INSTRUCTION ON ALTITUDE ENRICHED WITH SOCIOMATHEMATICAL NORMS AND TECHNOLOGY INTEGRATION

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The purpose of this study is to analyze the effectiveness of instruction enriched with sociomathematical norms and technology to improve Turkish 6th grade students' conceptual understanding of the concept of altitude. Instruction of altitude, enriched with sociomathematical norms and technology, were developed and implemented. It was found that this enriched instruction improved students' conceptual understanding.

INTRODUCTION AND THEORATICAL FRAMEWORK

The concept of altitude plays an important role for students to understand the geometry topics of area and volume. Students may have difficulty in drawing altitudes and possess misconceptions related to the concept. Students' understanding of the concept of altitude can be improved in a rich environment. Cobb and Yackel (1996) found that sociomathematical norms which defined as patterns of social interactions that become routine in the mathematics classroom create rich learning environment. The environment with these norms provides both individual and cooperative construction and improve understanding (Yackel & Cobb, 1996).

The purpose of this study is to analyze the effectiveness of instruction enriched with sociomathematical norms and technology to improve Turkish 6th grade students' conceptual understanding of the concept of altitude. The research question of the study is that "Is there a statistically significant difference between 6th grade participants' conceptual understanding of altitude before and after instruction?"

METHOD

The study lasted for 5 weeks and there were 48 sixth grade participants. The researcher designed lesson plans enhanced with technology like simulations such that they interact with technology. Also, the instruction planned to have four sociomathematical norms: sharing solutions collaboratively, working cooperatively, acceptable mathematical explanations and free to make mistakes. Sociomathematical norms create rich learning environment. Yackel and Cobb (1996) found that students improved their understanding through mathematical explanations. When students feel free to make mistakes in the classroom as a norm, students have opportunity to reveal misconceptions and reconceptualize the concept. Working collaboratively and sharing solutions become routine in the classroom, students improve their understanding by reflecting and discussing their ideas.

The study presented here was grounded in action research methodology. As a teacher researcher, the researcher collected data from altitude test (as pre and post-test). The results of Wilcoxon Signed-Rank Test showed a statistically significant difference between pre-test and post-test scores ($Z= -6.032$, $p= 0.000$). The misconceptions were revealed and eliminated while working cooperatively, sharing their ideas collaboratively and making acceptable mathematical explanations. In this paper, the analysis is focused on students' misconceptions, we focused on one of the misconceptions, namely the disregard of length as being a part of large study since this misconception was the most frequent one exhibited on the pre- test. After the instruction, there were no students who exhibited this misconception on the post-test. Sociomathematically enriched, technology incorporated instruction led to eliminating many misconceptions related to the concept of altitude and improved students' conceptual understanding within the scope of tasks.

References

[1] P. Cobb and E. Yackel, E., "Sociomathematical Norms, argumentation, and autonomy in mathematics", *Journal for Research in Mathematics Education,* vol. 27 no. 4, pp. 458-477, 1996.