

THE EFFECT OF GOOGLE SKETCH UP ON ELEMANTARY PRE-SERVICE TEACHERS' ATTITUDES TOWARD USING TECHNOLOGY IN MATHEMATICS

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This proposed study seeks to examine elementary pre-service teachers' attitudes toward using technology, who engaged with Google Sketch Up (a 3D modeling program) in a mathematics methods course. Data will be collected via a pre- and post quantitative survey, which assesses their attitudes towards using instructional technology in mathematics. The results will be compared using statistical procedures (t-test).

Key words: technology, pre-service teachers, geometry

OVERVIEW

The National Council of Teachers of Mathematics (NCTM, 2000) Technology Principle suggests “electronic technologies... are essential for teaching, learning and doing mathematics” (p.24). The means in which technology is integrated into the classroom, and the extent to which it is used, is a result of instructional decisions made by teachers. Ensuring teachers are proficient with technology, and are provided the opportunity to experience the advantages of using the software can increase teachers' usage of dynamic geometry in their classrooms (Stols and Kriek, 2011).

Pre-service mathematics teachers' beliefs and attitudes towards technology can potentially influence the instructional practices they will employ. For example, Ozgun-Koca, Meagher and Edward 2010, examined the emergent Technological Pedagogical and Content Knowledge (TPACK) of pre-service secondary teachers and found that over time students' belief shifted from viewing technology as a reinforcement tool to a tool that can facilitate students developing a deeper mathematical understanding. The nature of the technological tool can potentially influence pre-service teachers attitude towards it being integrated into a mathematics classroom. Hence, this proposed study seeks to investigate how Google Sketch Up can potentially change pre-service elementary teachers' attitude towards using technology for the teaching of mathematics.

Sketch Up is a free modeling program that can be used to illustrate 2D and 3D objects. According to Hart, Early, and Brylow (2008), Sketch Up has useful characteristics, namely: the interface is user-friendly, video tutorials are included in the program, it is compatible with Windows and Mac operational system, and there exist an extensive library of community-developed plug-ins for mathematics.

Shafer, Severt, and Olson (2011) conducted a study with elementary pre-service teachers using Sketch Up to create a 3D figure for their future teaching practice. They found that all participants demonstrated an appreciation for the activity, and a willingness to use it in their future lessons. Goodson-Espy, Lynch-Davis, Schram, Quickenton (2010) found that pre-service teachers felt that their geometrical knowledge improved, were more prepared to teach the content matter, and had positive thoughts about computer activities after enrolling in a geometry methods course, which used a 3D software (NVIDIA). Therefore, the technological tool utilized in pre-service teachers preparation courses can potentially influence their attitude and overall disposition towards teaching mathematics with it.

METHOD

This proposed quantitative study will be conducted at a southeastern university in the United States. Elementary pre-service teachers in their second mathematics methods course will be asked to participate. The course seeks to develop students' understanding of mathematical contents, and pedagogy. The lead author of this paper will facilitate instruction for the controlled and experimental groups. In the controlled group, traditional teaching strategies will be employed to teach geometry with minimal usage of the dynamic geometry software. In the experimental group students will engage in the learning of geometry using Sketch Up. Ten specialized lesson plans were designed for the experimental group to explore geometry using Sketch Up. These lessons include activities and assignments useful for pre-service teachers to improve both their geometrical and pedagogical knowledge by using the software. To enhance pre-service teachers' geometrical knowledge, sample tasks for the experimental group will be to create geometric shapes and find the areas and volumes of the shapes. Pre-service teachers will also create some daily figures and geometric shapes in 3D form. Moreover, they will examine shapes from different directions, and later identify the shapes based on their geometrical properties. To improve pre-service teachers' pedagogical knowledge, the experimental group will design a mathematics lesson plan, suitable for elementary students, which integrates Sketch Up, and develop a project with Sketch Up to illustrate the application of geometry in real-life. Additionally, they will discuss the advantages and disadvantages of using the software in an elementary math class.

To investigate pre-service teachers' attitudes towards using technology in mathematics, data will be collected via a survey. The same survey will be used before and after intervention. The survey to be used is adapted from Metin, Yilmaz, Coskun, and Birisci (2012). It has five factors, which measure pre-service teachers beliefs about instructional technology, relative to: usage, appreciation, negative dispositions, avoidance of it, and usefulness. Factor 1, which has ten items, measures pre-service teachers' beliefs in terms of *usage of*

instructional technology in lesson. Factor 2, has nine items and measures pre-service teachers' *appreciation to usage of instructional technology in lesson*. Factor 3 consist of nine items which measure pre-service teachers' feeling *unappreciated using instrustional technology*. Factor 4 has seven items measuring their *disinclination to make use of instructional technology*. Finally, Factor 5 contains two items which measure pre-service teachers' beliefs about *usefulness of instructional technology*. A 5-point Likert Scale, ranging from "Strongly Disagree" to "Strongly Agree" will be used. The data will be quantitatively analyzed using SPSS statistical software.

LIMITATIONS

There are limitations for this study, inclusive of potential teacher bias and time constraints. Since the lead researcher is also the instructor of the controlled and experimental groups, another researcher will be asked to be an independent observer who will provide feedback and make suggestions relative to the teacher's actions. Due to time constraints, the software will be used only to explore geometrical contents, rather than multiple branches of math. Hence future studies can seek to examine Sketch Up in other mathematical areas.

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