



The Effect of the Blended Learning Model on Social Attitudes and Improvement of Cognitive Learning Outcomes of Science Grade VII Students

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Abstrak

Model blended learning merupakan kombinasi strategi pembelajaran yang dilaksanakan dengan menyajikan variasi sumber belajar peserta didik guna untuk membantu memperluas dan memperdalam pemahaman belajar individu pada suatu materi pembelajaran. Oleh karena itu, penelitian ini memiliki tujuan untuk mengetahui dan mendeskripsikan pengaruh model blended learning terhadap sikap sosial, hasil belajar kognitif IPA siswa, dan peningkatan hasil belajar kognitif IPA setelah penerapan model blended learning. Selain itu, penelitian ini juga memiliki tujuan untuk mengetahui dan mendeskripsikan pengaruh model blended learning terhadap hasil belajar kognitif IPA siswa kelas VII melalui sikap sosial. Dalam pengumpulan data penelitian, metode penelitian yang digunakan dalam pelaksanaan penelitian ini adalah metode kuasi eksperimen (quasy experiment) dengan desain penelitian yaitu one group pretest-posttest design. Sampel penelitian yang digunakan adalah siswa kelas VII A SMP Negeri 2 Martapura OKU-Timur dengan jumlah 30 siswa sebagai kelas eksperimen. Dalam prosedur pengumpulan data penelitian, metode pengumpulan data yang digunakan diantaranya adalah menggunakan metode kuesioner/angket dan tes. Pada tahap pengujian data, penerapan model blended learning memiliki pengaruh yang signifikan baik terhadap sikap sosial siswa dan hasil belajar kognitif IPA siswa dengan hasil signifikansi hitung sebesar $0,00 < 0,05$. Sedangkan pengujian ketiga, penerapan model blended learning tidak memiliki pengaruh yang signifikan terhadap hasil belajar kognitif IPA siswa melalui sikap sosial siswanya yang ditunjukkan dari nilai t-hitung yang diperoleh sebesar $0,1049 < 2,052$ (t-tabel). Kemudian, pada pengujian ke-empat menjelaskan bahwa terdapatnya peningkatan hasil belajar kognitif IPA siswa kelas VII dengan menggunakan model pembelajaran blended learning dengan hasil perolehan N-gain sebesar 0,487 dengan kategori peningkatan cukup/sedang.

Kata Kunci: model blended learning, sikap sosial, hasil belajar kognitif

Abstract

The blended learning model is a combination of learning strategies that are implemented by presenting a variety of learning resources for students to help expand and deepen individual learning understanding of a learning material. Therefore, this study aims to find out and describe the influence of the blended learning model on social attitudes, students' cognitive learning outcomes, and the improvement of cognitive learning outcomes of science after the application of the blended learning model. In addition, this study also aims to find out and describe the influence of the blended learning model on the cognitive learning outcomes of science students in grade VII through social attitudes. In the collection of research data, the research method used in the implementation of this research is a quasi-experimental method (quasy experiment) with a research design, namely one group pretest-posttest design. The research sample used was students in grade VII A SMP Negeri 2 Martapura OKU-Timur with a total of 30 students as an experimental class. In the research data collection procedure, the data collection methods used include using questionnaires/questionnaires and test methods. In the data testing stage, the application of the blended learning model had a significant influence on both students' social attitudes and students' cognitive learning outcomes in science with a calculated significance result of $0.00 < 0.05$. Meanwhile, in the third test, the application of the blended learning model did not have a significant influence on students' cognitive learning outcomes in science through their students' social attitudes as shown by the t-count value obtained of $0.1049 < 2.052$ (t-table). Then, in the fourth test, it was explained that there was an increase in the cognitive learning outcomes of science students in grade VII by using a blended learning learning model with an N-gain of 0.487 with the category of moderate/moderate improvement

Keywords: blended learning model, social attitudes, cognitive learning outcomes

Introduction

The current educational paradigm is called 21st century learning which makes a lot of use of technological advances in every learning activity. Wijaya, et al. (2016) revealed that to face 21st century learning in every learning process, individuals are required to have critical thinking skills, knowledge and abilities in digital literacy, media literacy and be able to master ICT. This 21st century educational paradigm requires a relevant learning model. According to Sari (2016), currently the learning model that has developed in the educational environment and is in accordance with 21st century learning is the Blended Learning learning model. According to Darma, et al. (2020), the blended learning model is known as an innovative learning strategy that is able to produce 21st century competencies, which means that the blended learning model plays an important role in supporting the development of students' 4C (creativity, critical thinking, communication, and collaboration) skills. Therefore, the blended learning model can be used as a recommendation that can improve the quality of learning activities. The blended learning learning model has the concept of hybrid learning, which is a model that combines learning with a face-to-face approach (offline) and internet-based learning (online). Santoso and Chotibuddin (2020) and Hasbullah (2015) mentioned that there are several characteristics of the blended learning model, namely consisting of live synchronous, virtual synchronous, independent asynchronous, and collaborative asynchronous. Each of these characteristics has a percentage or proportion of its learning content which can be grouped into traditional, web, hybrid and full online learning types.

When viewed from the current learning implementation conditions, the concept of blended learning both quadrant and using a combination of other strategies, the blended learning learning model can still be an option both during the pandemic and learning towards the new normal. This is because the blended learning model is a learning strategy that is oriented towards learning concepts that provide benefits, such as helping and encouraging educators and students to be able to hold learning activities with a wider and deeper variety of learning resources. This statement is supported by Rusman (2015) who stated that the blended

learning model is a supplement to the learning program that supports the learning environment and expands the view of learning by utilizing technology in its learning activities. Considering one of the benefits and several types of characteristics described, the researcher hereby decided to choose the use of a blended learning model in this study, namely with a type of collaborative asynchronous learning model.

It is known that the concept of learning with blended learning that provides a wealth of access to knowledge, interaction, skills, effectiveness and efficiency is used as an application to improve the quality of learning. As in Abdullah (2018) research that the blended learning model contributes highly to learning outcomes and in increasing learning effectiveness. Wardani (2018) also mentioned that the success of learning can be seen if in the process of learning activities can create a learning environment that suits the learning style of each individual. Therefore, the application of the blended learning model can be an opportunity to achieve this success.

Apart from the application of the blended learning model in 21st century learning activities, it also requires a high or positive social attitude. Hasanah, et al. (2017) stated that a positive social attitude is a social attitude consisting of indicators of politeness, caring, tolerance, easy to get along / can socialize with friends, ready to sacrifice, fair, able to cooperate (mutual cooperation), responsible and prioritizing deliberation. Meanwhile, Subhi (2016) revealed that a positive social attitude is a social attitude whose application has been in accordance with the criteria of character values in the assessment of the learning curriculum or contained in core competencies 2 (KI-2), namely honesty, discipline, responsibility, care (tolerance and mutual cooperation), politeness, and confidence. This means that students who have good social attitude characteristics are students who have good honesty, discipline, responsibility, care and confidence in learning activities. However, as is known, the essence of science learning is to focus on scientific learning activities.

This explains that the implementation of the assessment of students' attitudes towards science learning used/developed in this study is an assessment of scientific attitudes in the social scope. In Basic Competency 2.1, it is revealed

that the competence of social attitudes in learning can be seen through the scientific behavior of students, which includes showing an attitude of curiosity, objectivity, honesty, carefulness, thoroughness, responsibility, critical thinking, openness and concern for the environment. Supporting this statement, Ridha (2020) also explained that the attitude assessment instrument in science learning is a special assessment instrument that must be able to be adjusted to the values that arise during the science learning process, these character values can be formed from the symptoms of social attitudes or the impacts of students' social interaction in science learning. Therefore, in order for social attitudes to be seen in the essence of science learning, the process of learning activities leads to the development of social-based scientific attitude competencies.

In an observation of an interview with one of the science subject teachers, it was known that SMP Negeri 2 Martapura, OKU-Timur Regency, in the cognitive assessment there were still students who obtained an average learning outcome that was less than the KKM (score 75) which can be seen from the data on student learning outcomes in the mid-semester exam of science subjects. Meanwhile, for the assessment of social attitudes, it also seems that there is less attention, especially scientific attitudes in the social space in science learning. Therefore, from these problems, a study was conducted that aims to find out and describe the effect of the application of the blended learning model on students' social attitudes, students' cognitive learning outcomes, on the cognitive learning outcomes of science through students' social attitudes, as well as to find out and describe the improvement of cognitive learning outcomes of science students in grade VII by using the blended learning model. Based on the background of the problem and the purpose of this research, the researcher decided to conduct a study with the title "The Influence of the Blended Learning Model on Social Attitudes and Improvement of Cognitive Learning Outcomes of Science Grade VII Students".

Method

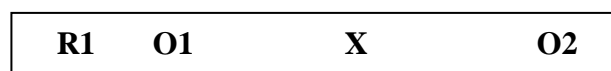


Figure 1. Research Design

The type of experimental research used in the implementation of this research is *quasi-experimental* or pseudo-experimental research model. This quantitative research was established with the aim that the research given treatment and the research variables measured could display conclusions as a result of the application of treatment when the sample used was not randomly selected. In addition, the treatment was also determined only on one learning treatment given to the experimental group, namely the application of *the blended learning* learning model. Thus, it can be said that the procedure of this research is to apply *a pretest* to the experimental group first before the treatment is given and *a posttest* is given to the experimental group after the researcher applies a treatment in learning. Jarnawi, et al. (2019) explained that quasi-experimental research or better known as *quasi-experimental research* was chosen as a type of research that emphasizes the application of treatment and the impact of its measurements as well as the units that are part of the experiment because the subjects or objects in the research are not randomly placed. Meanwhile, the determination of the research design in this quantitative research is to use *the one group pretest-posttest design* method. Rais, et al. (2016) explained that *the one group pretest-posttest design* is a design that has an experimental research design using pretest and posttest measurements to the study group that is given treatment. The selection of this type of design by the researcher is seen based on the purpose of its use, namely to assess how much basic knowledge students have in science learning and how much final knowledge students gain due to the influence of the application of the *blended learning model*. Thus, the impact or influence of the application of the learning model can explain the improvement of cognitive learning outcomes obtained by students in the learning process. Therefore, the application of this design uses the measurement of student learning outcomes based on one learning group, namely an experimental class or no control class. Thus, the design of this research according to Sugiyono (2016) can be seen as follows.

Information:

R1 = Experimental class

X = Model *blended learning*

O1 = *Pretest* in the experimental class

O2 = *Posttest* in the experimental class

This study took two classes as research samples using *the Purposive Sampling* technique. This technique is one of the non-random sampling techniques, where researchers can determine sampling by setting special criteria that are in accordance with the research objectives so that it is expected to help solve research problems. The sampling procedure used in this study is based on the learning achievement of students in the previous semester. So, in this case, the researcher decided that each number of research samples in the experimental group and the trial group was taken as many as 30 students.

The learning instrument used in this study is a HOTS question sheet consisting of essay questions or descriptions that are used to assess students' critical thinking skills in solving problems or phenomena in science learning. The questions used during the *pretest* and *posttest* consisted of 10 multiple-choice questions and 5 essay questions. As for the assessment of students' social attitudes, the ones measured in the study are scientific attitudes in the social scope using questionnaires and observation sheets consisting of peer assessments and self-assessments. The purpose of the assessment of students' social attitudes is to find out the development of attitudes or characters and social interactions of students formed in the learning process, especially in science learning, which is then given certain treatment. One of the indicators of assessing students' social attitudes in Basic Competency 2.1 Curriculum 2013, which includes scientific attitudes in the social environment such as honest attitude (skeptical of facts/data), discipline attitude (curiosity and positive towards failure), responsibility (cooperation), caring (sensitive to the surrounding

environment), confidence (open-mindedness and criticality), and politeness.

In addition, in the implementation of this research activity, there is a validity test and a reality test of the instrument in order to obtain the feasibility and relevance of the instrument used based on the criteria that have been determined. The test of the instrument was carried out by the test of instrument experts, respondents, and processed using Ms. Excel and the SPSS version 25 program. After the instrument to be used has been declared feasible and appropriate, research data is collected through observation/investigation activities in the experimental class. In the data processing of this study, the data analysis techniques used consist of 2 types, namely the analytical prerequisite test and the hypothesis test. In the prerequisite test, the data analysis used in this study is the normality test and the linearity test. Then, there is also hypothesis testing using 4 types of data analysis techniques, namely using a simple linear regression test, path test, partial t-test and N-Gain test. In the first and second hypotheses, data analysis was carried out with a simple linear regression test. Data testing from the third hypothesis is carried out by path test. Meanwhile, for the testing of data from the fourth hypothesis through the t-partial test and the N-Gain test. The prerequisites for this test can be met if the data used has been declared to be normally and reliably distributed.

The first and second hypothesis testing criteria are *that Ho* is accepted if $F_{cal} < F_{a(n1 + n2 - 2)}$ and vice versa *HO* is rejected if $F_{cal} > F_{a(n1 + n2 - 2)}$ or it can be known by reviewing if the significance value of the calculation < the real level is 0.05 then *Ho* is rejected and if the significance value of the calculation > the real level is 0.05 then *Ho* is accepted.

Meanwhile, for the third hypothesis testing criterion, it can be seen from the multiplication between the value of the path coefficient (beta) of the independent variable to the intervening variable and the beta value of the intervening variable to the bound variable. Thus, the total influence given by the independent variable on the bound variable through the intervening variable can be determined by calculating the sum between direct and indirect influences. Furthermore, the researcher can formulate a conclusion stating that the results of the interpretation of the calculation show whether or not there is a significant influence either directly or indirectly between the research variables. Meanwhile, the formulation of the research results in the fourth hypothesis is described through the calculation of the N-Gain score.

Result and Discussion

Result

The determination of the time allocation for this research was carried out on November 3 – 17, 2022 at SMP Negeri 2 Martapura OKU-Timur which is located in Kotabaru, Martapura, South Sumatra. The implementation of this study has involved two learning groups consisting of an experimental group that was given a *blended learning* model

treatment and an instrument trial group. Each number of research samples taken was 30 research samples.

It is known that after the implementation of the research in the school, the steps taken to explain the objectives and hypotheses of this study are the preparation of a report with the submission of the results of the analysis test of the obtained data. The data analysis was used to find out how much social attitudes and improvements in students' cognitive science learning outcomes had been influenced by the *blended learning* model. The data analysis tests used in this study are in the form of validity, reliability, linearity, normality, simple linear regression, path test and n-gain test. Meanwhile, the type of research data used is quantitative data obtained from social attitude questionnaire scores and pretest/posttest scores. The results of data obtained from questionnaire and pretest/posttest instruments that have been tested to the experimental class are processed using the help of SPSS Version 25 and Microsoft Excel. The first step obtained by the researcher to obtain the results of the analysis of the research data is the results of the normality and linearity analysis test of the research data, where the test results are explained as follows.

Table 1. Results of Normality Analysis of Student Social Attitude Data

Variable Test	Y1
Normal Parameter	
N	30
Mean	127,290
Std. Deviation	10,40558
Most Extreme Differences	
Absolute	0,082
Positive	0,082
Negative	-0,076
Kolmogrov Smirnov	0,448
Asymp. Sig (2-tailed)	0,988

Table 2. Results of Normality Analysis of Student Science Cognitive Learning Outcome Data

		X	Y2
Normal Parameters ^{a,b}	N	30	30
	Mean	40.7000	78.0667
	Std. Deviation	7.02287	14.00722
Most Extreme Differences	Absolute	.128	.149
	Positive	.085	.097
	Negative	-.128	-.149
	Kolmogorov-Smirnov Z	.703	.817
	Asymp. Sig. (2-tailed)	.706	.517

Based on the results of the normality test of social attitude data of grade VII students in Table 1, it shows that the distribution of social attitude data of students has a calculation significance value of 0.988 greater than the real level value of 0.05. So, with this, the social attitude data of grade VII students is declared to be normally distributed. Meanwhile, in table 2 regarding the

results of the analysis of the normality test of cognitive learning outcome data of grade VII students, it shows that the distribution of students' cognitive data has a computational significance value of 0.517 higher than 0.05. With this, it can be concluded that this cognitive data is also stated to have been distributed normally.

Table 3. Results of Linearity Analysis of Student Social Attitude Data

Test Variables		Sum of Square	df	Mean Square	F	Sig.
X*Y1	Combined	2790,837	17	164,167	5,642	0,002
Between Group	Linearity	1815,228	1	1815,228	62,384	0,000
	Deviation From Linearity	975,609	16	60,976	2,096	0,100
	Within Group	349,170	12	29,098		
	Total	3140,007	29			

Table 4. Results of Linearity Analysis of Student Cognitive Learning Outcome Data

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Y2 * X	Between Groups	Combined	4386.450	17	258.026	2.376	.066
		Linearity	2140.180	1	2140.180	19.704	.001
		Deviation from Linearity	2246.270	16	140.392	1.293	.331
		Within Groups	1303.417	12	108.618		
		Total	5689.867	29			

In the next analysis, a linearity test was carried out which was used to

determine the linear relationship between the independent variable and the bound

variable. Thus, through the help of *the Test for Linearity* in the SPSS program, it is known in Table 3 above that the calculation results obtained a calculation significance value of 0.100 greater than the probability value of 0.05, so it can be said that the data on students' social attitudes with the application of *the blended learning* model has a linear relationship. Similarly, the results in Table 4 show that the cognitive data of

students' science with *the blended learning* model has a linear relationship. With the knowledge that in the prerequisite test for data analysis that the data tested has been distributed normally and linearly, the next test is a hypothesis test. The first hypothesis test is using a simple linear regression test. The following results of the calculation of the first hypothesis with the help of the SPSS program can be seen in Table 5 below.

Table 5. Results of Significance Analysis of Variable X to Y1
 ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1815.228	1	1815.228	38.366	.000 ^a
	Residual	1324.779	28	47.314		
	Total	3140.007	29			

a. Predictors: (Constant), X (students' social attitudes)

b. Dependent Variable: Y1 (students' social attitudes)

Based on the results of the analysis in Table 5 above, it shows that the significance value of the calculation obtained is $0.00 < 0.05$, then H_0 is rejected. Which means that the results of the variable significance test have met the criteria or it can be said that the testing of research data with a simple linear regression equation model is significant. Therefore, it was decided that there was an influence of variable X on

variable Y, which means that *the blended learning model* had a significant influence on the social attitudes of grade VII students. Furthermore, in the second hypothesis test, where the test is carried out to determine the influence between variable X (*blended learning model*) on variable Y2 (cognitive learning outcomes of students), it can be explained in the following table.

Table 6. Results of Regression Analysis of Variable X to Variable Y2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2140.180	1	2140.180	16.882	.000 ^a
	Residual	3549.686	28	126.775		
	Total	5689.867	29			

a. Predictors: (Constant), X (model blended learning)

b. Dependent Variable: Y2 (Cognitive learning outcomes of science students in grade VII)

The results in Table 6 above, the data testing was carried out using a simple linear regression method which can be seen that the calculation

significance value of 0.00 is obtained less than the real level criterion of 0.05. Thus, the results of the second hypothesis test can be concluded that the application of

the blended learning model in the experimental group has a significant influence on the cognitive learning outcomes of science students in grade VII. Based on the results of the test, it can also be seen that the application of *the blended learning model* has an important role as a tool/forum for student learning approaches that can help and affect the process of developing students' abilities, especially in the cognitive realm. As the basis of research conducted by Indayani, et al. (2021) and Ramadhan, et al. (2022) stated that the application of *the blended learning model* is able to affect the cognitive learning outcomes of junior high school students, which is characterized by the achievement of student learning completeness of 80%. Meanwhile, the results of the third hypothesis test are carried out by mediation, where the test of this hypothesis uses the path test technique. Path analysis is one of the extension

techniques of regression analysis to interpret the clausarity relationship between research variables, whether the data that has been compiled has a significant influence both directly and indirectly.

In this third hypothesis test, there are several steps of path analysis based on 2 types of equation structures. The equation of path analysis structure 1, the results of the analysis are known from the statistical calculation of the path coefficient where the result of the calculation of the path coefficient value is $Y1 = py1x1.x + py1.e1.e = 0.760X + 0.437$. Meanwhile, the equation of structural path analysis 2 obtained the result of $Y2 = py2x1.x1 + py2y1.y1 + py2e2 = 0.746X1 - 0.174 Y1 + 0.656$. So through these 2 types of equations, to find out how much influence between variables both directly and indirectly can be explained in the following table.

Table 7. Structure Path Analysis Coefficient 1
 Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	81.439	7.508		10.847	.000
X	1.127	.182	.760	6.194	.000

a. Dependent Variable: Y1

Table 8. Structure Path Analysis Coefficient 2
 Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	47.344	28.252		1.676	.105
Y1	-.234	.312	-.174	-.751	.459
X	1.487	.462	.746	3.219	.003

a. Dependent Variable: Y2

Table 9. Direct and Indirect Influence Between Research Variables

Variabel	Pengaruh Langsung	Pengaruh Tidak Langsung Melalui Y1	Total Pengaruh Langsung	Total Pengaruh Tidak Langsung	Total Pengaruh
X – Y2	(0,746) ²	0,760 x (-0,174)	0,5565	-0,1322	0,4243
Y1 – Y2	(-0,174) ²	-	0,0302		0,0302

From the results of the calculation in Table 9 above, it can be explained that there is a direct influence between variable X and variable Y2 which has a greater direct influence than the indirect influence. Reviewing the testing of this hypothesis was carried out by mediation to find the magnitude of the significant influence between the research variables,

so the calculation of the influence between the variables was using the sobel test and t-test statistical techniques. This calculation technique is one of the calculation methods by finding the error standard of the variable indirect coefficient. The calculation method is as follows.

$$\begin{aligned}
 SP1P3 &= \sqrt{(P3^2) (SP2^2) + (P2^2) (SP3^2) + (SP2^2) (SP3^2)} \\
 &= \sqrt{(-0,234^2) (0,182^2) + (1,127^2) (0,312^2) + (0,182^2) (0,312^2)} \\
 &= \sqrt{1,585821} = 1,25929384974
 \end{aligned}$$

$$T\text{-count} = (P1XP3) : SP1P3 = -0,1322 : 1,25929384974 = -0,10498729352$$

Based on the calculation of the statistical sobel test and t-test above, the following result formulation is obtained.

Table 10. *Formulation of the Results of the Mediation Variable Influence Test*

Variabel	Indirect influence	S-inside effect	t-count	t-table (df = n-k = 30-3 = 27)	Ket.
X – Y1 – Y2	-0,1322	1,2592	-0,1049	2,052	No Sign.

Table 10 above shows that the effect of the application of the *blended learning* model has a t-calculated value of $-0.1049 <$ from the t-table value of 2.052. Thus, it can be concluded that the mediation coefficient indirectly states insignificant results or has no effect. Thus, the results of the formulation in Table 10 state that the *blended learning* model (X) has a direct influence on students' social attitudes and there is no indirect influence on the cognitive learning outcomes of science (Y2) through students' social attitudes (Y1). From this explanation, the statement in the third hypothesis proves that H_0 is accepted, meaning that the influence of the *blended learning model* does not have a significant influence on the cognitive learning outcomes of science students in grade VII through students' social attitudes. After

conducting statistical analysis to determine the influence between variables partially and mediatedly, the next investigation carried out by the researcher is through partial t-test and N-Gain testing. The testing step for this fourth hypothesis was carried out to determine the magnitude of the improvement in students' cognitive abilities or cognitive learning outcomes of science students in grade VII as a result of the influence of the application of the *blended learning model*. The researcher's consideration using this partial t-test is to see the difference in students' cognitive learning outcomes (pretest and posttest) which can then prove whether or not there is an influence of the application of the *blended learning model* on the improvement of students' cognitive science learning outcomes.

Table 11. *Partial T-test Results*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before MBL	57.23	30	19.823	3.619
	After MBL	78.07	30	14.007	2.557

Table 12. *Results of N-Gain Analysis*

Kelas	Pretest	Posttest	Gain	N-Gain	Category Interpretation
VIIA (Experiment)	57,23	78,07	20,84	0,487	Sedang

Based on the results of the analysis of student pretest and posttest data in science learning, it can be seen in Table 11 above which explains that there is a difference in the average cognitive data of students between before and after the implementation of the *blended learning* model. As for the difference in the average score, to prove whether or not there is an improvement in students' cognitive learning outcomes, the analysis continues with the N-gain equation. From this equation, Table 12 shows the results of student cognitive improvement, which is 0.487 with the category of moderate improvement.

Discussion

As is known, the purpose of this study is to find out how the application of the blended learning model affects students' social attitudes and students' cognitive learning outcomes, the influence of the blended learning model on students' cognitive learning outcomes through students' social attitudes and to find out how much the cognitive learning outcomes of grade VII students have improved by using the blended

learning model. The type of implementation of this research activity is a quasi-experimental research that is determined with the aim that the investigation activity is given treatment when the specified sample is not randomly selected. The research procedure was carried out by applying pretest and posttest to the experimental group before and after being given a blended learning model. Thus, this quantitative research uses a research design, namely one group pretest posttest, where the measurement of learning outcomes in this design is carried out only in 1 study group, namely the experimental class and distinguishes the achievement results of the experimental group based on the pretest and posttest treatment given. The learning steps of the blended learning model applied include 50% face-to-face learning and 50% online learning which has the characteristics of collaborative asynchronous learning, where it is in the form of following the steps of seeking of information activities in preliminary activities, acquisition of information in core activities and synthesizing of

knowledge in closing activities. At the stage of implementing research in the experimental class, the learning process meeting was held 6 times. The first to third learning meetings are pretest, learning preparation in the form of orientation on the use of ICT / computers and the internet, delivery of practicum preparation and delivery of basic material. Meanwhile, the fourth to sixth meeting of learning is a virtual lab practice using the Phet Colorado online application, assignment presentations, and posttests.

Based on the learning activities, 4 data statements were obtained, which in the first analysis of the study it was known that the application of the blended learning model had a significant influence on the social attitudes of grade VIIA students. The existence of this influence can be seen from the magnitude of the linear regression significance value which states that the calculation significance value of 0.00 is lower than the nayata level value of 0.05. This is also accompanied by the demonstration of significant changes in students' learning attitudes in learning after being given the blended learning model, which increases the enthusiasm or active participation of students who participate in learning activities. Students become more communicative, open in opinions and collaborative in group discussions. Especially in direct practicum activities and online practicum through virtual labs. In addition, learning activities are also supported by other media facilities or variations such as Ebooks, printed science books for students and the use of E-learning as a medium for discussion and delivery of other materials. Supporting the above statement, research by Dite, et al. (2022) revealed that the application of learning with the blended learning model has positive implications of 46% on students' social attitudes, where in the learning process students become more active and creative in understanding information, building knowledge and solving problems. Thus, from the description it is explained that the positive thing about the use of the blended learning model during the learning process can cause an increase in students' ability or attitude skills, especially students' social attitudes in their learning environment.

Furthermore, for the data from the analysis of the two studies, it was explained that the application of the blended learning model had a significant influence on the cognitive learning outcomes of science students in grade VIIA. This

decision was made based on the results of the data significance test, namely the calculated significance value obtained by 0.00 lower than the probability value of 0.05. In addition, changes in students' cognitive outcomes are also caused by the active role of students and the opportunities given to students to explore their knowledge and abilities through the various learning resources provided. Students are also given the opportunity to analyze and solve problems in learning through assignments, discussions and practices that are carried out both in person and online. Thus, it can be said that changes in the development of students' abilities and improvement of cognitive learning outcomes in science can also be due to different learning experiences. Based on research by Ramadhan, et al. (2021); Indayani, et al. (2021); and Dianti, et al. (2022) revealed that there is a positive and significant influence of the application of the blended learning model on students' cognitive learning outcomes.

Meanwhile, in the results of the third analysis, a decision was obtained stating that the application of the blended learning model does not have a significant influence on the cognitive learning outcomes of students through their students' social attitudes. This decision was obtained through path testing analysis, where there are 2 types of calculations that produce 2 forms of regression coefficient equations. In the 2 forms of equations, results were obtained that stated the influence of variables directly or indirectly, which was then continued by finding the standard error calculation value through the sobel test analysis method. Based on the results of path analysis, it is known that the result of variable mediation of -0.1049 (t-calculus) is lower than the t-table value of 2.052. Such as research conducted by Olitsky & Cosgrove (2014); Chang, et.all (2014) stated that blended learning does not show any influence on cognitive learning outcomes, but can significantly increase students' self-value/attitude in the learning process. This is because blended learning can present a variety of different learning experiences (approaches, media, sources) from each student, so the level of performance, involvement and attitudes (scientific attitudes or social attitudes) of student learning obtained is also different. Thus, Hesti, et al. (2021) also revealed that there was no influence of the blended learning model on student learning outcomes. Especially in the

current study, mediation shows results that state that the blended learning model does not have a significant influence on the cognitive learning outcomes of science students in grade VII through the social attitudes of their students.

In the results of the analysis of the four studies, a decision was obtained that showed that there was an improvement in the cognitive learning outcomes of science students in grade VIIA using the blended learning model. This finding can be seen from the results of analysis on student pretest and posttest data, where the average pretest score was obtained at 57.23 and the average posttest score was 78.07. Thus, by using the N-Gain calculation, it is known that the increase in cognitive learning outcomes of science students in grade VIIA is 0.487 which is included in the category of moderate improvement. Based on the research of Simamarta, et al. (2016); Montoh, et al. (2021); Abroto, et al (2021); and Mufidah, et al. (2021) showed results that stated that there was an increase in students' cognitive learning outcomes using the blended learning model.

In the implementation of learning, a good learning effectiveness is known to realize expectations for the achievement of good learning outcomes. What drives the effectiveness of learning is of course accompanied by optimal sources of support for learning activities. In accordance with what was expressed by Rusman (2015) that the success or failure of the achievement of student learning outcomes, one of them is influenced by factors from within and outside the individual/student. Factors from within the individual are the selection of good learning strategies, supportive learning facilities and self-motivation as well as individual interest in learning. Meanwhile, factors from outside the individual come from the environment, conditions and a supportive learning atmosphere. Therefore, the application of the blended learning model in this study can be a learning strategy that not only pays attention to factors in individuals, but can also pay attention to individual learning needs as expected. Thus, this can also have an impact and affect the achievement of student learning outcomes, both in the student's (cognitive) thinking process and students' learning attitudes in learning. In addition, the above statement is also in accordance with previous research conducted by Akbar, et al. (2016) and Saleh (2018) regarding the influence of the blended learning model on social attitudes

and cognitive learning outcomes of science grade VII students.

Conclusion

Based on the results of the research and discussion, the following conclusions were obtained: 1) The application of the blended learning model has a significant influence on the social attitudes of grade VII students, with a significance value of 0.00 less than the real level value of 0.05. Thus, the indication of these results states that the better the learning with the blended learning model, the greater the contribution to the development/development of social attitudes of grade VII students; 2) The application of the blended learning model has a significant influence on students' cognitive learning outcomes, with the significance of the calculation being 0.00 less than the probability value of 0.05. Thus, the indication of the test results shows that the better the application of the blended learning model for learning, the greater the contribution to the cognitive learning outcomes of science students in grade VII; 3) There is no significant influence between the application of the blended learning model on students' cognitive science learning outcomes through social attitudes or the application of the blended learning model in learning activities can only have a direct influence on students' cognitive science learning outcomes without going through the students' social attitudes; 4) There was an increase in the cognitive learning outcomes of science students in grade VII using the blended learning model, with an increase of 0.487 which was included in the category of moderate improvement. Thus, it can be said that the application of the blended learning model has an influence that can improve the cognitive learning outcomes of science students in grade VII.

One of the suggestions that can be given is that for future researchers, it is hoped that this research can be an insight, reference, and improvement in developing further research through other variables. As well as in the learning application for educators to be more able to involve various learning resources or a variety of learning resources that provide a variety of different learning experiences for students. This is expected to help students develop their competencies and deepen the knowledge previously obtained.

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