Abstract

Problem posing is of central importance in mathematical thinking. Several distinguished reports, concerned with curriculum development in mathematics education, have emphasized the significance of problem posing, and suggested introducing activities, which will promote children's ability to pose problems.

The purpose of this study was to examine the influence of mathematical knowledge and creative thinking on mathematical problem posing. A group of 48 tenth grade students from Al-Maamunieh school in Jerusalem formulated a sequence of problems from a given situation described in a story form.

The posed problems were studied in two ways:

1) The quantitative analysis focused on the problem-posing product.
2) The qualitative analysis focused on the problem-posing process.

Students' mathematical knowledge and creative thinking were determined through the national tenth grade mathematical test, and the verbal form of the Torrance test (level A), respectively.

Four groups of 16 subjects each (high or low in either mathematical knowledge, or creative thinking) were formed for quantitative and qualitative analysis.

The quantitative analysis focused on the differences in posed problems between the high and low groups of students,

and between the interaction of the four groups. While the qualitative analysis focused on the processes used by the high and low groups in problem posing.

Results of t-Tests and ANOVA Tests indicated that mathematical knowledge influences problem posing for subjects with high mathematical knowledge in two categories of problem types: problems with sufficient data, and problems with modified source of information.

Overall, no significance differences ($\alpha = 0.05$) were found between the high and low creative thinking groups. The interaction between mathematical knowledge and creative thinking was found not significant ($\alpha = 0.05$).

Qualitative analysis indicated that the group with higher mathematical knowledge, group produced clusters of more interrelated sets of problems. Also, students in this group did not follow any pattern in their posing process; sometimes they started from the less mathematical or linguistic complicated problems to the more complicated ones, and sometimes the opposite.

The qualitative differences between the high and low creative thinking groups were small, because they have followed the same pattern in their problem posing linguistic complexity, and the high creative thinking group posed more problems with interrelated relations, and followed a pattern in their problem posing mathematical complexity, while the low group did not follow any pattern.

One contribution of this study was introducing an instrument for an evaluating problem posing. The recommendations of this study were presented in two parts: promoting problem

posing in mathematics curriculum, and presenting questions for further research.