

## The Comparison Between the Use of Blender and 3DS Max application toward students' Comprehension of 3D Animation Subject at Vocational School in Surakarta

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### Abstract:

Based on observations at Vocational School in Surakarta, the 3-dimensional animated subject using 3Ds Max as the only learning tool, consequently, students find it is difficult to practice during off-class as the 3Ds Max is not free software and affordable to buy by students. Blender application maybe can be compensate for 3D Max, which has a user-friendly appearance, neatly arranged, and free. The population in this study is the students of Vocational High School. The total population was 297 students.. The sample used was 70 students. The sampling technique in this study used the simple random sampling method. The data collection technique used the pretest-posttest. The data analysis technique used is the balance test, normality test, homogeneity test, and hypothesis testing using the independent sample t-test. The results of the study are as follows. First, there are differences in students' comprehension that can be seen from the learning outcomes between the use of Blender applications (experiment class) and the 3Ds Max application (control class). Second, the effectiveness of Blender supporting applications is higher than the 3Ds Max application in improving students' comprehension and learning outcomes. In general, it can be concluded that Blender can be used as an alternative or can replace 3Dmax as a learning medium in 3-dimensional animated subjects. This study aims to determine (1) whether there are differences between the use of Blender application and 3Ds Max on students' comprehension; (2) a more effective supporting applications between Blender applications and 3Ds Max. This study used an experimental method with a pretest-posttest control group design model.

**Keywords:** Blender, 3Ds Max, Students' Comprehension, 3D Animation

## Introduction

There are two aspects in of learning methods, learning media as teaching tools and methods itself. Learning media can be categorized as the external factor which is affect learning process in the classroom, both for teacher and students. Wahyudin, Sutikno (2010) said, the value and purpose of learning media can increase the quality of the learning process and learning results in the learning process. The use of teaching tools, educational displays and learning media in schools is beginning to adjust technological developments. What needs to be considered is that all equipment and school supplies must be adapted to the demands of the material curriculum, methods, and students ability to achieve learning goals.

In the 2013 curriculum which is student-centered learning (student center) oriented media that can help students in learning the student center is needed. One of the media that applies the student center is computer-based learning. But in the application of computer-based learning has not applied for maximum. Three-dimensional animation subject is not enough if only learn in theory, because students cannot describe the form of 3-dimensional animation.

Along with the birth of growth and the development of Indonesian science and technology, the world of 3-dimensional animation education has also involve very quickly. In the 20th century, the progress of education in the field of graphics and animation had been involved very quickly. Not only making animated games but has penetrated business fields such as advertising. In media of animation, education learning also has involve very quickly, a lot of learning media that came up competing to provide features which is more varied and conveniences. Blender and 3Ds Max learning media application is an application used to create object designs in the form of 3 Dimensional (3D). Students can create objects that appear to the real life in the form of 3 dimensions. (Mulyono, 2009). In the outline, these two applications have a similar way of forming a model. The difference lies in naming & using the tools of each application.

Multimedia Vocational School is a vocational high school which has work practices in the learning process. The 3-dimensional animation is one of the most useful lessons for Multimedia Vocational students where students can make various animation products such as entertainment media, presentation media, advertisements, and so on. In fact, the subject using 3Ds Max as the only learning tool, consequently, students find it is difficult to practice during off-class as the 3Ds Max is not free software and affordable to buy by students.

There are other applications that are able to compensate the 3Ds Max, Blender, which has a user-friendly appearance, neatly arranged, and free. Both of these three-dimensional animation applications have their own advantages and disadvantages that can affect the process of understanding students in learning the two applications.

The Blender application is a free application, aimed at design professionals and the like to be motivated to become 3-dimensional artists. Blender has more complete features than other 3-dimensional software. Blender features include 3-dimensional modeling, UV unwrapping, texturing, rigging and skinning, fluid and smoke simulation, particle simulation, animating, match moving, camera tracking, rendering, video editing, and compositing. Blender also has a built-in game engine (Rinaldi et al., 2012). And for the Video editing feature, Game Engine, Compositing Node, Sculpting is only found in the Blender application (Ardhianto & Hadikurniawati, 2012). Blender is used to make animated films, visual effects, interactive 3-dimensional applications or video games.

Dounas and Sigalas (2009) in their research examined a three-dimensional open source device called Blender, as a tool for architectural design. The research states that by mastering software such as Blender, users become more comfortable with making designer tools, whether it's simple geometric models, animated structures or scripts that activate generative systems.

Blender Software, although it is an open source software but has good graphics quality and is supported by full features so that it can facilitate the animator in creation (Rinaldi et al., 2012).

Autodesk 3DS Max. An Autodesk output software that is used to do 3-dimensional modeling, animation, to rendering. 3D Studio Max can export modeling results that can be received by Unreal Development Kits such as .ASE, .FBX and .DAE (Berta Sihite & Febriliyan Samopa, 2013). According to Limniou, Roberts, and Papadopoulos (2007) 3ds Max is one of the most popular 3D animation rack programs used by content creation professionals. By using 3ds max, a designer can create 3D objects that are similar to the original and observe them from different perspectives and points of view. These 3D objects can be exported as static images (jpg and bmp files) or can be exported as animations (avi, mov and png files). 3ds Max is an

animation tool that can visualize the lifting process, but the tedious and manual process of preparing the animation restricts efficiency and productivity (Lei et al. 2015).

The question that will be answered in this study is: (Q1) whether there are differences between the use of Blender application and 3Ds Max on students' comprehension; (Q2) a more effective supporting applications between Blender applications and 3Ds Max.

## Methods

This research used an experimental design with pretest-posttest control group design mode. Before the treatment, both classes were given a pretest to find out the students' initial ability. After the treatment, at the end of the study, participants were invited to a posttest.

Population in this study is the students of Vocational High School. The total population was 297 students. The sampling technique uses a simple method of random sampling. From Sugiyono (2012: 57), the random sampling technique is retrieving samples technique from the population that is carried out following the strata contained in the population. Data acquisition is done simply, and is distinguished by draw (lottery technique) or also by using table numbers or random numbers (Notoatmodjo, 2010). The membership of the population is homogenous or relative homogenous.

The data collection technique used is a test of learning outcomes and documentation. Learning outcomes tests can be used to assess learning progress and also for looking problems in learning. The pre-test was the initial test before the experiment was conducted on the research sample and became the first step in equating the conditions between the control group and the experimental group. Furthermore, the posttest is aimed to obtain the treatment result both for the control group and the experimental group. Documentation methods are used to collect data regarding the experiment process. Test instruments include : 1) validity using the Product Moment formula, 2) reliability by using K-R 20. In addition, the level of difficulty, differentiation of the problem, and deception (distractor) are also measured. A balance test using the t-test to determine the two groups had the same initial capability before being given treatment. The data analysis technique consisted of : 1) Prerequisite test which included: normality test using the Kolmogorov-Smirnov test, homogeneity test using the formula  $F_{\text{Count}}$  2) Test the hypothesis by using the t-test to measure the difference and gain test to determine effectiveness.

## Result

To find out the initial ability of both classes, a pretest was performed. Value data from the pretest results were obtained before students were given treatment. While the posttest result value data was obtained after students were given treatment. The pre-test and post-test results are shown in the following graph.

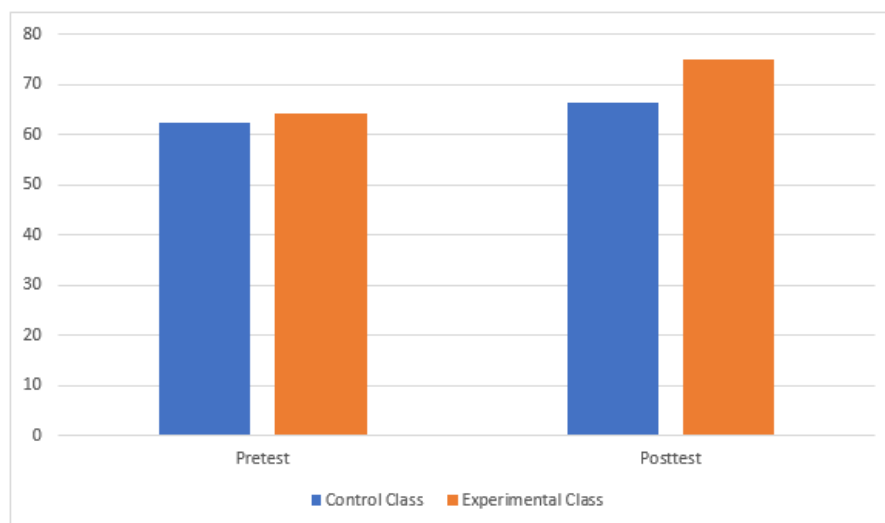


Figure 1. Graph of Mean Values of Each Class

**Q1:** There is a difference between the use of Blender application and 3Ds Max on students' comprehension as a learning application on 3-dimensional animation subjects.

Testing the first hypothesis is used to determine the differences in student learning outcomes of both classes. The test used is the t-test with an error level of 0.05. The decision to test the first hypothesis: the hypothesis is accepted if Sig (2tailed) < 0.05 while the hypothesis is rejected if Sig (2tailed) > 0.05.

Hypothesis 1: There is a difference between the use of Blender application and 3Ds Max on students' comprehension as a learning application on 3-dimensional animation subjects

**Table 1. Results of Analysis of Testing the First Hypothesis**

Class	N	Sig	$\alpha=5\%$	Criteria	Description
Experimental Class	35	0,000	0,05	$0,000 < 0,05$	$H_0$ rejected
Control Class	35				$H_1$ accepted

**Q2:** There are differences in learning effectiveness for the use of the Blender application with the 3Ds Max application in student learning on 3-dimensional animated subjects

Testing the second hypothesis is used to prove student learning outcomes using the Blender application is higher than the 3Ds Max. This technique uses a gain test from Hake (1999) (Sundayana, 2016: 151). The decision to test the second hypothesis: learning using Blender learning media is higher than 3Ds Max.

Hypothesis 2: More effective use of the Blender application compared to the 3Ds Max application in student learning on 3-dimensional animation subjects at Surakarta Batik 2 Vocational School.

**Table 2. Results of Analysis of Testing of the Second Hypothesis**

Class	Pretest Average	Posttest Average	Standard Gain	Description
Experimental Class	64,28	75,08	0,30	Medium
Control Class	62,22	66,50	0,11	Easy

## Discussion

Based on Table 1 the results of the first hypothesis test with a level of sig < 0.05 the result is sig 0,000 < 0,05 with a value of  $t_{hitung} > t_{table}$  (4,110 > 1,995). This shows that  $H_0$  is rejected and  $H_1$  is accepted, there is a difference between the use of Blender application with 3Ds Max on students' comprehension as a learning application on 3-dimensional animation subjects. The control class has increased by 4.28 and the experimental class has increased by 10.8. Therefore the results of this test accept the hypothesis of the difference between the use of Blender application and 3Ds Max application as a learning medium for students' comprehension of 3-dimensional animation subjects.

The results of this study are supported by the statement of Aufa Anggun P K (2017) who uses the Blender application in learning automotive engineering. The study shows that 85% of respondents think the application is easy to operate/play, 86% of respondents think the application can help in learning the types of motorcycle engine parts, 90% of respondents also think that applications can increase the desire to learn. As well as Dounas and Sigalas (2009) in their research they compared the visualization characteristics architecture of the Blender and 3Ds Max. These comparisons were prepared to take into account industry reviews, questionnaires and comparative studies in the architectural visualization industry and also personal experiences of Dounas and Sigalas. And Blender's results have advantages in geometry editing, rendering speed (no GI), animation (design), parametric design, modeling speed, features compilation, use and speed interface, and memory and CPU features. Whereas 3Ds Max has advantages in rendering speed (GI), animation (presets), and parametric objects.

Based on table 2 the results of the second hypothesis test are gain index analysis in the result control class of 0.11 means the effectiveness of using the 3Ds Max application with a low category and the results of the experimental class 0.30 have the effectiveness of using the Blender application in the medium category. Increasing the learning outcomes of the experimental class is higher than the learning outcomes of the control class. Therefore this test accepts the hypothesis that more effective use of the Blender application is compared to the 3Ds Max application.

## Conclusion

Based on the results show that there is a difference between the use of Blender with 3Ds Max as a learning media towards the understanding of students of class XI Multimedia in Batik 2 Vocational School in Surakarta. Students who are given learning using the Blender application have better learning outcomes than students who use the 3Ds Max application. The use of the Blender application has more influence for students because students can practice off-class. In general, it can be concluded that Blender can be used as an alternative or can replace 3Dmax as a learning medium in 3-dimensional animated subjects.

## Recommendation

It can be considered by the teacher in applying learning media on 3-dimensional animation subjects, especially in 3-dimensional Rigging Animation Basic Competencies, as well as other basic competencies so that learning objectives are achieved optimally.

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