The Effectiveness of Game Based Learning on Student Motivation and Learning Outcomes in Camera Movement Engineering Materials

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ABSTRACT

The shift of conventional learning media to modern learning media becomes the obligation of education world to adapt to the development of science and technology. This study was to analyse the effectiveness of the use of *game-based learning* on motivation and student learning outcomes on the subject of camera movement techniques. Data collection used the tests to measure learning outcomes and to measure learning motivation. The data analysis technique used normalized gain (N-Gain). The results showed that the average value of the pre-test was 76.41 and increased in the post-test to 90.28. Based on the Minimum Completeness Criteria (KKM), as many as 37 people or 94.9% had finished studying. It showed the increase of learning outcome seen from the average value. The average value of normalized gain (N-Gain) was 0.60, so the game-based learning quiz method was quite effective in improving learning outcomes. As a teacher, it is necessary to apply game-based learning methods in increasing student motivation and learning outcomes.

Keywords: *Effectiveness, Game-based Learning, Motivation, Learning Outcomes*

INTRODUCTION

The 21st century is well-known as the century of openness or the century of globalization, it means that human life in the 21st century experiences the fundamental changes that are different from the previous century (Wijaya, 2016). Information, Technology and communication (ICT) provide challenges in the education world, students are more interested in learning ICT than other learning materials, students are interested to spend hours in front of the computer to access the internet and look for information that cannot be obtained at school. This phenomena becomes a big task and for the world of education to adopt and create learning innovations. Formal education is not only as a place to get diploma without contributing to fostering the next generation of the nation struggle who will be the future leaders. The digitalization of communication devices that converge with computers characterizes the 21st century as the 18th century as characterized by the industrial revolution. The aadvances in

Information and Communication Technology (ICT) that penetrated the socio-cultural, political, economic aspects, including education (Yusri, 2016).

There are various ways that a teacher or instructor can do to increase student learning motivation, one of which is the use of various teaching methods and learning activities. A teacher wants a class full of students with intrinsic motivation. Based on observations at SMK Veteran 1 Sukoharjo on 23th November 2021, it was found that students had less motivated in learning as seen from the lack of student response in the learning process, lack of enthusiasm during lessons and lack of attention given by students when the teacher is explaining. There are several problems in learning activity, the learning innovation that can be implemented by teachers integrating knowledge and technology in the learning process is needed, one of which is to motivate students, arouse interest, attract and maintain their attention, through technology-based learning.

Learning media is an important component used in the learning process because the use of learning media can facilitate interaction between teachers and students in the learning process. One of the functions of the learning media itself is to make student passion for learning, as well as create more direct interaction between students and learning resources (Daryanto, 2016). The media used in the learning process is expected to increase the quality of learning and can make students feel unsaturated during learning. According to (Joko, 2020), this learning strategy is excellent for creating an atmosphere that encourages the students to be active in learning.

Game Quizizz is a game-based educational application that brings multi play activities to the classroom and makes it interactive and fun to practice in the classroom (Purba, 2019). Quizizz is one of the educational game media that provides benefits in increasing learning motivation to improve learning outcomes, as well as sharpening the competence of educators in utilizing learning media (Ali, 2017). According to (Maria, 2019), the change in the teaching and learning process for the success of learning objectives is by implementing a learning system that actively involves students in teaching and learning activities, learning which was originally teacher-cantered has shifted to student-cantered.

Based on the opinion above, *Quizizz* is one of the online-based learning media that can be used in the learning process. The *Quizizz* application is a quiz maker application that can be downloaded via the *play store* or *Appstore* for free. *Quizizz is* presented in the form of a *game* or a fun game in answering the questions given by the teacher in the learning process. *Quizizz* can be a learning medium used by teachers to create a learning atmosphere that stimulates student enthusiasm to learn because *Quizizz is* designed in a "quiz game" concept that encourages students to be able to compete in a healthy manner in getting the best results as first place in this game so that they can compete healthy and increase their learning motivation.

Based on the documentation data on the learning outcomes of class XII Multimedia students, most of the student learning outcomes are still incomplete or still below the Minimum Completeness Criteria (KKM) that is under 70. Research conducted by (Cahyani and Brillian, 2020) concluded that the use of quizzes in the learning process can improve student learning outcomes. Meanwhile, (Rahmania, 2020) has states that the use of the quizzes application has a positive and significant impact on learning motivation. This study seeks to develop the two studies above through the *game-based learning* model quiz in increasing student motivation and learning outcomes.

The research related to the use of games in learning has been carried out by several previous researchers. Iayatollah, et.al., (2020) research on the effect of learning games on improving learning outcomes for understanding natural science. Winatha and Setiawan (2020) research showed that there was a positive effect of game-based learning model towards Collegian's motivation and learning achievement in Interpersonal Skill subject. This study was s to re-examine the use of game-based learning in increasing motivation and learning outcomes.

METHODS

This research is experimental research with the treatment. According to (Arikunto, 2016) experimental research is research with the purpose to know the effect on the subjects studied. This type of research is quasi-experimental research with *one group pre-test post-test design.* This research does not use a comparison class but used the initial test so that the magnitude of the effect or influence of using *Game Based Learning* can be known with certainty.

In this research, the subjects were given a *pre-test* to determine the extent of the students initial abilities before learning of camera movement techniques using *Game Based Learning*. After being given the initial test, the students were given treatment, namely learning camera movement techniques using *Game Based Learning.* After completing the camera movement learning techniques using *Game Based Learning*, then all students were given a final test (*post-test*) to determine the extent of the influence of learning camera movement techniques using *Game Based Learning* on learning motivation and to find out the effect of *game-based learning* on student learning outcomes. The data analysis technique used normalized gain (N-Gain). The application of the game-based learning model also improved learning outcomes.

RESULTS AND DISCUSSION

Results

The respondents of this study were 39 students of 12th grade of Multimedia SMK Veteran 1 Sukoharjo in the 2021/2022 academic year. There were 23 male students and 16 female students. Learning outcomes obtained from pre and post tests conducted with multiple choice tests totalling 15 question items and the test results can be seen in table 1.

Table 1
Learning outcomes

Analysis	Pretest	Posttest
The highest score	85	100
Lowest Value	66	72
Average value	76.41	90.28
Standard Deviation	6.44	7.62
KKM	75	75
Completeness	24	37
Percentage	61.5%	94.9%

Based on the table above, it is known that the pre-test had a range of values between 66 – 85. The average value was 76.41 and the standard deviation was 6.44. Based on the KKM score, as many as 24 students or 61.5% had completed learning. Meanwhile, the post-test had a range of values between 72-100. The average value was 90.28 and the standard deviation was 7.62. Based on the KKM score, 37 students or 94.9% had completed learning.It showed that there was an increase in learning outcomes seen from the average value. The increase indicates that the use of *quiz-based* learning model *games* can improve learning outcomes.

To measure motivation, use the checklist filled in by the civil servant teacher at SMK Veteran 1 Sukoharjo. The results of student learning motivation can be seen in table 2.

Table 2
Motivation to learn

Motivation	Pretest	Percentage	Posttest	Percentage
Active	4	10.3%	11	28.2%
Active Enough	15	38.5%	19	48.7%
Less Active	20	51.3%	9	23.1%
Amount	39	100.0%	39	100.0%

Based on the table above, it showend that there were 4 active students at the pre-test or 10.3%, while the most dominant were 20 students or 51.3% less active students. After using the learning *quiz game model*, the student learning motivation increased with 11 active students or 28.2%, and 19 students being quite active or 48.7%. It showed that there was an increase in student activity in being motivated through the *quiz* -based *learning* model *games.*

Testing the analysis requirements was carried out with two tests, namely normality and homogeneity. The results of the normality test can be seen in table 3.

Table 3
Normality Test Results

	Kolmogorov-Smirnov [a]		
	Statistics	df	Sig.
POSTEST	.155	39	.019
PRETEST	.246	39	.000

Based on the results of the normality test, it was found that the significance value for the pre-test was 0.000 and the post-test was 0.019. It showed that the significance value was less than 0.05, so it was decided that the research data were not normally distributed. The next test is homogeneity and the results can be seen in table 4.

Table 4
Homogeneity Test Results

Levene Statistics	df1	df2	Sig.
.075	1	76	.784

Based on the results of the homogeneity test, obtained 0.784 significance value . The significance value was greater than 0.05, so it was decided that the research data

came from the same or homogeneous population. Based on this prerequisite test, the next data analysis used the *Mann-Whitney test* because of not normally distributed data, so it is included in non-parametric analysis. The results of the *Mann-Whitney test* can be seen in table 5.

Table 5
Results of *Mann-Whitney test*

	LEARNING OUTCOMES
Mann-Whitney U	131.0
Wilcoxon W	911.0
Z	-6,368
asymp. Sig. (2-tailed)	.000

The table above showend that the Z value of the *Mann-Whitney test* was 6.368 and the sig value was 0.000. It showed that the value of sig (0.000) was smaller than the value of the research sig of 0.05, it showed that statistically *game-based learning* was able to provide differences in student learning outcomes in the material of camera movement technique for 12th grade of Multimedia SMK Veteran 1 Sukoharjo Academic Year 2021/2022.

To measure the effectiveness level, the normalized gain test (N-Gain) was carried out to determine the increase in students cognitive learning outcomes after the treatment. This increase was taken from the pre-test and post-test scores obtained by students. Normalized gain or N-Gain is a comparison of the actual gain score with the maximum gain score (Richard R. Hake, 2010). N-Gain criteria can be seen in table 6.

Table 6
N-Gain Criteria

N-Gain Value	Category
g > 0.7	High
0.3 < g < 0.7	Medium
g < 0.3	Low

The results of the normalized gain (N-Gain) measurement using Microsoft Excel , can be seen in table 7.

Table 7
Calculation of N-Gain

Post-Pre	100-pre	N-Gain
19	34	0.56
13	21	0.62
5	15	0.33
30	30	1.00
21	21	1.00
13	21	0.62
31	31	1.00
5	15	0.33
11	21	0.52
11	21	0.52
17	32	0.53
16	31	0.52
11	21	0.52
18	28	0.64
13	21	0.62
18	28	0.64
15	15	1.00
6	34	0.18
6	21	0.29
5	15	0.33
15	15	1.00
15	15	1.00
11	21	0.52
7	28	0.25
24	34	0.71
6	21	0.29
6	21	0.29
15	15	1.00
20	20	1.00
23	28	0.82
19	24	0.79
26	34	0.76
2	28	0.07
6	21	0.29
7	28	0.25
15	15	1.00
6	21	0.29
21	21	1.00

Post-Pre	100-pre	N-Gain
13	34	0.38
	average	**0.60**
	maximum	1.00
	minimum	0.071

The average value of normalized gain (N-Gain) was 0.60. Based on the category of interpretation of the effectiveness of N-Gain above, it can be said that the *game-based learning quiz* method is fairly **effective** in improving learning outcomes.

Discussion

In order to support independent learning, it needs media that can provide external motivation (Eka Budhi, et.al, 2021). Learning media is an effective means in assisting the teachers so the learning activities can run smoothly. The teaching aids used by the teacher are aimed at increasing students motivation and learning outcomes for the material on camera movement techniques for 12th grade of Multimedia at SMK Veteran 1 Sukoharjo for the 2021/2022 academic year. The development of technology and science has influenced the use facilities in schools and other educational institutions. This game is an assessment tool, facility and instrument that can support increasing student activity in the learning process.

Santoso (2019) states that the *Game* is a medium for children to be able to get learning that includes cognitive, social, emotional, and physical development. Learning *games* is needend to be made a challenge and motivation so that the *game* becomes interesting (Samsul, 2016). *Games* have experienced a lot of development from the beginning (Wifda, 2015). Torrente states the *game-based learning* is the use of games with a serious purpose (ie educational purposes), as a tool that significantly supports the learning process (Pratiwi & Musfiroh, 2017).

Sudjana (2017), states that learning outcomes are abilities owned by the students after they receive their learning experiences. Kunandar (2017) states that learning outcomes are certain competencies or abilities both cognitive, affective and psychomotor achieved or mastered by students after participating in the teaching and learning process.

There are two factors that affect student learning outcomes, namely internal and external factors. Media/learning model is the external factor. A model needs the right method in learning. The relationship or link between the use of the *quiz* method and learning outcomes is the existence of student-centered learning activities to create a new and more fun learning atmosphere and can make students challenged and compete with other students. The use of the *quizzes* method is able to encourage students because they compete with other students because students can see directly their rankings or learning outcomes that come out of the application.

The results of this study showed that the application of game-based learning models can improve learning outcomes. The results of this study are relevant to Hidayatullah, et.al., (2020) research on the effect of learning games on improving learning outcomes for understanding natural science. Sardiman states that learning process will be success if students have good learning motivation (Emda, 2017). As educators, teachers and lecturers must motivate students to learn in order to achieve

the goals and desired behaviour. Motivated students will be easily directed, given assignments, tend to have great curiosity, be active in seeking information about the material explained by the educator and use higher cognitive processes to learn and absorb the lessons delivered (Slavin, 2016).

The results of this study showed the effectiveness in increasing students learning motivation through the application of game-based learning models. The results of this study are in line with the research of Winatha and Setiawan (2020) that the research result showed that there was a positive effect of game-based learning model towards Collegian motivation and learning achievement in Interpersonal Skill subject.

There are three types of learning outcomes such as : 1) Cognitive Domain, that is related to intellectual learning outcomes consisting of six aspects, namely knowledge, memory, understanding, application, analysis, synthesis, and evaluation; 2) Affective domain, it is related to attitude that consists of five aspects namely acceptance, response or reaction, research, organization, and internalization; 3) Psychomotor domain, that is related to the learning outcomes of skills and the ability to act (Sudjana, 2017).

Learning with the game-based learning model is able to change the learning paradigm that is originally a teacher center to a student center. Based on constructivist learning theory, it is stated that learning will be more meaningful when students are involved in constructing their own knowledge. This theory emphasizes to provide opportunities for students to make judgments and interpretations of their situations (Hussain, 2012). One of the innovative learning models that involve students in problem solving activities and provide opportunities is to work autonomously to construct their own way of learning by game-based learning.

CONCLUSION

The application of the *Game based learning* model on camera movement subjects in Vocational High Schools can increase learning motivation. It can be seen from the results of the pre-test motivation measurement that showed as many as 19 students in the fairly active and active category, while at the post-test time as many as 30 students showed fairly active and active.

The application of *Game based learning* improves learning outcomes. The average value of the pre-test was 76.41 and increased at the post-test of 90.28. Based on the KKM score, 37 students or 94.9% have completed learning. It shows that there is an increase in learning outcomes seen from the average value. The average value of normalized gain (N-Gain) is 0.60, so the *game-based learning quizzes* method is quite effective in improving learning outcomes.

Based on the conclusions above, it shows that the use of *Game based learning Quizizz learning model is* capable and effective in increasing learning motivation and learning outcomes in camera movement subjects in vocational high school. Teachers should reduce the lecture method by increasing the active play method. This research is limited in an effort to find the effectiveness of the use of game-based learning in increasing student motivation and learning outcomes, especially the material on camera movement techniques at SMK Univet Sukoharjo. For Further researchers, it can use other methods in increasing student motivation and learning outcomes.

The implication of this research is that learning media in the form of game-based learning can be used by educators as an alternative to ICT-based learning media to be

utilized as much as possible to achieve learning objectives. The use of this learning media can overcome the lack of use of similar learning media to support the achievement of learning objectives. The use of this learning media can overcome various problems in the learning process and follow-up is needed with the design of the development for the next learning process.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper is free of plagiarism.

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