

## **ABSTRACT**

Common Errors on Basic Algebraic Concepts and Thinking Strategies Associated with these Errors of Students in Eighth and Tenth Grades in Jerusalem

This study aimed at identifying common errors in basic algebraic concepts, and their patterns of occurrence in grades 8 and 10. It also aimed at identifying the thinking strategies associated with these errors and the extent to which these errors persist, when the same problems or similar problems are presented to children for the second time.

In specific terms, the study tried to answer the following questions:

- 1-What are the common errors and what are the patterns of their occurrence on basic algebraic concepts in grades 8 and 10?
- 2-What are the thinking strategies associated with these common errors in grades 8 and 10?
- 3-To what extent, do these common errors persist, upon presenting the same or similar problems for the second time?

In this study, both quantitative and qualitative methodologies were used. The sample consisted of 529 male and female students comprising 20 classes of grades 8 and 10.

Two instruments were used in answering the research questions: (1) A written test on basic algebraic concepts was constructed by the researcher, and consisted of two parts, one for grade 8 and the other for

ط

grade 10; (2) Individual interviews for 10 students from each of grades 8 and 10 were performed. These were randomly selected from those who had common errors on several items of the test.

The aim of the interview was to find out what thinking strategies accompanying the common errors, were used by children in solving tasks on basic algebraic concepts. Moreover, the extent to which these errors are stable was explored.

Results of the study showed the existence of a large number of common errors on basic algebraic concepts, made by students in grades 8 and 10. The study provided extensive lists of common errors, and their frequencies on several algebraic concepts, made by Palestinian students. The most common errors were the use of incorrect characteristics of the algebraic system, or misapplication of correct principles or procedures, mixing between concepts, using incorrect generalizations, and performing incomplete solutions.

The common errors were classified into four categories: conceptual errors, errors of generalization, procedural errors, and other miscellaneous errors called “other errors”.

Conceptual errors ranked highest among the common errors in grades eight, while errors of generalizations ranked highest in grade ten, followed by conceptual errors. “Other errors” were the least in both grades 8 and 10.

Results showed that more than 75% of students who were interviewed persisted on using the same strategies, which led them to make the common errors.

It was concluded that the students' thinking strategies, which led to those errors, were deeply rooted in their cognitive structures. It was also noted that that the level of their persistence on giving the same incorrect strategies was very high in both classes, and ranged between 50% to 100%. In the few cases when students changed their strategies during the interview, they adopted a correct strategy or solution.

This study recommends conducting more research in order to explore reasons behind this huge number of errors, and find out methods of addressing them.