Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 172 (2015) 208 – 214

Procedia
Social and Behavioral Sciences

Global Conference on Business & Social Science-2014, GCBSS-2014, 15th & 16th December, Kuala Lumpur

The effects of GeoGebra on students achievement

Nazihatulhasanah Arbain and Nurbiha A. Shukor*

Universiti Teknologi Malaysia,Faculty of Education, Johor Bahru, 81310 Malaysia

Abstract

The rapid growth of technology for learning includes the introduction of educational software. However, rare reports were found that provides evidence on the effectiveness of these software. This study investigates the effectiveness of using GeoGebra software on Mathematics learning among 62 students in Malaysia. Results show that students have positive perception towards learning (m =4.26) and have better learning achievement using GeoGebra ($p < 0.05$). Available free online, GeoGebra can benefit students Mathematics learning and diversifying learning in classrooms. The overflown of resources triggered students' interest to learn Mathematics however, the selection of software has to be properly planned.

Peer-review under responsibility of GLTR International Sdn. Berhad.

Keywords: GeoGebra software; learning Mathematics; learning performance; educational technology; learning perfomance

1. Introduction

Technology has become one of the powerful resources of learning. The evolution in using technology in teaching and learning process has grown by leaps and bounds. There was a lot of Mathematics software have been developed to aid teaching and learning, including GeoGebra, Geometer's Sketchpad and Mathematica. Several studies have been carried out on GeoGebra software to study various aspects of learning. GeoGebra has become a tool that can help teachers to design effective instructional lessons. GeoGebra not yet widely used in teaching Mathematics in Malaysia. Although, technology has been proven to improve the efficiency of learning. Li (2007) cited that more than 73% of

* Corresponding author. Tel.: +607-5534282.
E-mail address: nurbiha@utm.my

Peer-review under responsibility of GLTR International Sdn. Berhad.
doi:10.1016/j.sbspro.2015.01.356

the students commented that GeoGebra is found to be a very useful technology for learning. Technology allows easy access to information and other cutting-edge research to make learning easier.

2. Background of Problem

The factors that influence students' attitudes towards Mathematics are the teaching materials used by teachers, classroom management, teacher content knowledge and personality, relating the topics with real life situation (Yilmaz Altun & Olkun, 2010) and teaching methods (Papanastasiou, 2000). Mathematics can be regarded as a challenging subject. Learning Mathematics involves understanding the theories and formulas to describe something. In the typical classroom, the challenge for the students is to explore complex problems. With advances in multimedia technology, learning difficulties can be overcome.

The challenge is more complex in teaching and learning of Mathematics, where teachers have to balance the mental, stationery and digital tools for teaching and learning that involve abstract mathematical concepts that is difficult to be understood by students (Prieto, Sordo Juanena & Star, 2013). Technology plays an important role in the development of the educational process (Gursul and Keser, 2009). Existing technology equipment such as GeoGebra, Geometer's Sketchpad and Mathematica should be used to the maximum by the educators. The use of technology is important because it serves as an object of education, which affect the learning content and objectives, and as a medium to improve the teaching and learning process (Voogt, 2008).

According to Hohenwarter (2008), GeoGebra is a computer program (software) for Mathematics, especially for learning geometry and algebra. Abramovich (2013) defines GeoGebra as a free online software application for the study of geometry, algebra, and calculus at grade level and different teaching. Studies on students' perception on applying technology in Mathematics classes were given less attention (Li, 2007). Therefore, a study on the effectiveness on student achievement GeoGebra has to be conducted to see how it can be beneficial to improve the education system in Malaysia. The second objective of this study was to identify students' perceptions of the use of GeoGebra in learning Mathematics. There is much controversy over the past two decades about the effects of using the tools of technology (calculators and computers) in the teaching and learning of Mathematics (Smith, 2002). Therefore, this study aimed to prove the extent to which technology tools can impact the teaching and learning of Mathematics.

3. Methods

This study applied quasi-experimental research design involving 62 students. Students were divided into two groups of the experimental group and the control group. The experimental group is the group of students were taught about how to use the GeoGebra software to solve Statistics problems. Meanwhile, the control group was given Statistics problems to be solved without using GeoGebra.

The participants of the experimental and the control group were randomly selected. The difference between pre and post- performance test determines whether the GeoGebra software influenced the students' achievement on learning Statistics.

3.1. Research procedure

The research procedure consists of four phases. As shown in Figure 1, the first phase is the pre-achievement tests consist of four questions and carried out simultaneously on the experimental group and the control group. The second phase is the intervention phase of the experimental group by using GeoGebra while the control group was taught using traditional teaching methods (without using Geogebra). Next, the third phase is the post-performance test to both groups after two weeks. After the respondents went through the three phases, the test results will be evaluated to determine whether GeoGebra affect student achievement test results for the topic of Statistics Form 4. At the fourth phase, only the experimental group answered a questionnaire to find out their perception on using GeoGebra.