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A NEW APPROACH WHEN COMPREHENDING THE ORDER OF OPERATIONS IN MATHEMATICS INSTRUCTION: MNEMONI

ABSTRACT

The aim of this research is to investigate the effect of the mnemonic device (When You Get Money You Can Quickly Go On a Vacation), which was developed by Oksuz (2009) over students' success and to find out students' solution strategies when solving problems requiring the use of order of operations rule.

This research has been structured as a mixed research model including both qualitative and quantitative research methods. This model mixes the results from both quantitative study, which was modeled as a quasi-experimental pretest-posttest design with a control group and qualitative study, which was carried out through using clinical interviews to find out students' solution strategies when solving problems requiring the use of order of operation rules. To find out students' success on problems consisting of order of operations, a success test was used as data collection instrument, which was developed by the author of this research, and data collection and data analysing procedures have been done congruent to the quantitative model. For the same purpose, while collecting qualitative data, researcher's notes, students' notes and video recording transcripts have been examined thoroughly and triangulation method has been utilized in this way. The analysis and interpretation of qualitative data have been done following qualitative research analysis method.

To figure out 6th grade students' success on the order of operations topic "Success test for the order of operations" was developed and item analysis was used to build validity and reliability of the test. Cronbach alpha values of the success test was found as .82. After completing item, validity and reliability analyses, a 25 item test, which was categorized under 6 problem types (Symbolic expressions, confirmatory expressions, true-false questions, open-ended questions, symbolic to verbal translational questions, and verbal expressions) was finalized.

For the quantitative dimension of this research, data was collected with 156 sixth grade students in the downtown area of the city of Aydin during 2009-2010 academic

year. Three schools were randomly chosen to conduct this study. Two groups were randomly assigned to an experimental ($\Sigma n = 78$) and control group ($\Sigma n = 78$) among these 3 schools. Thus 3 experimental and 3 control groups were formed. Both groups were identified as equivalent in respect to pretest results about their success on the order of operations. While in the experimental group, mnemonic device assisted instruction was utilized through using “Parayı Bulan Çabucak Tatile Çıkar” expression, in the control group lesson plans that were designed by the teacher based on 6th grade teacher book have been utilized during the 3 hours of the study. While teaching activity in the experimental groups were carried out by researcher, classrooms` own teachers were in charge in the control group.

Experimental and control groups were subjected to; pretest simultaneously a week before the study begins, posttest right after the study completes and a retention test 8 weeks after the study completes regarding the students` success. Quantative analysis of this research was obtained from calculating independent t-test and paired T-test using SPSS 11.5 statistics program.

For the qualitative dimension of this research 3 students were assigned to experimental and 3 students were assigned to control group. Clinical interviews were conducted with these students before and after the experiment to gather their problem solving strategies on the order of operations. While conducting clinical interviews “Success Test for Order of Operations” was utilized. In these interviews, students were faced with some question types regarding with the order of operations and observed how did they deal with these problems when solving them. Their reactions to the problems and their solution strategies were fully videorecorded.

Results from the quantitative dimension of this study illustrated that using Mnemonic Device in instruction is more effective on students` success on the order of operations subject comparing to the regular classroom activities in which Mnemonic Device use is not present. Moreover the level of retention is found more significant when using the Mnemonic Device in instruction.

Examining the qualitative results of this study, students` solution strategies on the order of operation problems were found different and varied at the end of the study. While experimental group mostly used Mnemonic Device when solving order of

operation problems, control group mostly used order of operation rules. Moreover, their success on their solutions were found in favor of the experimental group.

Comprehensive analysis was carried out by comparing qualitative and quantitative results. At the end of the analysis, it was found that both dimension of the study support each other.

KEYWORDS:

Order of Operations, Mnemonic devices, Parayı Bulan Çabucak Tatile Çıkar,
Arithmetical Operations, Mathematics Instruction