Extended Summary

The Comparison of the Effectiveness of the Using Compass-Straightedge and a Dynamic Software on Achievement

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The purpose of this study is to compare the effectiveness of using a dynamic software or tools (compass, straightedge) for geometric drawings in lines and angles on the achievement of pre-service mathematics teachers and to bring out the opinions of pre-service mathematics teachers on using compass-straightedge or a dynamic software for teaching geometry. A mixed research approaches includes quantitative and qualitative methods were employed for this study. One of the quantitative methods, pretest and posttest comparison group design, was used in this study. One of the qualitative methods, case study design, was also used for this study to acquire qualitative data. The data in this study conducted with 55 elementary pre-service teachers, 24 for the first experimental group and 31 for the second experimental group, who study at a college of education in Turkey. An achievement test that was implemented as a pretest and posttest for measuring comprehension in geometric drawing in lines and angles and a semi-structured focus group interview form were used to collect data in this study. Firstly, a seven-question open-ended achievement test that was generated based on three experts’ feedback was administered for the first and the second group. Later, geometric drawing activities in lines and angles took place in the first group by using compass-straightedge tools in GeoGebra and in the second group by using physical tools (compass-straightedge). Finally, the achievement test was administered for both groups. In addition, 20 minute focus group interviews were conducted by volunteer pre-service teachers from both groups to specify pre-service mathematics teachers’ opinions on using compass-straightedge or a dynamic software for teaching geometry.

When the pretest and posttest results for both groups were analyzed, a considerable increase in the test scores in both groups has been observed. The results show that these two applications increase the achievement of pre-service mathematics teachers. There was not a
significant difference determined when the post achievement test results were compared for the two groups. However, when the groups’ test averages were compared, the first group’s average was higher than the second group’s average. This data can be interpreted as using a dynamic software did not make a significant difference on academic success compared to using compass-straightedge but using dynamic software improved student achievement more than using compass-straightedge.

The pre-service mathematics teachers in the first group stressed the effectiveness of using dynamic software on “complicated drawings” and “content comprehension”, and “time saving” in the focus group interview. The teachers also mentioned that the dynamic software was “attracting attention”, “functional” and “makes drawing easier”. The focus group interview for the second group showed that most of the pre-service teachers acknowledged that using compass-straightedge provided “retention in learning”. Moreover, the pre-service mathematics teachers mentioned that using compass-straightedge was “easy and fun”, and these physical tools applied the learning methods includes “engagement and hands-on experience”.