Effectiveness of Educational Games in Improving Students' Cognitive and Social Skills

Dindin Abidin [1]
[1] *Universitas Islam 45, Indonesia*

Corresponding Author: Dindin Abidin,   E-mail; dindin_abidin@unismabekasi.ac.id

ABSTRACT

Cognitive ability is an inner skill that uses the brain that is needed to perform tasks or anything that is simple to the most complex tasks. Games in education for students will help them develop the ability of cognitive structures in themselves, with the development of cognitive skills, students will also foster social attitudes in themselves and will help them socialize in society. The purpose of this study is to examine the effectiveness of educational games in improving students' cognitive and social skills. This research was conducted to understand that educational games can improve students' cognitive skills and can also develop students' social attitudes, while this research will also illustrate whether these educational games can be applied to all levels of education in schools. The method used in this study is a quantitative method in which in this case, the data collection used is by means of a questionnaire, with the correlation method to be applied through SPSS statistical software. Respondents involved in this study are students who are currently studying elementary school education and the results of the preparation of students who are used as assessment materials. The results obtained from this study explain that the effectiveness of educational games in improving students' cognitive and social skills has a good impact on students who are taking elementary school education, educators can also find out the effectiveness of educational games in improving students' cognitive and social skills. The conclusion obtained from this research outlines the effectiveness of educational games in improving the cognitive and social skills of students who are still studying in elementary school. With educational games can also find out the cognitive skills possessed by students and can also find out their attitudes in their social environment. Educational games can also develop students' cognitive and social attitudes.

Keywords: *Games, Skills, Students*

INTRODUCTION

Education is a process of changing attitudes and behavior in a person in an effort to mature through training. Education is also a very important aspect for individuals in forming and obtaining quality individuals and having a good personality (Yang et al., 2019). In the learning process that students will go through, an educator needs to know the methods that will be used and developed for students and whether the effective methods that will be used and developed for students that educators will teach, and the

methods that will be used are effective in improving students' cognitive and social skills (Bediou et al., 2018). Active learning methods are creative ways to increase student motivation, attention, engagement and the methods used are considered to help the learning process in the classroom, so the methods to be used are considered necessary in the learning process (Dias et al., 2019).

One of the solutions that can be used in this educational method is (Lamb et al., 2018). Educational games are a learning method that involves active student interaction and involvement through educational game methods (Chou et al., 2018). In this educational game method, students will be faced with situations or challenges that involve problem solving. This game method is formed to help or facilitate students in learning certain concepts and can develop certain skills needed in these students (Claro et al., 2018). The educational game method is also effective in improving cognitive and social skills, where in the game, students experience directly and can interact directly in understanding people's perspectives, appreciate differences and can work as a team in the game played in the educational process that is passed.

Problems that exist in the effectiveness of educational games in improving students' cognitive and social skills (Zhang & Mi, 2018). The problem is the lack of understanding and knowledge of an educator in the application of this educational game. Many educators still do not understand the application of concepts and potential in educational games (Pettersen et al., 2021). Some of these educators do not know or realize the true benefits of using educational games in improving students' cognitive and social skills, and also many educators provide material to their students and assume that students who have high scores are smart students (Bray et al., 2018). So that students who are more inclined to activeness such as games applied in learning do not get the opportunity to develop cognitive and social skills.

Besides the lack of understanding of an educator in understanding this educational game, another problem is that there are obstacles in technology (Kanehisa et al., 2019). Where if a school or educational institution implements an online-based or technology-based educational game, there will be obstacles such as data security, device availability, and also unstable internet or network connectivity, especially if the school is in a rural area where the internet network is difficult (Khan & Salah, 2018). Of course, this can be a problem or obstacle in the effectiveness of educational games in improving students' cognitive and social skills (Hoffmann et al., 2020). Not all educational games are equally effective. Some games may be poorly structured or less relevant to educational objectives.

All of these issues are important to discuss because if they are not addressed, they may hinder the potential of educational games to maximize students' cognitive and social skills (Korber et al., 2020). Students who have the ability or tendency to learn who like to involve themselves and are also active, of course, this will hinder these students in developing the cognitive or social skills possessed by these students, so they do not get these opportunities (Bikbov et al., 2020). Each student has a different way or pattern of learning, so with this educational game students will be able to develop cognitive and social skills within the student, besides that the environmental changes in learning are

changing rapidly, especially in technology (Paradis & Schliep, 2019) . Games in education are one of the rapidly growing innovations.

The problems that exist in using educational games in improving students' cognitive and social skills can be overcome by an educator to better understand the application of educational games that will be applied to elementary school students (Pettersen et al., 2021). Study the concept or potential that will be obtained in applying this educational game to elementary school students and the impact that will be experienced by these students (Kuderer et al., 2020). Educators who will apply these educational games should also conduct training in advance, what types of games will be applied and what kind of concepts will be used in the game, and also know the actual benefits of using educational games in improving students' cognitive and social skills (Deutsch et al., 2018). And whether these educational games are useful for students.

The study was conducted to determine the effectiveness of educational games in improving students' cognitive and social skills (Wu, Zeng, et al., 2018). In the research conducted, there are gaps, so researchers contribute to filling the gaps in the research by applying the methods in the research (Pang et al., 2021). The method used in this study is a quantitative method by distributing questionnaires and elementary school students who are currently taking education which is used as a tool for assessment (Romer & Jamieson, 2020). Innovations that can be used by educators in educational games in improving students' cognitive and social skills can take advantage of the sophistication of technology in this day and age, which is all technology (Hinings et al., 2018). With the sophistication of today, it can be utilized to collaborate in education both in the form of communication between students and teachers and in the form of problem solving in improving students' skills and social skills in using technology.

In this study the researcher also has several questions including, what is the effect of using educational games on interpersonal communication and collaboration skills among students? (Ajzen, 2020). The application of this educational game to students also aims to improve students' cognitive skills, encourage active learning and students are able to develop their social skills (Midega et al., 2018). With the effectiveness of educational games, the use of educational games can be done, where games are designed to teach students concepts in education in an interesting and interactive context (Luo et al., 2019). With the effectiveness of educational games, it is also expected to improve students' cognitive skills, both in terms of critical thinking, problem solving, and also expected to make learning fun and can motivate students in learning.

RESEARCH METHODOLOGY
Research Design

The research conducted uses a quantitative approach which is an element of the meteology of the research conducted by distributing questionnaires online (Beck et al., 2019). The purpose of using this quantitative method is to conduct research and explore the effectiveness of educational games in improving students' cognitive and social skills (Aghajani & Ghadimi, 2018). There are several considerations made by researchers using

the quantitative approach approach method in conducting this research, first, by using this quantitative method, researchers can try hypotheses between the relationship between the two variables, such as questionnaires, the more they agree with the answers to the effectiveness of educational games in improving students' cognitive and social skills, the more the application of educational games in the teaching and learning process will increase (Ahlqvist et al., 2018). Second, researchers chose this quantitative method because it can allow researchers to collect numerical data which can be done with reliability experiments on SPSS. In addition, the use of this method can be used by future researchers to broaden their knowledge of the current world of education.

This quantitative method is carried out with a systematic model, starting from the data collection process to its interpretation (Roth et al., 2018). The form of research that uses this quantitative method focuses more on the causes of certain characteristics in humans called flexible (Artz et al., 2018). This method has a clear, detailed, specific and fixed nature (Cobos et al., 2019). The flow of using quantitative research has been planned from the beginning and this quantitative research cannot be changed. So the quantitative approach itself is a flexible relationship or affiliation that will be analyzed objectively (Verity et al., 2020). Researchers in conducting this research used two sources, namely primary data sources and secondary data sources (Wu, Zhang, et al., 2018). Researchers collect data from various sources obtained such as the distribution of questionnaires conducted by researchers to university students, and the results of data collection from these respondents will be collected and input through the SPSS tool, so that with this input, researchers and readers can find out how many results are obtained from research conducted by researchers and also what percentage is in the table or diagram in this article (Tschandl et al., 2019). Therefore, the results obtained in the tables and diagrams are relevant and accurate.

Research Setting and Subjects

Researchers in conducting research using data collection techniques with survey methods and distributing questionnaires to respondents, namely to students at the elementary school education level (Gunderson et al., 2018). Dalam distributing questionnaires researchers use the publication method by utilizing social media (Asadi et al., 2018). In this study, there are two choices of respondents who will be analyzed by researchers or who will be tested, the first is respondents who agree with the effectiveness of educational games in improving students' cognitive and social skills, the second is respondents who disagree with the effectiveness of educational games in improving students' cognitive and social skills (Parsazadeh et al., 2018). The sample made in this study is elementary school students. These students will be asked questions through a google form questionnaire that will be shared about the theory of educational games for students. In this study, data will be collected and then analyzed using the correlation method. The correlation method is a statistical method, where this method involves two or more variables which will be expressed in the form of coefficients and correlations (Poitout et al., 2018). The correlation method can be used in SPSS and the data will be analyzed by means of elementary school students who will be tested.
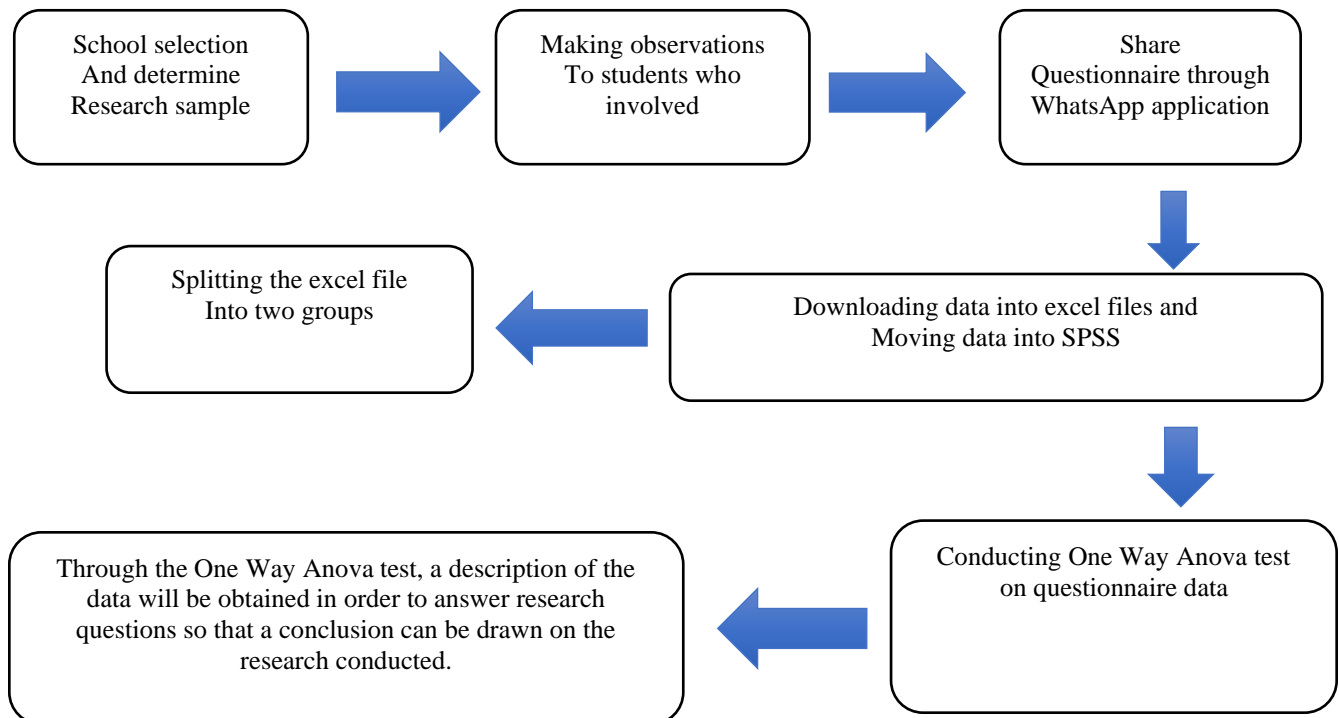
Table 1

Students' agreement with the effectiveness of educational games in improving students' cognitive and social skills.

NO	Acquisition Category	Education Level	Value Interval
1.	Agree	Elementary School	>60%
2.	Strongly Agree	Elementary School	30-40%
3.	Disagree	Elementary School	10-15%
			Total =100%

Related to table 1, in the study of the effectiveness of educational games in improving students' cognitive and social skills, researchers made statements totaling 15 questionnaire items. In each statement made, the researcher sets 3 answers which will be chosen by students as a result of the answers to the questionnaires that researchers distributed to these elementary school students. In each answer given by the respondent has a different percentage, as seen from table 1, in the choice of agreeing to get a percentage of 65%, in the choice of strongly agreeing to get a percentage of 40-50% percent, and in the last choice, namely the choice of disagreeing to get a percentage of 10-15%.

Figure 1

Flow of data collection, processing, and analysis.

In Figure 1 is a flow in the sequence of data collection and data processing carried out by researchers when collecting answers from respondents to respondents who have been given. Researchers conducted several stages in researching, namely, first the researcher determined the school and research sample. Second, researchers made observations of the students involved. Third, researchers distributed questionnaires through the whatsapp application, fourth download the questionnaire data into excel files

and move the data into SPSS software. Fifth, dividing the excel file into two groups, sixth, conducting a One Way Anova Test on the questionnaire data obtained. And finally, through the One Way Anova Test, a description of the data will be obtained in order to answer the researcher's questions so that the researcher can make conclusions about the research conducted.

RESULT AND DISCUSSION
Effectiveness of Educational Games in Improving Students' Cognitive and Social Skills

The effectiveness of educational games in improving students' cognitive and social skills, when viewed from the results of the questionnaire respondents who have been distributed, the effectiveness of educational games in improving students' cognitive and social skills can increase students' understanding of learning and also student involvement in the learning process which will create an effective and efficient learning process for students. The highest statement was in question 3 Agree, namely educational games are one way to be directly involved in learning, 100% of respondents said that games in education are one way for students to be directly involved in the learning process, then the results of respondents on question 2 which is not much different from the results of respondents' answers to question 1 Agree, namely whether educational games help students in improving students' problem-solving abilities, 92, 3% of respondents said that educational games can help students in their problem-solving abilities. So the effectiveness of educational games in improving students' cognitive and social skills is very beneficial for students.

The results of distributing questionnaires and interviews show that the effectiveness of educational games in improving students' cognitive and social skills is very useful in improving students' cognitive and social skills in the teaching and learning process, because the teaching and learning process that combines games and education can help students understand learning faster, because students are more likely to be involved in the teaching and learning process. From the results of the questionnaire that has been given to students in elementary schools, it is said that games in education can help students understand learning. Can be seen below are the results of the questionnaire respondents distributed by researchers through the whatsaapp application.

Percentage of Learner Agreement on Cognitive Learning Theory

In this study, researchers set each value to be able to calculate the percentage or score on the statement, namely on the statement strongly agree the researcher sets the score at 3, on the statement agree 3 and on the statement disagree 2. From these results it can show that elementary school students strongly agree with the statements that the effectiveness of educational games in improving students' cognitive and social skills.

Table 2

Based on the results of the questionnaires that have been distributed, it is obtained according to the respondents' answers.

NO	Statement	Persentace	Agree	Strongly Agree	Disagree
1.	Do educational games help students in improving students' problem solving	100%	92,3%	7,7%	0%
2.	Are educational games effective in improving students' cognitive skills?	100%	84,6%	15,4%	0%
3.	Educational games are one way to be directly involved in learning	100%	100%	0%	0%
4.	Educational games will make children more active in learning	100%	76,9%	23,1%	0%
5.	Schools should prepare facilities for teachers to implement educational games.	100%	69,2%	30,8%	0%
6.	Educational games make it easier for students to understand learning	100%	61,5%	38,5%	0%
7.	Games in learning make it easier for teachers to explain learning	100%	61,5%	38,5%	0%
8.	Educational games should not be implemented in schools	100%	15,4%	7,7%	76,9%
9.	Educational games make children bored in learning	100%	30,8%	0%	69,2%
10.	What role do educational games play in child development	100%	84,6%	15,4%	0%
11.	Educational games can reduce social attitudes in children	100%	30,8%	0%	69,2%
12.	All teachers should be able to apply educational games	100%	61,5%	23,1%	15,4%
13.	Games in learning will reduce student concentration while learning	100%	23,1%	7,7%	69,2%
14.	Educational games will make children uncomfortable during the learning process	100%	30,8	0%	69,32%
15.	Games in learning can help students think more about learning	100%	76,9%	23,1%	0%

From the table, researchers can conclude that in the first statement with the question do educational games help students in improving student problem solving? 92.3% answered agree that educational games help students in improving their problem solving, 7.7% said strongly agree, and 0% disagree, meaning that no one disagrees with educational games helping students in improving problem solving. The next answer to the second question is whether educational games are effective in improving students' cognitive skills? 84.6% said agree with educational games can improve cognitive skills in students, 15.4% said strongly agree with educational games can improve students' cognitive skills and 0% said disagree. Furthermore, in the third question, namely the game is one way to be directly involved in learning with the answers 100% of respondents

answered agree with the question because the game in education allows students to be directly involved in the learning process because the student will play the game in education, 0% of respondents answered strongly agree and 0% of respondents answered disagree. In the next statement, namely on the question of educational games will make children more active in learning, 76.9% of respondents answered that educational games will make children more active in learning because in the game, children will think and will be more active in the teaching and learning process, 23.1% of respondents answered strongly agree that educational games will make children more active in learning and 0% of respondents answered disagree. In the next statement, namely that schools must facilitate teachers to implement educational games with 69.2% of respondents said they agreed that schools must facilitate teachers in implementing educational games because if schools do not provide facilities for teachers who want to implement educational games then the teacher will have difficulty in implementing them, 30.8% of respondents answered strongly agree that schools must facilitate teachers who will implement educational games and for respondents who answered disagree, namely 0%.

Furthermore, the statement of educational games makes it easier for students to understand learning 61.5% of respondents answered agree with educational games making it easier for students to understand learning, 38.5% of respondents answered strongly agree with educational games making it easier for students to understand learning because with games in education students will be able to understand learning directly and practice it, 0% of respondents answered disagree. The next statement is that games in learning make it easier for teachers to explain learning 61.5% of respondents answered agree with educational games making it easier for teachers to explain learning because with educational games teachers can practice directly to students, 38.5% of respondents answered strongly agree with teachers being younger in explaining learning with educational games, and 0% of respondents answered disagree or no respondents disagreed with educational games making it easier for teachers to explain learning. In the next statement, namely educational games should not be implemented in schools, 15.5% of respondents answered agree because each child has different ways of learning and understands learning differently, 7.7% of respondents answered strongly agree because it can disrupt the learning process of students and make students careless in learning, and 76.9% of respondents answered that educational games should not be implemented in schools because respondents believe and believe that educational games will make students easier and can develop their creativity in learning, so respondents answered disagree if educational games are not implemented in schools. Furthermore, the statement that educational games make children bored in learning 30.8% of respondents answered that they agreed with educational games making children bored in learning, 0% of respondents answered strongly agree, and 69.2% of respondents answered disagree if educational games made children bored in learning. Furthermore, the question is, do educational games play a role in child development? 84.6% of respondents answered agree that educational games play a role in child development, 15.4% of respondents answered strongly agree that educational games play a role in child development because

educational games will help students develop both cognitive and social, 0% of respondents answered disagree.

Furthermore, the statement of educational games reduces social attitudes in children, 30.8% of respondents answered that educational games can reduce social attitudes in children, 0% of respondents answered strongly agree, and in the answer disagree the respondent answered 60.2% because the respondent believes that educational games can help students develop their social attitudes both to the teacher and to their friends. In the next statement, namely all teachers must be able to apply educational games, 61.5% of respondents answered that they agreed that educational games must be applied by teachers in the learning process in order to help students understand learning, 23.1% of respondents answered strongly agree that teachers must apply games in education, and 15.4% of respondents answered that they did not agree if teachers applied educational games in learning because the respondents were afraid that later it would affect student concentration. Furthermore, in the statement that games in learning will reduce the concentration of learning in students, 23.1% of respondents answered agree if educational games can reduce concentration in students, as many as 7.7% of respondents answered strongly agree, and in the answer respondents disagreed as much as 69.2% that educational games would not reduce the concentration of learning in students. Furthermore, in the statement that educational games make children uncomfortable during the learning process, 30.8% of respondents answered agree if educational games make children uncomfortable with learning, 0% of respondents answered strongly agree, and in the answer disagree as much as 69.2% of respondents said that educational games will not make children uncomfortable with learning because with games children will be able to express their attitudes. In the last statement, namely games in learning will help students think more in learning, 76.9% of respondents answered agree that educational games will help children think more in learning, and in the answer respondents strongly agreed, namely 23.1% because games in education will help children think more in learning, and in the answer disagree, namely 0% of respondents answered, because all respondents agreed that educational games make children think in learning.

From the observations that the researchers have summarized in the form of the table above, the researchers found that in statement no. 12, namely that all teachers must apply games in education, 100% of the respondents who filled out the questionnaire found respondents who answered agreed with a percentage of 61.5% and who answered strongly agreed with a percentage of 23, 1% while those who answered disagreed were 15.4%. This happened probably because of the following things: The first is, teachers must apply games in education in the learning process. Because games in education can help students develop the skills that exist in students. If the teacher only sticks to the book and always explains the material, it will make children bored and will feel bored in learning. Furthermore, in explaining the material, if a teacher is not creative in explaining the material such as applying games in education or in the teaching and learning process, then

in explaining the material, a conducive and effective class will not be created for students and it will interfere with the process of students understanding the teacher's explanation. Furthermore, on student involvement in the teaching and learning process, games in learning will make the learning process more interesting and interactive, so that students can be involved in the teaching and learning process. Furthermore, teachers must apply educational games in education so that in the learning process it will make students to further enhance the understanding of concepts in students, games often use a practical approach to teach complex concepts to students, so that students understand them.

From the explanation above, the researcher has briefly explained the answers given by the respondents to the questionnaire that the researcher has distributed and has researched the percentage of the answers given by the respondents concisely, carefully, and precisely so that it can be understood about the effectiveness of educational games in improving students' cognitive and social skills. The data that researchers get is accurate data, from questionnaires made by researchers and which researchers distribute to respondents through the whatsaapp application, and researchers get the results of the results that researchers have explained.

Table 3

One Way Anova Test Class A

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
X.1	Class A	.923	4	.231	.	.
	Class A	.000	8	.000		
	Total	.923	12			
X.2	Class A	1.026	4	.256	3.077	.082
	Class A	.667	8	.083		
	Total	1.692	12			
X.3	Class A	.000	4	.000	.	.
	Class A	.000	8	.000		
	Total	.000	12			
X.4	Class A	1.641	4	.410	4.923	.027
	Class A	.667	8	.083		
	Total	2.308	12			
X.5	Class A	2.103	4	.526	6.308	.014
	Class A	.667	8	.083		
	Total	2.769	12			
X.6	Class A	2.410	4	.603	7.231	.009
	Class A	.667	8	.083		
	Total	3.077	12			
X.7	Class A	3.077	4	.769	.	.

		Sum of Squares	df	Mean Square	F	Sig.
	Class A	.000	8	.000		
	Total	3.077	12			

Table 4

One Way Anova Test of Class B

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
y.1	Class B	4.769	5	.954	.	.
	Class B	.000	7	.000		
	Total	4.769	12			
y.2	Class B	2.019	5	.404	3.769	.056
	Class B	.750	7	.107		
	Total	2.769	12			
y.3	Class B	.692	5	.138	.969	.496
	Class B	1.000	7	.143		
	Total	1.692	12			
y.4	Class B	2.769	5	.554	.	.
	Class B	.000	7	.000		
	Total	2.769	12			
y.5	Class B	2.173	5	.435	1.106	.435
	Class B	2.750	7	.393		
	Total	4.923	12			
y.6	Class B	5.077	5	1.015	.	.
	Class B	.000	7	.000		
	Total	5.077	12			
y.7	Class B	2.769	5	.554	.	.
	Class B	.000	7	.000		
	Total	2.769	12			

After researchers collected data as many as 14 questions related to effective educational games in improving students' cognitive and social skills. The next step taken by the researcher is to import the data and collect the data obtained in the questionnaire on google form. After that the data is downloaded to excel and then edited based on data processing in the SPSS application, then edited based on data processing in the SPSS application, then placed on data that has been analyzed with uni one way anova.

Related to effective educational games in improving students' cognitive and social skills can affect the teaching and learning process. With the benefits of educational games, students can be motivated in learning, although there are still negative sides of educational games in improving students' cognitive and social skills.

Effectiveness of Educational Games in Improving Students' Cognitive and Social Skills

Educational games are methods or ways used in learning by using game elements, such as goals, rules, rewards, and challenges to increase student learning motivation. In educational games in learning, students not only learn formally or focus on the material but students also get a play experience through the application of these educational games. Through this research, researchers suggest that in this educational game, students can solve a problem together and also students will be directly involved in the learning process. With interesting and creative educational games applied by teachers, students can increase the motivation of students in learning. By conducting this research, it can be known what factors make this educational game interesting for students. This research can help in developing games to improve what factors can increase learning motivation in students. Furthermore, by conducting this research, it can be known to what extent the role of educational games in improving cognitive and social skills in students, and helping students in understanding learning materials. This research can provide an overview to develop games to improve game features to suit learning needs.

In addition, researchers also found that using games in learning can run more effectively, and also many students say the learning process will be more effective by using games, and students can be more directly involved in the learning process. With games in education students will not feel bored or saturated in the teaching and learning process, and also students can develop their cognitive skills and also their social attitudes both to the teacher and to their friends. In addition, previous research also states that by using games in the learning process students can feel playing while learning and can also further develop students' thinking. Furthermore, by applying games in the teaching and learning process can develop students' social attitudes such as in working together and also solving problems together with their friends. This can be seen in the results and discussion of previous researchers.

A Comparison of Literature on the Effectiveness of Educational Games in Improving Students' Cognitive and Social Skills.

The relationship between students and the role of games in education has a very close relationship in increasing motivation in learning and also student involvement with educational games. Which with the application of educational game learning in an elementary school level can provide very important benefits or uses in the teaching and learning process. Related to the teaching and learning process, the researcher found that in the application of teaching methods using educational games in improving students' cognitive and social skills at the elementary school level views that the learning process involves changes in the learning process.

In addition, researchers also found that learning by using games will involve students in the teaching and learning process, which the statement was found by researchers in the results of the questionnaire distributed by researchers, so this educational game if applied in learning it will provide opportunities for students to be directly involved in the teaching and learning process. Students will feel happy if they are directly involved in the learning process because there students will be able to develop themselves and also develop their cognitive skills. With educational games in learning, an

effective learning atmosphere will be created and students will also be able to understand and also capture learning well. In this process it is also important for individuals to understand basic concepts and skills before learning more complex concepts. In addition, researchers also suggest that educational games must be applied by teachers in learning, because with the games in education that are applied by teachers in the learning process, because it will help students understand the learning explained or explained by the teacher in the learning process. Therefore, it is also important for a teacher to apply educational games in the learning process.

Based on the results and discussion above, it can be seen that the very important role of educational games in improving students' cognitive and social skills can cover aspects of questionnaire questions that have been distributed by researchers with various answers from respondents or students at the elementary school level that in the learning process is an active process in learning that involves changes in the way students understand and think in the learning process, with this educational game learning emphasizes more on the results. Educational games have a positive effect on efforts to improve cognitive and social skills in students. Students involved in educational games have significant cognitive improvements, such as in problem solving, critical thinking skills, and decision making. In addition, educational games improve students' social skills such as cooperation, interpersonal communication and empathy.

CONCLUSION

The effectiveness of educational games in improving students' cognitive and social skills, provides a good impact or effect related to learning by using the educational game method by applying it during the teaching and learning process. This educational game is not only focused on one learning material but can be applied to other learning materials. And also students will be more focused in learning which can improve the memory and cooperation of students in the teaching and learning process. In this study, Penenliti used a method that is quantitative method, this study uses data collection with the results given by the questionnaire on the answers to the questionnaire that has been filled in, and with the collection of these data, it can be used SPSS software by conducting reliability testing and involving elementary school students.

Researchers in conducting research on the effectiveness of educational games in improving students' cognitive and social skills, it can be concluded that educational games have an impact on students, namely positive impacts and also negative impacts obtained from the results of the questionnaire. The positive impact is that educational games provide benefits or a good impact on students, one of which is that during the teaching and learning process, students will be able to organize or use their minds in solving their problems and also students can train their social attitudes and also cooperate with each other. The negative impact is: seen from the results of the questionnaire, educational games can disrupt the concentration and focus of students in learning so to overcome this, the teacher can do or choose a better and more effective learning method for students in learning. In addition, the application of educational games will help students to actively

participate in the teaching and learning process, thus the effectiveness of educational games can help students develop a better understanding of learning and can also improve learning achievement in students.

REFERENCES

Aghajani, G., & Ghadimi, N. (2018). Multi-objective energy management in a micro-grid. *Energy Reports*, *4*, 218–225. https://doi.org/10.1016/j.egyr.2017.10.002

Ahlqvist, E., Storm, P., Käräjämäki, A., Martinell, M., Dorkhan, M., Carlsson, A., Vikman, P., Prasad, R. B., Aly, D. M., Almgren, P., Wessman, Y., Shaat, N., Spégel, P., Mulder, H., Lindholm, E., Melander, O., Hansson, O., Malmqvist, U., Lernmark, Å., … Groop, L. (2018). Novel subgroups of adult-onset diabetes and their association with outcomes: A data-driven cluster analysis of six variables. *The Lancet Diabetes & Endocrinology*, *6*(5), 361–369. https://doi.org/10.1016/S2213-8587(18)30051-2

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, *2*(4), 314–324. https://doi.org/10.1002/hbe2.195

Artz, J., Müller, T. E., Thenert, K., Kleinekorte, J., Meys, R., Sternberg, A., Bardow, A., & Leitner, W. (2018). Sustainable Conversion of Carbon Dioxide: An Integrated Review of Catalysis and Life Cycle Assessment. *Chemical Reviews*, *118*(2), 434–504. https://doi.org/10.1021/acs.chemrev.7b00435

Asadi, M., Asadi, A., & Aberoumand, S. (2018). An experimental and theoretical investigation on the effects of adding hybrid nanoparticles on heat transfer efficiency and pumping power of an oil-based nanofluid as a coolant fluid. *International Journal of Refrigeration*, *89*, 83–92. https://doi.org/10.1016/j.ijrefrig.2018.03.014

Beck, H. E., Wood, E. F., Pan, M., Fisher, C. K., Miralles, D. G., Van Dijk, A. I. J. M., McVicar, T. R., & Adler, R. F. (2019). MSWEP V2 Global 3-Hourly 0.1° Precipitation: Methodology and Quantitative Assessment. *Bulletin of the American Meteorological Society*, *100*(3), 473–500. https://doi.org/10.1175/BAMS-D-17-0138.1

Bediou, B., Adams, D. M., Mayer, R. E., Tipton, E., Green, C. S., & Bavelier, D. (2018). Meta-analysis of action video game impact on perceptual, attentional, and cognitive skills. *Psychological Bulletin*, *144*(1), 77–110. https://doi.org/10.1037/bul0000130

Bikbov, B., Purcell, C. A., Levey, A. S., Smith, M., Abdoli, A., Abebe, M., Adebayo, O. M., Afarideh, M., Agarwal, S. K., Agudelo-Botero, M., Ahmadian, E., Al-Aly, Z., Alipour, V., Almasi-Hashiani, A., Al-Raddadi, R. M., Alvis-Guzman, N., Amini, S., Andrei, T., Andrei, C. L., … Vos, T. (2020). Global, regional, and national burden of chronic kidney disease, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *395*(10225), 709–733. https://doi.org/10.1016/S0140-6736(20)30045-3

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. (2018). Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, *68*(6), 394–424. https://doi.org/10.3322/caac.21492

Chou, C.-H., Shrestha, S., Yang, C.-D., Chang, N.-W., Lin, Y.-L., Liao, K.-W., Huang, W.-C., Sun, T.-H., Tu, S.-J., Lee, W.-H., Chiew, M.-Y., Tai, C.-S., Wei, T.-Y., Tsai,

T.-R., Huang, H.-T., Wang, C.-Y., Wu, H.-Y., Ho, S.-Y., Chen, P.-R., … Huang, H.-D. (2018). miRTarBase update 2018: A resource for experimentally validated microRNA-target interactions. *Nucleic Acids Research*, *46*(D1), D296–D302. https://doi.org/10.1093/nar/gkx1067

Claro, M., Salinas, A., Cabello-Hutt, T., San Martín, E., Preiss, D. D., Valenzuela, S., & Jara, I. (2018). Teaching in a Digital Environment (TIDE): Defining and measuring teachers' capacity to develop students' digital information and communication skills. *Computers & Education*, *121*, 162–174. https://doi.org/10.1016/j.compedu.2018.03.001

Cobos, M. E., Peterson, A. T., Barve, N., & Osorio-Olvera, L. (2019). kuenm: An R package for detailed development of ecological niche models using Maxent. *PeerJ*, *7*, e6281. https://doi.org/10.7717/peerj.6281

Deutsch, C. A., Tewksbury, J. J., Tigchelaar, M., Battisti, D. S., Merrill, S. C., Huey, R. B., & Naylor, R. L. (2018). Increase in crop losses to insect pests in a warming climate. *Science*, *361*(6405), 916–919. https://doi.org/10.1126/science.aat3466

Dias, P., Silva, R., Amorim, P., Lains, J., Roque, E., Pereira, I. S. F., Pereira, F., & Santos, B. S. (2019). Using Virtual Reality to Increase Motivation in Poststroke Rehabilitation. *IEEE Computer Graphics and Applications*, *39*(1), 64–70. https://doi.org/10.1109/MCG.2018.2875630

Gunderson, E. A., Park, D., Maloney, E. A., Beilock, S. L., & Levine, S. C. (2018). Reciprocal relations among motivational frameworks, math anxiety, and math achievement in early elementary school. *Journal of Cognition and Development*, *19*(1), 21–46. https://doi.org/10.1080/15248372.2017.1421538

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, *28*(1), 52–61. https://doi.org/10.1016/j.infoandorg.2018.02.004

Hoffmann, M., Kleine-Weber, H., Schroeder, S., Krüger, N., Herrler, T., Erichsen, S., Schiergens, T. S., Herrler, G., Wu, N.-H., Nitsche, A., Müller, M. A., Drosten, C., & Pöhlmann, S. (2020). SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor. *Cell*, *181*(2), 271-280.e8. https://doi.org/10.1016/j.cell.2020.02.052

Kanehisa, M., Sato, Y., Furumichi, M., Morishima, K., & Tanabe, M. (2019). New approach for understanding genome variations in KEGG. *Nucleic Acids Research*, *47*(D1), D590–D595. https://doi.org/10.1093/nar/gky962

Khan, M. A., & Salah, K. (2018). IoT security: Review, blockchain solutions, and open challenges. *Future Generation Computer Systems*, *82*, 395–411. https://doi.org/10.1016/j.future.2017.11.022

Korber, B., Fischer, W. M., Gnanakaran, S., Yoon, H., Theiler, J., Abfalterer, W., Hengartner, N., Giorgi, E. E., Bhattacharya, T., Foley, B., Hastie, K. M., Parker, M. D., Partridge, D. G., Evans, C. M., Freeman, T. M., De Silva, T. I., McDanal, C., Perez, L. G., Tang, H., … Wyles, M. D. (2020). Tracking Changes in SARS-CoV-2 Spike: Evidence that D614G Increases Infectivity of the COVID-19 Virus. *Cell*, *182*(4), 812-827.e19. https://doi.org/10.1016/j.cell.2020.06.043

Kuderer, N. M., Choueiri, T. K., Shah, D. P., Shyr, Y., Rubinstein, S. M., Rivera, D. R., Shete, S., Hsu, C.-Y., Desai, A., De Lima Lopes, G., Grivas, P., Painter, C. A., Peters, S., Thompson, M. A., Bakouny, Z., Batist, G., Bekaii-Saab, T., Bilen, M. A., Bouganim, N., … West, J. (2020). Clinical impact of COVID-19 on patients with

cancer (CCC19): A cohort study. *The Lancet*, *395*(10241), 1907–1918. https://doi.org/10.1016/S0140-6736(20)31187-9

Lamb, R. L., Annetta, L., Firestone, J., & Etopio, E. (2018). A meta-analysis with examination of moderators of student cognition, affect, and learning outcomes while using serious educational games, serious games, and simulations. *Computers in Human Behavior*, *80*, 158–167. https://doi.org/10.1016/j.chb.2017.10.040

Luo, E., Zhang, H., Wang, X., Gao, L., Gong, L., Zhao, T., Jin, Z., Ge, J., Jiang, Z., Liu, C., & Xing, W. (2019). Single-Atom Cr−N $_4$ Sites Designed for Durable Oxygen Reduction Catalysis in Acid Media. *Angewandte Chemie International Edition*, *58*(36), 12469–12475. https://doi.org/10.1002/anie.201906289

Midega, C. A. O., Pittchar, J. O., Pickett, J. A., Hailu, G. W., & Khan, Z. R. (2018). A climate-adapted push-pull system effectively controls fall armyworm, Spodoptera frugiperda (J E Smith), in maize in East Africa. *Crop Protection*, *105*, 10–15. https://doi.org/10.1016/j.cropro.2017.11.003

Pang, Z., Chong, J., Zhou, G., de Lima Morais, D. A., Chang, L., Barrette, M., Gauthier, C., Jacques, P.-É., Li, S., & Xia, J. (2021). MetaboAnalyst 5.0: Narrowing the gap between raw spectra and functional insights. *Nucleic Acids Research*, *49*(W1), W388–W396. https://doi.org/10.1093/nar/gkab382

Paradis, E., & Schliep, K. (2019). ape 5.0: An environment for modern phylogenetics and evolutionary analyses in R. *Bioinformatics*, *35*(3), 526–528. https://doi.org/10.1093/bioinformatics/bty633

Parsazadeh, N., Ali, R., & Rezaei, M. (2018). A framework for cooperative and interactive mobile learning to improve online information evaluation skills. *Computers & Education*, *120*, 75–89. https://doi.org/10.1016/j.compedu.2018.01.010

Pettersen, E. F., Goddard, T. D., Huang, C. C., Meng, E. C., Couch, G. S., Croll, T. I., Morris, J. H., & Ferrin, T. E. (2021). UCSF CHIMERAX: Structure visualization for researchers, educators, and developers. *Protein Science*, *30*(1), 70–82. https://doi.org/10.1002/pro.3943

Poitout, A., Crabos, A., Petřík, I., Novák, O., Krouk, G., Lacombe, B., & Ruffel, S. (2018). Responses to Systemic Nitrogen Signaling in Arabidopsis Roots Involve *trans* -Zeatin in Shoots. *The Plant Cell*, *30*(6), 1243–1257. https://doi.org/10.1105/tpc.18.00011

Romer, D., & Jamieson, K. H. (2020). Conspiracy theories as barriers to controlling the spread of COVID-19 in the U.S. *Social Science & Medicine*, *263*, 113356. https://doi.org/10.1016/j.socscimed.2020.113356

Roth, G. A., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Abebe, H. T., Abebe, M., Abebe, Z., Abejie, A. N., Abera, S. F., Abil, O. Z., Abraha, H. N., … Murray, C. J. L. (2018). Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1736–1788. https://doi.org/10.1016/S0140-6736(18)32203-7

Tschandl, P., Codella, N., Akay, B. N., Argenziano, G., Braun, R. P., Cabo, H., Gutman, D., Halpern, A., Helba, B., Hofmann-Wellenhof, R., Lallas, A., Lapins, J., Longo, C., Malvehy, J., Marchetti, M. A., Marghoob, A., Menzies, S., Oakley, A., Paoli, J., … Kittler, H. (2019). Comparison of the accuracy of human readers versus machine-learning algorithms for pigmented skin lesion classification: An open, web-based,

international, diagnostic study. *The Lancet Oncology*, *20*(7), 938–947. https://doi.org/10.1016/S1470-2045(19)30333-X

Verity, R., Okell, L. C., Dorigatti, I., Winskill, P., Whittaker, C., Imai, N., Cuomo-Dannenburg, G., Thompson, H., Walker, P. G. T., Fu, H., Dighe, A., Griffin, J. T., Baguelin, M., Bhatia, S., Boonyasiri, A., Cori, A., Cucunubá, Z., FitzJohn, R., Gaythorpe, K., … Ferguson, N. M. (2020). Estimates of the severity of coronavirus disease 2019: A model-based analysis. *The Lancet Infectious Diseases*, *20*(6), 669–677. https://doi.org/10.1016/S1473-3099(20)30243-7

Wu, Q., Zeng, Y., & Zhang, R. (2018). Joint Trajectory and Communication Design for Multi-UAV Enabled Wireless Networks. *IEEE Transactions on Wireless Communications*, *17*(3), 2109–2121. https://doi.org/10.1109/TWC.2017.2789293

Wu, Q., Zhang, S., Song, H.-F., Troyer, M., & Soluyanov, A. A. (2018). WannierTools: An open-source software package for novel topological materials. *Computer Physics Communications*, *224*, 405–416. https://doi.org/10.1016/j.cpc.2017.09.033

Yang, J.-H., Kang, L.-F., Liu, L., Peng, J.-T., & Qi, Y.-Q. (2019). Tracing the origin of ore-forming fluids in the Piaotang tungsten deposit, South China: Constraints from in-situ analyses of wolframite and individual fluid inclusion. *Ore Geology Reviews*, *111*, 102939. https://doi.org/10.1016/j.oregeorev.2019.102939

Zhang, Y., & Mi, Z. (2018). Environmental benefits of bike sharing: A big data-based analysis. *Applied Energy*, *220*, 296–301. https://doi.org/10.1016/j.apenergy.2018.03.101