups. The performed t-test showed that both groups were equivalent.

Post- test data were statistically analyzed using SPSS, and it was found that the "Hands-On Equations Model" had a significant positive effect on learners' achievement in Algebra. The study also showed that using the model had significantly increased students' motivation towards learning mathematics. It was also found that the learners in the experimental group showed higher abilities in solving higher-order thinking questions, and made a better connection of mathematics to real life situations. The interviews with some selected students showed that children of the experimental group had an advantage on their counterparts in confronting difficulties in solving equations and could overcome them by resorting to representations.

The researcher recommends that the concrete and semi-concrete activities embedded in the “Hands-On Equations Model”, be used at the initial stages of teaching basic algebraic concepts in general, and in teaching equations in particular. It is recommended that each school be provided with several copies of the model, and that teachers be trained in implementing relevant activities. The researcher recommends conducting further studies on the use of the “Hands-On Equations Model” in remedial work involving equations, at grade levels higher than grade six.