

THE EFFECTIVENESS OF CHEMISTRY TRICKY TEST GAME IN ONLINE LEARNING WHEN COVID-19 PANDEMIC

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Abstract. *This study is purposed to determine the effectiveness of learning chemistry on Hydrocarbon by using Chemistry Tricky Test Game when Covid-19 based on completeness of learning outcomes. This is a quantitative research. The research method used pre-experimental using one group pretest and posttest design. Chemistry Tricky Test game is implemented as a learning media through online. It's given before students take on pretest, after using media students can do posttest. The sample's 25 students on XII grade in Bojonegoro Integrated High School chosen by cluster random sampling. The instrument used multiple choice for pretest and posttest also response questionnaire. The result media's responded very well reaches 98.7% students agreed that media is appropriate for learning, there is a significant difference between pretest and posttest, classical completeness after using this media reaches 100%. The conclusion is chemistry tricky test games can effectively improve learning completeness in Bojonegoro Integrated High School.*

Keywords: *Game, Classical completeness, learning outcomes, Chemistry, Effectiveness*

INTRODUCTION

Unforeseen circumstances in the form of Covid-19 as an pandemic that brought enormous to changes all aspects of life. Covid-19 was first identified from Wuhan city in China. The rapid and widespread development of this virus had an impact throughout the world. At the beginning of March 2020, the first case of positive patients with Covid-19 in Indonesia began to emerge rapidly and expanded around this country [1]. The government finally took part in breaking the chain of the spread of Covid-19 by some rules as physical and social distancing in the hope that the spread of Covid-19 would soon be dissappear in Indonesia. With the government's policy, learning activities are disrupted. Teaching and learning process that's usually done face-to-face in school will be change to online learning in students home. The process of learning from home will be fascilitated by the government, the Ministry of education and culture had collaboration with some telecommunications providers in Indonesia that

would provide special internet quotas for students activities in online learning.

Online learning is a learning process with help of electronic media [2]. Teaching and learning activities by online can be used every time without limitation. Online learning have some potentials include: meaningful learning, easy access, and improving learning outcomes. In the context of online learning, students can connect directly with teacher to access the material and learning media that they want to convey [3].

Based on interviews with Bojonegoro integrated high school teachers stated that during online learning, learning outcomes of students was decrease because they were not accustomed to online learning and the lack of media can increase the enthusiasm of students to learn independently at home. According to students' questionnaire responses, as many as 64% said that chemistry lesson was classified as difficult subjects. Most high school students assumethat learning chemistry are difficult [4]. Based on the response questionnaire as much as

52% of students agreed that the hydrocarbon material was stated as one of the difficult materials. Lack of interest in the learning process can cause students to get bored easily, so motivation to learn will decrease. This is evidenced based on interviews with teacher who stated that students during online learning had decreased learning outcomes, the classical completeness just reached 70.

Teaching and learning activities during online learning are only limited with given some tasks, so it did not get students interest. An unattractive learning atmosphere can be dealt with combining student's likey, such as playing game during learning. Game as learning media can increase the enthusiasm of students to receive material [3]. Chemistry teachers also stated that schools never used game as learning media. Games can integrate fun with learning activities so students will get some motivation to study harder. The use of games for leaning is basically about gamification: applying game design and technology to serious learning to restore motivation and pleasure [5]. Games that are used for learning content are also called educational games.

Games by combining material into components in game are called educational games [6]. The advantages of this can increase knowledge with fun and not boring way, it will make learning easier for students to absorb the materi that has been taught. One device that supports the use of educational game is smartphone. Smartphone is a suitable device to be used in this study because it is equipped with various sensors [7]. Using smartphone for educational games means that technological and information advancements have been utilized in an effort to improve the effectiveness of chemistry learning. The effectiveness of learning can be seen from learning outcomes and learning objective [8].

Knowing the effectiveness of learning is important because it will known learning activities can achieve their goals or not. Based on the description, the aim for this research to find out the effectiveness of using game as learning media based on the students' responses and the result of learning

completeness between pretest and posttest score after using chemistry tricky test game as learning media. The learning indicator in the chemistry tricky test game has the aim to Analyze the structure and properties of hydrocarbon compounds based on understanding the specificity of carbon atoms and the classification of their compounds.

METHOD

The research method used is pre-experimental. This method is used to test the hypothesis of causal relationships. The design used is a One group pretest-posttest design. In the design of One Group Pretest-Posttest, learning activities begin by giving pretest questions with the aim to determine students' initial cognitive abilities on hydrocarbon material. After that, students are given learning media, namely chemistry tricky test game as a treatment. Chemistry Tricky test game is implemented as learning media during Covid-19 pandemic through online learning using smartphones that have been installed that media. At the end of the learning activity, the questionnaire responses and posttest were given to students. The response questionnaire contained the students' responses while using the media, and the posttest was used to measure the students' final understanding of the material being taught. So the effectiveness of chemistry tricky test game based on the completeness of student learning outcomes.

The population of class XII students in Bojonegoro Integrated High School is 128. By using cluster random sampling to determine the students who become the sample. The sample selection is done by a lottery system, as many as 25 students of class XII Integrated High School Bojonegoro are randomly selected. Data collection techniques were conducted through questionnaire responses of students after using Chemistry tricky test game and pretest-posttest form to measure the completeness of student learning outcomes after being given chemistry tricky test game. The use of tests as one of the data collection techniques is assessed according to the problem to be studied [9] [10].

Data analysis techniques in this study, namely the normality test used as a requirement

for further testing using paired simple t-test. Normality test has a provision if the significance value is more than 0.05 then data have normal distribution, but if the significance value is below 0.05 then the data obtained is not normally distributed so it can't do the next test, namely paired simple t-test. After that, a paired sample t test was calculated to compare the average pretest and posttest scores in the same group. With provisions, if the value of sig. (2-tailed) > 0.05 then there is no significant difference. Whereas if the value of sig. (2-tailed) < 0.05 then there is a significant difference between the results of the pretest and posttest. In processing data analysis, all researchers used SPSS version 21.

Classical completeness calculation is as follows.

$$\text{Class. Completeness} = \frac{\sum \text{students completeness}}{\sum \text{student}} \times 100\%$$

The research is said to be successful if it have the following criteria, individual completeness of students reaches ≥ 78 by achieving classical completeness of student learning outcomes reaching a minimum standard of $\geq 85\%$ [10].

Questionnaire responses of students using the provision of scoring through the Likert scale model in Table 1.

Table 1. Likert Scale

Answer Criteria	Score	
	Positive statement	Negative statement
Strongly agree	5	1
Agree	4	2
Doubt	3	3
Disagree	2	4
Strongly disagree	1	5

[11]

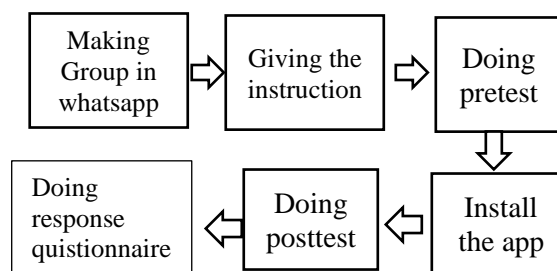
The indicator of success from the questionnaire response was set to a minimum score of $\geq 61\%$ with a good category represented by Table 2.

Table 2. Criteria for Questionnaire Responses

No	Percentage	Criteria
1	81%-100%	Very good
2	61%-80%	Good
3	41%-60%	Enough
4	21%-40%	Bad
5	0%-20%	Very Bad

[11]

RESULT



During the Covid-19 pandemic, learning system changed through online learning. Providing media during online learning aims to increase students' interest in learning. Implementation of the use of tricky test game chemistry media as follows, the teacher makes an online class with the help of whatsapp social media then the teacher gives special instructions about the general picture of the media and how to use the media before it is installed. To determine the students' initial cognitive abilities, a pretest is done first, then the students install the chemistry tricky test game and play it. After learning to use the media students do a posttest to test the final understanding after learning with that media. At the end of the lesson the teacher gives the student questionnaire responses to find out the students' interest after learning to use tricky test game chemistry media.

Learning Outcomes

The game is an interesting thing for students this is proven in the questionnaire responses as much as 83% of students stated that they play using smartphones every day. While 58% of them play just to waste the time. So, game can be used as a creative media that attracts students' interest in hydrocarbon learning. During the Covid-19 pandemic at Bojonegoro Integrated High School, online learning was carried out following the

government's recommendations. However, during online learning the learning outcomes of students decrease. In accordance with research from Hikmah [12] that learning outcomes are important things that serve as a benchmark for the success of teachers in the learning process. The use of tests is carried out to test student learning outcomes. During online learning, the teacher only gave assignments so students feel not interested anymore. An unattractive learning atmosphere can be handled by using creative media [13].

Creative media can be represented by utilizing technology in the learning process. One of the principles of learning is to utilize technology in the learning process to increase the effectiveness and efficiency of learning [14]. Chemistry Tricky Test Game is a learning media in the form of a game for hydrocarbon material containing the problems that exist in Erlenmeyer but to achieve that player must avoid monsters so it will not lose the lives and still able to continue playing and answer questions until the game is finished [15].

Before using the Chemistry Tricky Test Game, students are given a pretest to find out their initial cognitive abilities. Then the media is used to study hydrocarbon material. Based on the response questionnaire as much as 52% of the participants had difficulty with hydrocarbon material. The learning process using media that is preceded by using pretest and ending with posttest aims to see how much cognitive knowledge that students learn with hydrocarbon material that has been taught.

The results of the pretest will help students integrate students' initial knowledge with new information so that the material to be taught can be in accordance with the ability of students. While the posttest is used to find out the mastery and understanding of the material that has been taught.

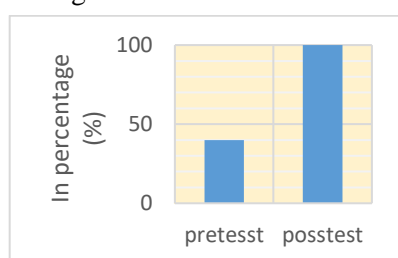


Figure 1. Complete learning outcomes

Based on Figure 1, the results of the pretest as much as 60% of students have not been completed, and 40% of students who have completed individual completeness standards ≥ 76 . Several factors can cause incompleteness including, lack of understanding and many students who have forgotten about hydrocarbon material. But after doing the posttest, all students are completely finished. Based on research conducted by Arum and Lutfi [16], learning media in the form of this game can motivate students so that they succeed in increasing the results represented by increasing the completeness of their learning outcomes. Classical completeness achieved in this study was 100%. This met the standard of research success with a classical completeness benchmark of $\geq 85\%$ [10]. Any unattractive learning conditions must be addressed as soon as possible by the teacher so that they do not have an impact on student learning outcomes. Unattractive learning atmosphere can be handled by using creative media [12].

Chemistry Tricky test game is used as a creative learning media that increases learning interest and influences student learning outcomes.

The statistical test on the pretest begins with the normality test using SPSS to get the following data results.

Table 4. Normality Test in Pretest

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Pretest	0.118	25	0.200*

Based on the results of data from Table 4 found that the significance value (Sig.) In all samples is 0.200, the results meet the standard criteria of significance value of more than 0.05, so it can be stated that the pretest score is normally distributed.

To test the statistical data posttest also tested for normality is shown in Table 5.

Table 5. Normality Test at Posttest

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Posttest	0.141	25	0.200*

Based on the results of data from Table 5 about posttest normality, the significance value obtained in all samples amounted to 25 by using a normality test of 0.200, these results also meet the standard criteria of significance data of more than 0.05, so the class is normally distributed.

After analysis with the normality test to see whether the media given is effective in improving learning outcomes, it can be continued with the hypothesis test using paired simple t-test. This test is done by comparing the initial situation of data taken from the pretest score and the final situation taken from the posttest score data on students. The following data is obtained.

Table 6. Paired simple t-test

Paired	t	Df	Sig. (2-tailed)
Pretest-posttest	-14.997	24	0.000

Based on Table 6, the significance value in this study is 0,000. The results of these data mean that the use of Chemistry tricky test media has significant changes in the comparison between pretest and posttest scores by fulfilling the significance criteria of less than 0.05.

The use of media can maximize student learning outcomes [16]. The lack of experience of students in using the game as a learning medium can inhibit students to show optimal learning outcomes. Teachers can help students to provide as many learning resources as possible, one of them by utilizing learning media in the form of games. By utilizing the media can help realize effective and efficient learning.

Based on the pretest and posttest scores proved to be higher posttest scores. It can be said after receiving treatment in the form of Chemistry Tricky Test Game as a learning media during the Covid-19 pandemic through online learning can optimize the completeness of student learning outcomes. In accordance with research from Arum and Lutfi, using learning media in the form of games can significantly increase classical completeness [16]. The use of Chemistry Tricky Test Game as a learning medium is very helpful to improve learning outcomes, because students not only play by using emotions, attention and high concentration but also are involved in the

process of absorbing learning information so that these memories enter into long-term memories and learning processes learners become meaningful [17].

Questionnaire Results

Table 3 which shown the responses of students after using the Chemistry Tricky Test Game as a learning media.

Table 3. Student Questionnaire Results

No	Statement	Score	Percentage
1	I find the Mobile Game Chemistry Tricky Test game fun	124	99,2%
2	Every level in this game makes me feel challenged	120	96%
3	I don't feel bored when using the Mobile Game Chemistry Tricky Test game	121	96,8%
4	I want to play it even outside of teaching and learning activities	124	99,2%
5	this media can make me learn independently although I don't do direct learning	121	96,8%
6	I can use a smartphone to play while learning	125	100%
7	The language in this game media is easy to understand	125	100%
8	I can read the writing on the media of this game clearly	125	100%

No	Statement	Score	Percentage
9	I am interested in online learning	125	100%
10	I find online classes very boring *	124	99,2%

*Negative statement

Based on Table 3, the first objective assessed is students' interest in the Chemistry Tricky test game, there are three statements that become the reference of assessment including feeling happy when using the game as a learning media, not feeling bored when studying and each level in the game makes students more challenged. The three statements obtained a very high percentage with a range of 96% to 99.2% can be categorized very well. Based on Permendikbud No. 3/2004, learning based on pleasure and challenge will increase the activeness of students in the learning process so that the feeling of being bored when learning will disappear. This is certainly very necessary in the learning process with the realization of a pleasant learning atmosphere that becomes more optimal so that learning objectives will be achieved and have an impact of improving learning outcomes.

The competition that appears in the game, in the form of increasing difficulty of each level will stimulate students to play by organizing strategies so that they can solve problems and finish the game to the end. A critical characteristic of the game is the presence of challenges in the game [18]. With challenges they can overcome increasing curiosity and they begin to set a good strategy to finish the game until the end. All students agree that when playing they feel a feeling of pleasure and interest that arises to overcome a sense of boredom [19]. Enjoyable atmosphere conditions need to be generated in the learning process in order to attract students' learning interest. Interest that arises while playing while learning can create a positive learning environment so that it can improve the quality of learning of students [20].

The usefulness of Chemistry Tricky Test Game as learning media for students can be concluded from statements 4, 5 and 6 which include, the desire to play game media outside

of learning activities, make students learn independently although they do not do direct learning and can use smartphones to learn while playing. Based on the three statements get a percentage of 96.8% to 100% in the excellent category. This means that students strongly agree that the Chemistry Tricky Test game is useful in the learning process. The media used by students are displayed with multimedia and good game flow, so that it attracts students to use the Chemistry Tricky Test Game again to learn without the help of teachers outside of school learning. Self-study by using a smartphone is rarely done so far, because smartphones are only functioned as a communicating tools, playing and surfing on social media. Smartphones that are used in the learning process can be used as an alternative in media development [21].

The use of this smartphone, in addition to maximizing its function as a media of entertaining but also a learning media to support the learning process. The interest of students using a smartphone while studying certainly has a positive impact on students because it motivates students to study harder. In learning, motivation can act as a supporter of learning activities in students so that the goals to be achieved by students can be implemented [15].

Based on Table 3, statements 7 and 8 namely the use of language that is easy to understand and the ease of students to read writing in the game reaching a percentage of 100% can be categorized that students strongly agree that the language of Chemistry Tricky Test game is easy to understand and has no difficulty to read it. The language sequences used in this media must be good and in accordance with the rules of grammar that apply in order to distribute information about hydrocarbon material to students appropriately and correctly. The use of language that is easy to understand will train students' way of thinking so it is not wrong to interpret an information [22]. Errors in processing information will be fatal if it occurs in the learning process, will have an impact on students' difficulty in understanding the next concept or even mistakes in understanding a learning concept. However, based on the data in Table 3, Chemistry Tricky game in terms of language is very good.

Students' interest in online learning can be concluded from Table 3 in statements 9 and 10 covering, interest and not feeling bored when doing online learning. Based on the two statements get a percentage with a range of 99.2% to 100% which means students strongly agree that they feel attracted by the existence of online learning in this corona outbreak. The use of smartphones can facilitate students to access various learning resources during online learning [23]. Online learning is more stimulating the activeness of students in the learning process because of the ease of accessing information so that meaningfulness in learning emerges.

The application of the game as a learning media is a good choice to help in increasing students' learning motivation [24]. All students also feel that this media is very easy to play but also remains challenging to play. With the Chemistry Tricky Test Game makes all students happy and do not feel bored when conducting online classes. Of the four objectives that have been presented proven that chemistry tricky test game is very effective as a medium of online learning.

CONCLUSIONS

Based on research that has been done it can be concluded that.

1. The use of Chemistry Tricky Test Game is declared effective as a learning media on hydrocarbon material based on t paired test with learning outcomes experiencing significant changes between pretest scores and posttest scores and achieving classical completeness has reached 100% classical completeness and these results have reached the minimum completeness criteria which is set, which is $\geq 85\%$.
2. Chemistry Tricky Test is responded very well that reached 98.7% students agreed that this media is appropriate for online chemistry learning on hydrocarbon material.

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