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EFFECTS OF NUMBER TALKS ON NUMBER SENSES OF PRE-SERVICE PRIMARY SCHOOL TEACHERS

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ABSTRACT: The aim of this study is to analyze the effects of the number talks on number senses of pre-service primary school teachers. The participants of the study were 31 third grade pre-service primary teachers at a state university in the 2015-2016 academic year. The study was designed as single group pre-post test research. The data collection tool was the number sense test developed by Kayhan Altay (2010). The findings of the study showed no significant difference in test scores of the participants. However, in regard to solutions of the problems in the test it was found that the number sense scores were significantly and positively significant.

Key words: Number sense, number talks

INTRODUCTION

Numbers and operations is widely included in the primary school mathematics program, with regard to number sense (NS) , providing students with skills such as figuring, also mental calculus are among basic objectives of the related program (MEB, 2009). And it's remarkable in the literature that teacher candidates' NSs are quite low. Thus, it'll be possible to contribute to the development of students' NS since teacher candidates understand the importance of NS and how to improve NS (Gülbağcı Dede, 2015; Kayhan Altay and Umay, 2011; Şengül, 2013; Tsao, 2004; Tsao, 2012; Yaman, 2015a; Yang, 2007). Therefore, allowing teacher candidates to experience about how to improve students' NSs and to think on how their classroom activities and teaching plans can be structured will contribute to teacher candidates significantly in terms of improving students' NSs (Şengül, 2013; Tsao and Lin, 2012). And also, number talk is a learning tool that allows teachers to understand how students think, and to listen and observe students' explanations about solution strategies (Flickr and Kuchey, 2015). In the study conducted by Celski (2009) with primary school first grade students relating to the effect of talking applications on students NS, an increase in both students' NSs and their participation to classroom discussions was observed. While there're studies available in the literature in which number talks are introduced to educationists and researchers and that emphasize the importance and necessity of using them in classrooms (Celski, 2009; Johnson and Partlo, 2014), there aren't any studies carried out with teacher candidates. Therefore, the aim of this study is determined as examining the effect of number talks on class teacher candidates' NSs.

METHOD

In this section study group, data collection tool and data analysis method of the research are included.

Research Model

Since the research examines the effect of number talks applied in two classes on teacher candidates' NSs, the research model is in single group pretest-posttest trial method. In this pattern, all groups are treated as a experimental group (Çepni, 2009).

Study Group

Study group of the research constitutes of 31 3rd graders who are attending the primary school education at a state university as of 2015-2016 academic year.

Data Collection Tool

The NST (number sense test) developed by Kayhan Altay (2010) and prepared for middle school students but deemed appropriate in using for teacher candidates by experts was used (Kayhan Altay, 2011; Yaman, 2015). KR-20 internal consistency coefficient obtained as a result of measurements was found as 0.83, and test measurements were considered as reliable.

Analysis of Data

Scoring of NST applied before and after the application is applied in two categories. In the first scoring stage, correct answers are given 1 point, and wrong and null answers are given 0 point. In the second stage, solutions and explanations used by teacher candidates while solving problems are taken into consideration, scoring is made according to candidates' use of NSs.

FINDINGS

In the first sub-problem of the study, an answer to the problem "How do pretest-posttest success point averages achieved from NST by primary teacher candidates applied with number talks differ?" is sought. Descriptive statistics for success scores from NST obtained by teacher candidates are given in Table 1.

Table 1. Descriptive Statistics of NST

Measurement (NST)	N	$\overline{X}$	S	Mode	Median	Coefficient of skewness
Pretest	31	10.32	3.40	7	10	0.007
Posttest	31	10.54	2.93	10	10	0.495

Pretest success point average for NST by teacher candidates is calculated as 10.32 and their posttest success point average as 10.54. Considering the fact that the highest score that can be achieved from NST is 17, it can be observed that score average slightly exceeded the half value. The fact that average, median and mode are equal and coefficient of skewness is within limits of +1 and -1 can be interpreted in a way that scores do not show excessive deviation from normal. Results of t-test conducted to test whether there is a significant difference between teacher candidates' pretest-posttest average success scores are given in Table 2.

Table 2. Results of t-Test for NST

Measurement (NST) Success rate	N	$\overline{X}$	S	sd	t	p
Pretest	31	10.32	3.40	30	0.560	.580
Posttest	31	10.54	2.93			

A significant difference between pretest-posttest average success scores in NST by the group applied with application is not observed, t(30)=0.56, p>.05. This finding shows the fact that the application does not have a significant impact on the state of correctly answering problems in NST by teacher candidates.

In the second sub-problem of the study, an answer to the problem "How do pretest-posttest NSS averages of primary school teacher candidates applied with number talks differ?" is sought. Regardless of how candidates' performances of NS usage in pretest and posttest differ, descriptive statistics for the total NSS obtained from the test are included (Table 3).

Table 3. Descriptive Statistics of NSS

Measurements (NSS)	N	$\overline{X}$	S	Mode	Median	Coefficient of skewness
Pretest	31	30.06	13.03	26	26	0.26
Posttest	31	38.48	11.60	28	37	0.63

It is seen that, while NSS average does not exceed the half value, in the final test, this average is higher than the half value. The fact that coefficient of skewness is within limits of +1 and -1 can be interpreted as scores do not

show excessive deviation from normal. Results of t-test conducted to test whether there is a significant difference between teacher candidates' pretest-posttest NS point averages are given in Table 4.

Table 4. t-Test Results for NSS

Measurement (NST) NSS	N	$\overline{X}$	S	sd	t	p
Pretest	31	30.06	13.03	30	5.34	.000
Posttest	31	38.48	11.60			

After the application, it is seen that there is a significant increase in average scores indicating teacher candidates' state of benefiting from NS, t(30)=5.34, p<.05. This finding shows that there is a significant increase in average scores for candidates' usage of NS.

CONCLUSIONS and RECOMMENDATIONS

No significant differences have been observed between average scores reflecting teacher candidates' performances before and after the number talks. Reason for the emergence of this result can be explained with the purpose of number talks. After the application, it's seen that there's a significant increase in average scores relating to teacher candidates' use of number sense. This finding of the research is in parallel with studies in the literature (Celski, 2009; Johnson and Partlo, 2014). Since this study cover a duration of almost 3 weeks, maybe a significant difference did not emerge between teacher candidates' scores obtained from NST.

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