



(RESEARCH ARTICLE)



The impact of the JIRE collaborative learning model based of smart apps creator on the learning outcomes and student character in learning physics

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Abstract

The purpose of this study was to determine the difference in learning outcomes after using JIRE collaborative learning model based on Smart Apps Creator, to describe the difference in student character after using JIRE collaborative learning model based on Smart Apps Creator, and to describe the interaction effect between learning outcomes and student character. Based on the results of the study, it is concluded that there are differences in learning outcomes using the JIRE collaborative learning model based on Smart Apps Creator on class XI of High School in Gorontalo Regency with one-group pretest-posttest obtained a significant value of 0.000 or smaller than 0.05 (F-count > F-table). There is a difference in character values using the JIRE collaborative learning model based on Smart Apps Creator with one-group pretest-posttest obtained a significant value of 0.000 or less than 0.05 (F-count > F-table). There is an interaction effect between learning outcomes and student character with JIRE collaborative learning model based on Smart Apps Creator on class XI of High School in Gorontalo Regency with one-group pretest-posttest test obtained a significant value of 0.000 or less than 0.05 (F-count > F-table).

Keywords: Student Learning Outcomes; Student Character; JIRE Collaborative Learning Model; Smart Apps Creator

1. Introduction

Problem-solving skills are very important for students. The goal is to be able to deal with problems that exist in the environment around them. Cahyani & Setyawati (2016) explained that skills can be formed if supported by innovative and fun learning. Thus, teachers need to choose and apply the right learning models and methods. In addition, it is necessary to utilize learner-oriented learning media, as well as strategies that are in accordance with the material being taught. Therefore, the learning model chosen should be related to current technological developments in order to motivate and attract students to learn.

One of the subjects in Senior High School (SMA) is Physics. This subject is classified as a subject that is considered difficult by students. Many students find it difficult to adjust to the existing materials and strategies the teacher applies in the learning process. In addition, this subject requires high thinking skills. Based on the researcher's observation of the implementation of learning in Gorontalo Regency High School, the teacher's teaching strategy has not been varied and seems monotonous. This is supported by an interview with the Principal of SMAN 1 Limboto, who said that teachers' teaching methods are still limited to the use of media and methods that are not yet oriented towards student-centered learning, teachers' ability to use the latest technology, both in learning strategies and media used in carrying out learning, is still considered low.

In addition to these observations and interviews, an interview with one of the Physics teachers at SMAN 1 Telaga Biru also illustrates that it is true that the use of models and media that utilize digital in accordance with the conditions of the current learning environment of students (digital native) is still limited. In addition, the current learning

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environment of students is more concerned with the use of digital, such as games on Android and so on. Thus, when presented with only teacher-centered learning, it causes low learning outcomes.

Meiskyarti Luma (2021) explains that teachers' role in shaping character and improving learning outcomes needs to condition teaching and learning strategies and adjust to the daily environment of students who are heavily influenced by digital use (gadgets). The collaborative model is one solution to improve learning outcomes and student character. According to Ntobuo (2018), the JIRE model collaborative method is a practical and effective method in learning activities.

Research done by Resti, et al. (2016) showed that the use of Android-based learning media and the use of JIRE collaborative models can improve the academic achievement of high school students. Research by Vilmala, et al. (2019), Rivai, et al. (2021), and Astuti, et al. (2017) also show the same results, that Android-based learning media and JIRE models can improve student learning outcomes and character. The results of this study are based on research on Physics subjects in high school.

Based on these problems, the researchers conducted a study with the title "The Impact of the JIRE Collaborative Learning Model Based of Smart Apps Creator on the Learning Outcomes and Student Character in Learning Physics". This study aims to determine the effect of the JIRE collaborative learning model on learning outcomes and student character in learning Physics in high school, especially in the Gorontalo Regency area.

2. Methods

This research is an experimental study involving several research variables. The research variables in question are the JIRE collaborative learning model variable (X) as the independent variable and the learning outcome variable (Y) as the dependent variable. Student character becomes a moderator variable, which is a variable that affects the relationship between the independent variable and the dependent variable. The research used a Pre-Experimental Design in the form of One-Group Pretest-Posttest Design. The sample in this study was 129 students from SMA Negeri 1 Telaga and SMA Negeri 1 Telaga Biru which were determined by purposive sampling technique. The research instruments used to collect data include questionnaires, observation sheets, and student learning outcomes tests. The research data were then analyzed using the Descriptive Statistical Analysis method.

3. Results

3.1. Prerequisite Test Analysis

3.1.1. Normality test

The normality test aims to test whether the sample used for this study comes from a normally distributed population or not. The technique used in this study is Kolmogorov-Smirnov because the research sample size is more than 50 respondents. It is said that the data is normally distributed if the significance value is greater than $\alpha = 0.05$. On the contrary, if the significance value is less than $\alpha = 0.05$, the data is not normally distributed.

Table 1 Normality Test Results

DependentVariable	IndependentVariable	Statistics	df	Significance of Kolmogorov-Smirnov
Learning Outcomes	Pretest	0.385	129	0.086
	Posttest	0.982	129	0.074
JIRE Model	Pretest	0.146	129	0.000
	Posttest	0.200	129	0.000
Number of Respondents			129	

Source: SPSS 25 test results output reprocessed

Based on the results in Table 1, the significance of the pretest variable before using the JIRE collaborative learning model based on Smart Apps Creator is greater than $\alpha = 0.05$, which is 0.086. So, it is concluded that the data is normally distributed. It was also found that the posttest significance value after treatment with the JIRE collaborative learning

model based on Smart Apps Creator obtained a significance value of 0.074, which is greater than $\alpha = 0.05$. So, it is concluded that the data is normally distributed. For the normality test on the JIRE model questionnaire, it is not normal because the significance value is smaller than α ($0.000 < 0.05$).

3.1.2. Homogeneity test

The variance homogeneity test was conducted using the Levene Test. The homogeneity test aims to determine the homogeneity of variance for pretest and posttest experimental classes. The homogeneity test results are presented in Table 2.

Table 2 Homogeneity Test Results of Learning Outcomes

Group		Levene Statistic	df1	df2	Sig.
Experiment	Based on Mean	0.907	1	256	0.342
	Based on Median	0.572	1	256	0.450
	Based on the Median and with adjusted df	0.572	1	252.810	0.450
	Based on trimmed mean	0.045	1	30	0.690

Source: SPSS 25 test results output reprocessed

Based on the results in Table 2, it is found that the significance value is 0.342 which is greater than $\alpha = 0.05$. Thus, it can be concluded that the assumption that each group comes from the same population and variance is accepted. This means that the level of confidence in the experimental class in using the JIRE collaborative learning model based on Smart Apps Creator is in the **good** category on learning outcomes in Physics learning before and after treatment.

The homogeneity test of student character assessment in learning Physics by using the JIRE collaborative learning model based on Smart Apps Creator can be seen in Table 3. Based on the results in the table, the significance value is 0.802 which means greater than $\alpha = 0.05$. So, it can be concluded that the assumption that each group comes from the same population and variance is accepted. This means that the level of confidence in the experimental class in using the JIRE collaborative learning model based on Smart Apps Creator is in the **good** category on character assessment in Physics learning before and after treatment.

Table 3 Results of the Student Character Homogeneity Test

Group		Levene Statistic	df1	df2	Sig.
Experiment	Based on Mean	0.063	1	256	0.802
	Based on Median	0.069	1	256	0.793
	Based on the Median and with adjusted df	0.069	1	255.88	0.793
	Based on trimmed mean	0.080	1	256	0.777

Source: SPSS 25 test results output reprocessed

3.2. Two Variant Fit Test

The suitability test of the two variants was carried out using the Paired Sample t-test. This method is used to see whether or not there is an average difference between the pretest and posttest. It is said that there is a significant difference if the significance value is less than $\alpha = 0.05$. The results of the two variants suitability test can be seen in Table 4.

Table 4 Paired Sample T-test of JIRE Model on Learning Outcomes

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest and Posttest Experiment on Learning Outcomes	81.52	11.19	0.69	80.15	82.89	116.977	257	0.000

Source: SPSS 25 test results output reprocessed

Based on the results in Table 4, a significance value of 0.000 is obtained, which is smaller than α ($0.000 < 0.05$). So, it can be concluded that there is a difference in the average pretest and posttest experimental class using the JIRE collaborative learning model based on Smart Apps Creator.

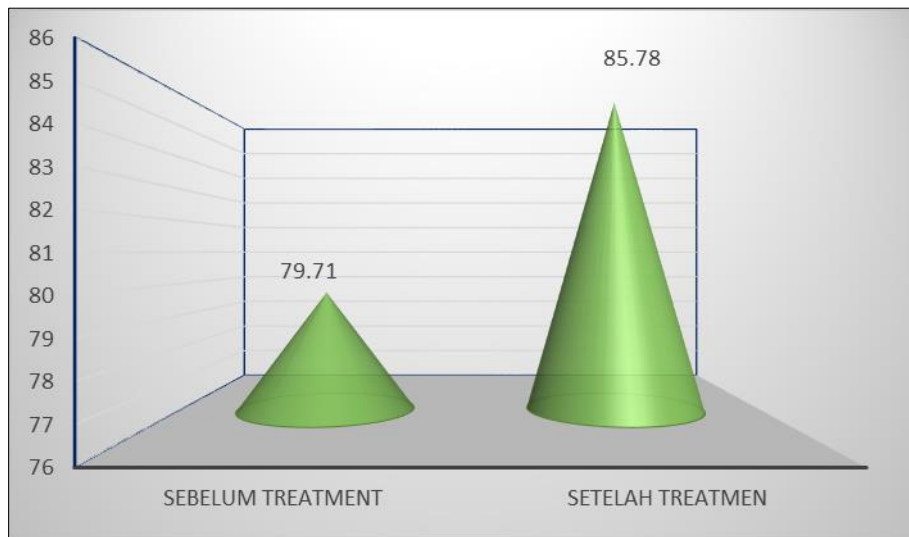


Figure 1 Diagram of the Improvement of Learning Outcomes Before and After Treatment Using the JIRE Collaborative Model Based on Smart Apps Creator

Based on Figure 1, it is very clear that there is an increase in learning outcomes after learning using the JIRE collaborative learning model based on Smart Apps Creator. Before the use of the JIRE collaborative learning model, the average percentage of learning outcomes was 79.71%, and after treatment increased by 6.07% to 85.78%.

Table 5 Paired Sample T-test of JIRE Model on Student Character

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest and Posttest Experiment on Student Character	67.90	19.18	1.19	65.555	70.25	56.85	257	0.000

Source: SPSS 25 test results output reprocessed

Based on the results in Table 5, a significance value of 0.000 is obtained, which is smaller than α ($0.000 < 0.05$). So, it can be concluded that there is an increase in the average assessment of the experimental class pretest with posttest by using the JIRE collaborative learning model based on Smart Apps Creator.

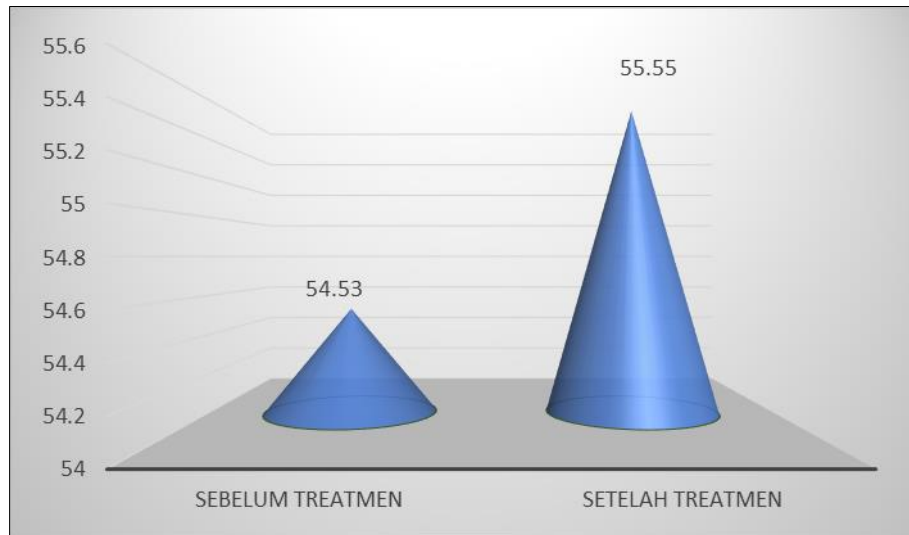


Figure 2 Diagram of Character Improvement Before and After Treatment Using JIRE Collaborative Model Based on Smart Apps Creator

Based on Figure 2, it is very clear that there is an increase in character assessment after learning using the JIRE collaborative learning model based on Smart Apps Creator. Before using the JIRE collaborative learning model, the average percentage of learning outcomes was 54.53%, and after treatment increased by 1.02% to 55.55%.

3.3. Hypothesis Test

3.3.1. Hypothesis 1

Hypothesis 1 is "There are differences in learning outcomes of learning Physics before and after the use of the JIRE collaborative learning model based on Smart Apps Creator". Acceptance or rejection of H_0 is determined by the interpretation of the significance value in the test of the between-subject effect table from the analysis of variance results. From the results of data processing, it is obtained that the learning model, in this case, the JIRE collaborative learning model based on Smart Apps Creator, has a significance value of 0.000 or smaller than $\alpha = 0.05$, so H_0 is rejected and H_a is accepted. This means that the use of the JIRE collaborative learning model based on Smart Apps Creator has a significant effect on student learning outcomes. The better the collaborative model used by the teacher, the higher the Physics learning outcomes of grade XI students in Gorontalo Regency High School.

3.3.2. Hypothesis 2

Hypothesis 2 is "There is a difference in student character assessment before and after the use of the JIRE collaborative learning model based on Smart Apps Creator". Acceptance or rejection of H_0 is determined by the interpretation of the significance value in the test of the between-subject effect table from the analysis of variance results. From the results of data processing, it is obtained that the learning model, in this case, the JIRE collaborative learning model based on Smart Apps Creator, has a significance value of 0.000 or smaller than $\alpha = 0.05$, so H_0 is rejected, and H_a is accepted. This means that the use of the JIRE collaborative learning model based on Smart Apps Creator has a significant effect on student characteristics. The better the collaborative model used by the teacher, the higher the student characteristics in Gorontalo Regency High School.

4. Discussion

4.1. There is an Effect of the JIRE Collaborative Learning Model Based on Smart Apps Creator on Learning Outcomes

Hypothesis 1 reads "There are differences in learning outcomes in learning Physics before and after the use of the JIRE collaborative learning model based on Smart Apps Creator". The results of data processing using the t-test show the significance result is 0.000 or smaller than $\alpha = 0.05$. This means that there are differences in learning outcomes with the use of the JIRE collaborative learning model based on Smart Apps Creator. The better the use of the JIRE collaborative learning model based on Smart Apps Creator, the better the learning outcomes will be towards improving better learning outcomes.

The use of creative and innovative learning models can improve student learning outcomes. This statement is supported by research by Chairunisa et al. (2022) which explains that the use of learning models is very important in explaining science. The JIRE collaborative learning model is a solution that can be used as an alternative to improving student learning outcomes and collaboration. The concept of JIRE collaborative learning itself is a learning method that has the potential to offer a way of solving how various problems can be solved by involving the participation of related learners collectively in a group. This group of learners conducts learning in collaboration according to their respective competencies (Ntobuo, 2018).

Batakene (2022) in his research explained that the use of Smart Apps Creator-based media showed an increase in student learning outcomes to 96.67% and exceeded the KKM standard. In other words, student learning outcomes after applying Smart Apps Creator learning media are achieved and have met the criteria for learning outcomes completeness. In addition to learning outcomes, the use of Smart Apps Creator-based learning media can also increase student motivation in carrying out learning. According to Uno (2011: 23), learning motivation is an internal and external drive in students who are learning to have behavior, generally with several indicators or elements that support it. These indicators, among others, are the desire to succeed, encouragement and needs in learning, future hopes and ideals, appreciation of learning, and a conducive learning environment.

Audie (2019) said that the use of learning media, in this case, Smart Apps Creator-based learning media, is a very important factor in improving student learning outcomes and increasing student motivation to learn because learning media is very supportive in developing one's knowledge, especially for students in the learning process. The application of using Smart Apps Creator-based learning in learning Physics shows that there is an increase in student learning outcomes.

4.2. There is an Effect of the JIRE Collaborative Learning Model Based on Smart Apps Creator on Student Characteristics

The JIRE collaborative model can improve the character of students. The learning model invites students to collaborate. Collaborative learning stimulates teachers to create many opportunities for students to learn from each other with peers in constructing knowledge or building concepts together (Santrock, 2010: 390). The implementation of character education in schools becomes more effective with the collaborative learning model. The success of collaborative learning is determined by the collaboration process between students and teachers so that character will also improve.

Based on the results of research and analysis using the one-group pretest-posttest experiment, the t-test significance value is 0.000, which is smaller than the $\alpha = 0.05$ level. Looking at the results of this data processing and the results of previous research, it is very clear that the better the use of the JIRE collaborative model based on Smart Apps Creator, the better the character of student learning in accordance with the expected character values.

JIRE collaborative learning model based on Smart Apps Creator certainly can interactively improve learning outcomes and student character. The validity test data is supported and can be a learning model that suits the learning needs in Gorontalo Regency High School. The implementation of research conducted in 2 selected schools with a total of 129 respondents obtained acceptable results, where the interaction of the JIRE collaborative model had a significance value of less than the $\alpha = 0.05$ level ($0.000 < 0.05$). The better the teacher uses JIRE Collaborative based on Smart Apps Creator, the better the learning outcomes and student character. Conversely, if the teacher's results are low in applying the JIRE collaborative learning model based on Smart Apps Creator, the learning outcomes and student character will also be low.

During the implementation of cooperative learning, students work together during group discussions. Groups that are arranged based on heterogeneous academic abilities make smarter students try to help their friends understand the material so that equal distribution of students' abilities in the class can be achieved. In cooperating and collaborating, it can form positive characters and high discipline, so that learning outcomes can improve.

JIRE collaborative learning model based on Smart Apps Creator is one model that provides opportunities for students to be able to express ideas or opinions in the home group which then becomes one of the group representatives in the expert group. Armed with the material and explanation provided by the teacher, the role of students in the expert group is very important because they can find solutions to the problems given and then the results of the expert group are conveyed back to the original group. This model also directs learners to be able to work together and respect each other's opinions between group members.

One of the advantages of the JIRE collaborative model based on Smart Apps Creator is that the application is very easy to use and contains learning support materials packaged in audiovisual form making it easier for students to understand the material presented. This application also greatly supports the learning process because this application can be used online or offline. Students can see the material presented anywhere so this has a positive impact on students to better understand each material presented. Understanding the material presented is one of the supporting factors for improving student learning outcomes. Students who are taught using the JIRE collaborative model based on Smart Apps Creator feel interested in continuing to develop and know in depth related to the material provided.

5. Conclusion

Based on the research results that have been presented, the following conclusions can be drawn:

- There are differences in learning outcomes using the JIRE collaborative learning model based on Smart Apps Creator on class XI of High School in Gorontalo Regency with one-group pretest-posttest obtained a significant value of 0.000 or smaller than 0.05 (F-count > F-table).
- There is a difference in character values using the JIRE collaborative learning model based on Smart Apps Creator with one-group pretest-posttest obtained a significant value of 0.000 or less than 0.05 (F-count > F-table).
- There is an interaction effect between learning outcomes and student character with JIRE collaborative learning model based on Smart Apps Creator on class XI of High School in Gorontalo Regency with one-group pretest-posttest test obtained a significant value of 0.000 or less than 0.05 (F-count > F-table).

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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