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Effect of Implementation of Chat Room-Based Blended Learning on Self-Efficacy and Student Learning Outcomes on Human Movement System Material

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Abstract: Self efficacy has an important role in student achievement, high self efficacy will encourage students to excel and low self efficacy makes it difficult for students to achieve achievements in their studies. This study aims to determine the effect of implementing chat room-based blended learning on self-efficacy and student learning outcomes and the relationship between self-efficacy and learning outcomes. This study used a Quasi-Experimental method with a pretest-posttest Non-Equivalent Control Group Design. Sampling used a purposive sampling technique with a total sample of 134 students consisting of the experimental group and the control group. The instrument used to measure self-efficacy uses a questionnaire containing 45 statements, while learning outcomes are measured using 40 multiple choice questions. Data analysis used covariance analysis at a significant level of 0.05, while analysis of the relationship between self-efficacy and learning outcomes used Pearson's Product Moment correlation analysis. The results showed that there was an effect of self-efficacy and student learning outcomes ($p < 0.05$) and there was a significant relationship between self-efficacy and student learning outcomes after implementing chat room-based blended learning. The conclusion of the study is that there is a positive influence on the implementation of chat room-based blended learning on self-efficacy and student learning outcomes in the human movement system material and there is a positive and significant relationship between self-efficacy and student learning outcomes.

Keywords: Blended Learning; Self Efficacy; Learning Outcomes

Introduction

Facing the current era of globalization, students must be equipped with 21st century skills known as 6C, namely communication, collaboration, critical thinking, citizenship, creativity and character (Stehle & Burton, 2019). One of the important abilities that students must have in the 21st century is self-efficacy. Self-efficacy is a belief in one's ability to carry out tasks and achieve goals. These beliefs determine how a person feels, thinks and behaves. In the educational sphere, self-efficacy is very important because it can affect cognitive processes, motivation, actions and achievements (Yolantia et al., 2021).

Self-efficacy must be developed in students so that they can interpret the learning process in real life, so that the learning process will occur optimally and can achieve learning goals and maximum learning achievement. Without self-efficacy, good learning outcomes will be difficult to achieve even if someone has good abilities.

Low self-efficacy and student learning outcomes are problems that often occur in the world of education. Based on observations made in October 2021 at SMAN 2 Banda Aceh it is known that there are several obstacles in learning, namely students are not enthusiastic during the learning process, they tend to be pessimistic in completing assignments and doubtful about their own abilities when the teacher gives questions to students

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tends to be passive, does not want to answer questions from the teacher, even though he actually knows the answer. There are still students who are embarrassed to ask questions and are embarrassed to express opinions because students are not fully convinced of their abilities. Other obstacles are in the form of learning resources such as textbooks which are still limited, learning that is usually carried out is still teacher-centered and students also do not have practical teaching materials that can enable students to study anywhere and anytime and (Ulhamdi et al., 2022). The learning process carried out has not directed students to be actively involved in learning activities. These constraints have an impact on low learning outcomes so that there are still many students who have not reached the minimum completeness criteria of 75 set by the school.

The results of interviews with Biology teachers at SMAN 2 Banda Aceh obtained information that the human movement system material is one of the most difficult materials to understand, because students do not have a good understanding of the material. Based on interviews with students at SMAN 2 Banda Aceh, it was informed that they experienced limitations in understanding the working mechanisms of the movement system and terms, Latin names for various bones, muscles and joints. This material requires in-depth understanding but time constraints make it difficult for students to understand the material. Solutions to existing problems require innovative learning processes that are relevant and supported by appropriate learning resources so that the material is easily understood by students.

One effort to overcome the value of students who have not reached the Minimum Completeness Criteria is the selection of learning strategies. The selection of learning strategies is very important to improve student learning outcomes and to make learning more meaningful, namely where students are able to find the knowledge needed, the skills used and finally able to understand the material provided, one example is the blended learning strategy.

Blended learning combines aspects of web-based learning, synchronous and asynchronous video streaming with conventional or face-to-face learning. Blended learning is a combination of face-to-face and virtual learning (e-learning) (Wardani et al., 2018). Blended learning is a process of unifying various learning methods that can be achieved by combining virtual and physical sources. It is hoped that learning will be more effective and efficient (Aritonang, 2021). In addition, this learning provides convenience because learning with computers (online) does not completely eliminate learning. face to face.

Blended Learning is known to be able to overcome various limitations associated with online learning and face-to-face teaching which require a lot of learning time and are constrained by insufficient learning time to convey material. The application of blended learning according to Adnyana (2022) has a positive impact because it combines the various features of the best advantages of face-to-face learning and the weaknesses of face-to-face learning complemented by the advantages and disadvantages of online learning so as to improve the quality of both because they complement each other. Blended learning learning strategies are considered appropriate to be used to equip teachers and students in increasing self-efficacy and are viewed as the right solution to improve student learning outcomes.

Blended learning has the ability to increase self-efficacy and achievement of student learning outcomes in Movement Systems material. This is because it provides many learning aids such as images, animations, videos, texts and others. To increase student self-efficacy, it is necessary to be given the opportunity to learn and understand the material that will be studied and has been studied independently by distributing the motion system material that will be studied in the form of reading materials, videos and other references in a chat room, namely a chat room in the form of Telegram is devoted to sharing various problems regarding learning both online and offline and it is implemented with an appropriate learning model that combines face-to-face (conventional learning) and online learning by utilizing various kinds of media and technology, one of which is a chat room in the form of Telegram.

Several studies on learning with the implementation of blended learning have been carried out by (Jani et al., 2018; Dziuban et al., 2018; Yustina 2020; Alsalhi et al. 2019). The results of the study only revealed that blended learning had a positive impact on learning achievement, there was an increase in student learning outcomes, student motivation and an increase in teachers' creative thinking skills in the blended learning learning process. Meanwhile, studies that examine how the effect of the implementation of chat room-based blended learning on self-efficacy and student learning outcomes are still very limited. Therefore this research was conducted, to answer the research question whether the influence of the implementation of chat room-based blended learning on self-efficacy and student learning outcomes in the material of the human movement system.

Method

The method used in this research is experimental research using a quantitative approach. The research design uses a Quasi-Experimental Design with a Pretest-Posttest Non-Equivalent Control Group Design model. This research method is used to determine the impact of a treatment given intentionally by researchers. The

variable used is experimental research. Experimental variables are directly related variables that are applied to find out a certain situation that is expected to get an impact from the experiment (Rais, 2019).

This research was conducted at SMAN 2 Banda Aceh with a sample of 134 class XI students. Determination of the sample is determined by using a purposive sampling technique. The research sample was determined based on the abilities possessed by students and based on interviews with teachers, it was obtained that sample information had the same abilities. The research instrument used was a non-test sheet containing statements that had been developed by Diana May from the University of Georgia Subali for observing students' self-efficacy. the test sheet contains multiple choice questions for observation of student learning outcomes.

The data collection technique in this study was by conducting pre-test and post-test to measure students' initial and final abilities. Data analysis techniques in descriptive research are quantitative data. Analysis of research data aims to test the truth of what is proposed in the research.

Self-efficacy data were analyzed quantitatively by converting ordinal data into interval data using the successive interval method (MSI). To find the average score of students' self-efficacy questionnaire data, use Equation 1.

$$\text{Score Average} = \frac{\sum \text{score responden}}{\sum \text{score quation}} \quad (1)$$

To determine the percentage level of self-efficacy, it is interpreted using the criteria that can be seen in table 1.

Table 1. Self Efficacy Score Criteria

Score	Categories
≥ Mean + 1.5 SD	Very good
Mean + 0.5 SD ≤ X < Mean + 0.5 SD	Good
Mean – 0.5 SD ≤ X < Mean + 0.5 SD	Enough
Mean – 1.5 SD ≤ X < Mean – 0.5 SD	Not good
≤ Mean + 1.5 SD	Very less

Study results were analyzed by analysis of covariance (ANKOVA) to test the significance of the difference between the two means of independent samples taken randomly from the same population. Covariance analysis is an analysis combining regression analysis and analysis of variance, which is carried out simultaneously. The covariance analysis equation model is like Equation 2.

$$(Yij=\mu+\beta(Xij- X)+ \tau i+ \varepsilon ij) \quad (2)$$

Information:

Yij = Variables to be analyzed
μ = Average
β = The regression coefficient Y over εij
τi = Treatment effect i
εij = treatment effect error

The Ankova test criterion is if Probability (Sig) ≥ F-table (0.05) then the data does not have a significant difference, so it can be concluded that the data has no significant difference or is not significantly different. However, if the Probability (Sig) < F-table (0.05) then it can be concluded that there is a significant or significantly different difference. The correlation between self-efficacy and student learning outcomes uses the calculation of the Product Moment Method correlation coefficient analysis or what is known as the Pearson formula. To see the level of closeness of the correlation, Guilford's interpretation of the magnitude of the significant correlation can be seen in Table 2.

Table 2. Correlation Closeness Level

Coefficient Intervals	Closeness Level
< 0.19	A little; almost no connection
0.20 – 0.39	Low correlation; relationship is sure but small
0.40 – 0.69	Moderate correlation; substantial relationship
0.70 – 0.89	High correlation; strong relationship
0.90 – 1.00	Very high correlation; very reliable relationship
≥ 0.30	A practically significant relationship

After analyzing the correlation then performed regression analysis. Regression analysis aims to predict the magnitude of the relationship between the dependent variable using independent variable data of which the magnitude is known. To find out the regression equation, it must be calculated first that the values of a and b are sought by Equation 3.

$$Y = a + bX \quad (3)$$

Information:
Y : dependent variable
X : Independent variable
a : Constant
b : Regression coefficient

Result and Discussion

Self Efficacy

Implementation of blended learning in the first experimental class based on chat room and control class, secondly with conventional learning obtained self-efficacy data from the results of questionnaires based on three aspects of self-efficacy according to Wood and Bandura. Recapitulation of the average initial and final self-efficacy scores of students between the control and experimental classes can be seen in Figure 1.

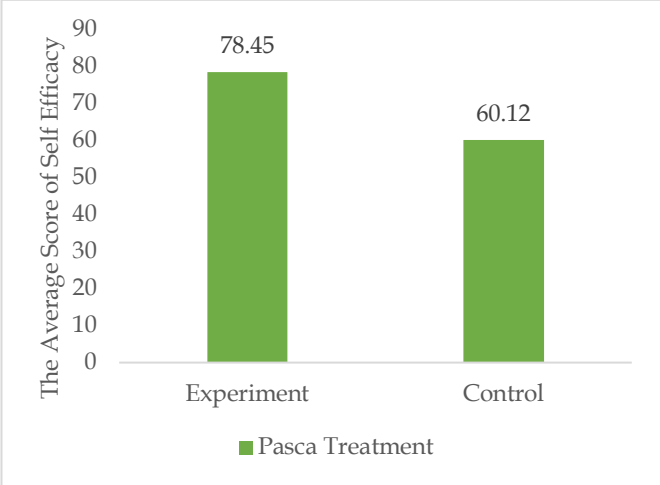

Figure 1. Post Treatment Self Efficacy Average Score

Self-efficacy data were analyzed with the Ankova test which can be seen in table 3.

Table 3. ANKOVA Results of Self Efficacy Data

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10657.946[a]	1	10657.946	198.124	.000
Intercept	735521.469	1	735521.469	13672.814	.000
Kelas	10657.946	1	10657.946	198.124	.000
Error	7100.867	132	53.794		
Total	750803.000	134			
Corrected Total	17758.813	133			

a. R Squared = .600 (Adjusted R Squared = .597)

The results of the Ankova test in table 3 show that the Probability (Sig.) Class is 0.000 <0.05, meaning that there is a significant difference or a real difference in self-efficacy between the experimental class and the control class and probability (Sig.) So, it can be concluded that there is a positive influence implementation of chat room-based blended learning on students' self-efficacy.

There are three main factors that influence a person's self-efficacy, namely internal and external factors. Internal factors, namely the experience of success, the experience of others, verbal persuasion and physiological conditions. In addition, the use of appropriate learning resources can also affect students' self-efficacy such as the use of innovations in the form of chat rooms (Peura et al., 2021). The four internal factors proposed by Bandura can be realized through chat room-based blended learning.

The high self-efficacy of students in the experimental class was due to the fact that students freely studied subject matter independently and students could hold discussions with teachers or other students outside of face-to-face hours. Another advantage is that teachers can ask students to read material or take tests before learning, teachers can add enrichment material through internet facilities. Learning with this blended learning model has proven to be effective in providing independent learning opportunities by distributing material to be studied so that students have more time to study independently. This makes students easier to remember and understand the material being taught so that students have high confidence in completing learning.

Students with a high level of self-efficacy will try to master the subject matter compared to students with low self-efficacy (Fitri et al., 2023). But on the contrary, as explained by Bandura (1977) "Students with low self-efficacy, mastery of learning material is also low, when facing exams they will have more difficulties in answering questions and deviant behavior in doing exams can also occur because of students' confidence in their own abilities. low self." There are three aspects used in measuring participants' self-efficacy, namely level, strength and generalization. Based on the three aspects of self-efficacy, it can be seen that the average of the experimental class and the control class is shown in figure 2.

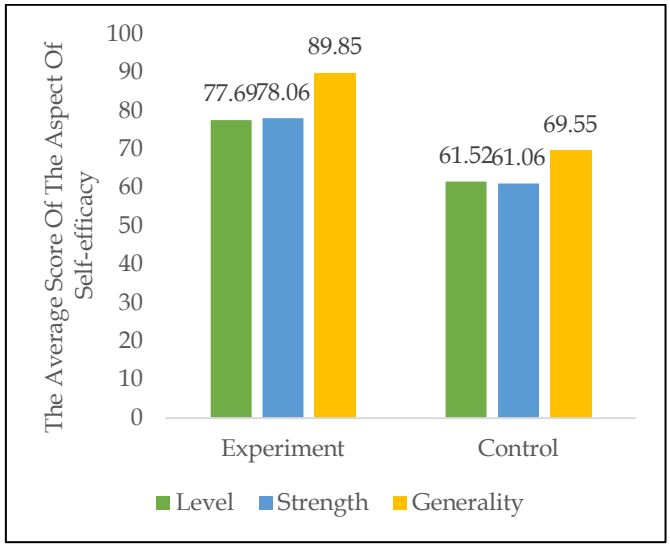

Figure 2. The Average Score of the Self Efficacy Aspect

Based on Figure 2, it shows that there is a difference in the average score on each aspect of self-efficacy between the experimental class and the control class. The experimental class has a higher average score on each aspect than the control class. This happens because students learn with chat room-based blended learning.

Based on the figure, it also shows the self-efficacy of control and experimental class students based on aspects of self-efficacy. The experimental class obtained an average score on the level aspect of 77.69, the strength aspect of 78.06, and the generalization aspect of 89.85. Meanwhile, in the control class, the highest average

score was in the generalization aspect with a score of 69.55, while the lowest score was in the level aspect with a score of 61.52 and strength with a score of 61.06. Students in the experimental class have higher scores on the level aspect. This happens because students are able to do the assignments given by the teacher. Blended learning learning makes students able to study independently anywhere and anytime. They can study and discuss before and after the learning process takes place and practice answering questions given by the teacher through chat rooms. In contrast to the control class, the level score looks the lowest compared to other aspects. This happens because students are not sure they are able to do questions and assignments due to a lack of experience in learning. Therefore they only do tasks that they think are easy and tend to avoid difficult tasks.

The strength aspect in the experimental class had a higher score than the control class, this happened because they felt confident and had more effort and did not give up in facing challenges in the learning process. Learning with blended learning has made students more challenged to complete tasks and problems in the learning process.

The generalization aspect in the experimental class has a higher score than the control class. This happens because students are able to make experience as a way to increase self-efficacy. Learning with blended learning makes them try harder to achieve good results on their own. They are not easily discouraged when they get low grades, they will try to achieve good grades by studying harder and confident. In contrast to students in the control class, students felt unsure of their abilities when they were in situations and activities that were different from before

Based on the average value of students' self-efficacy in the human movement system material, it was concluded that the application of chat room-based blended learning had an effect on students' self-efficacy in the experimental class. By increasing self-efficacy, students can achieve educational goals to the fullest, so that learning achievement will increase. so that students are expected to no longer have negative assumptions about their ability to learn.

Learning outcomes

Student learning outcomes were obtained from administering tests before and after learning activities on motion system material. The test questions given to students were 40 multiple choice questions which had 5 alternative answers. The initial ability score in both classes was obtained from the pretest and the final knowledge score was obtained from the posttest. Recapitulation of the average pre-test and post-test scores of the experimental class and control class students' learning outcomes is presented in Figure 3.

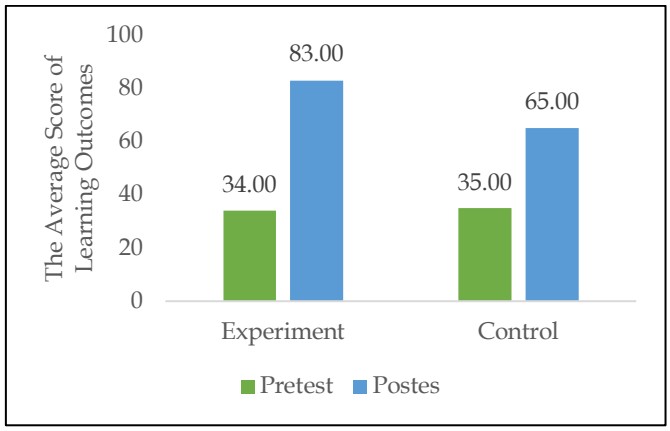

Figure 3. Average Score of Pretest and Posttest Learning Outcomes

Table 4. ANKOVA Results Data on Learning Outcomes

Source	Type I Sum of Squares	df	Mean Square	Sig.
Corrected Model	10822.344a	3	3607.448	.000
Intercept	733044.187	1	733044.187	.000
Kelas	10657.946	1	10657.946	.000
Pretes	135.700	1	135.700	.113
Kelas * Pretes	28.697	1	28.697	.465
Error	6936.470	130	53.357	
Total	750803.000	134		
Corrected Total	17758.813			

Based on Table 4 it shows that the Probability (Sig.) Class 0.000 <0.05 means, there is a significant difference or significantly different learning outcomes between the experimental class and the control class and the probability (Sig.) Class *Pretest 0.465 ≥ 0.05 meaning, no there is a difference in pretest scores between the experimental class and the control class. So, it can be concluded that there is an effect of the implementation of blended learning on student learning outcomes in one of the biology materials that is considered difficult, namely the human movement system material because it is a complex material. Previous studies also show that blended learning is a blended learning between face-to-face and online which involves an internet connection, thus establishing good communication between teachers and students so that it influences more effective learning outcomes.

Blended learning is a form of E-learning that is integrated with classroom learning using the internet and computers or smartphones, where the teacher communicates with students on a special platform that aims to improve student learning outcomes. The implementation of chat room-based blended learning makes it much easier for students to understand the material to be studied at future meetings because students have plenty of time to study before going

offline (Kavitha & Jaisingh, 2018). This is because during the online process the teacher distributes teaching materials in the form of ppt, materials, videos and also student worksheets through chat rooms via telegram. So that students who do not understand the material to be studied can interact or communicate in chat through the chat room.

E-learning is a flexible process because it does not consider time and place as a problem, but learning effectiveness, broad access, information, and a lot of time can account for a better end result. At each meeting a lot of time is used by the teacher in evaluating and the teacher can clarify material that is not fully understood by students. So, the time used in the offline process can be utilized as much as possible and during online learning the teacher receives input and also questions from students regarding assignments and also discussion of the material, so the learning process is used not only during face-to-face processes that occur at school, but even when students are outside of school hours, the learning process can continue by applying a chat room-based blended learning model.

Blended learning is a learning that combines direct learning (face to face) and online learning. This learning can be applied to any subject. This was explained by Kang et al. (2021) that there is an effect of blended learning on student learning outcomes. In line with Puspaningtyas et al. (2020) who stated that through blended learning, students can understand the material much better than face-to-face learning. The application of chat room-based blended learning to the movement system material in humans makes teachers and students understand the material more easily and in a more practical way.

Relationship between Self Efficacy and Student Learning Outcomes

Self efficacy is one of the internal factors that influence student learning outcomes. To prove this relationship, correlation and regression tests were carried out. The recapitulation of the results of the correlation test between self-efficacy and learning outcomes can be seen in Table 5.

Table 5. Correlation Results of Self Efficacy with Learning Outcomes

		Learning Outcome	Self efficacy
Learning Outcomes	Pearson Correlation	1	.764**
	Sig. (2-tailed)		.000
	N	134	134
Self Efficacy	Pearson Correlation	.764**	1
	Sig. (2-tailed)	.000	
	N	134	134

**. Correlation is significant at the 0.01 level (2-tailed).

Based on the table, it shows that the Significance (Sig.) of self-efficacy with learning outcomes is 0.000 <0.05, meaning that there is a correlation between self-efficacy and learning outcomes and the Pearson Correlation (r) value of 0.764 means the level of strong relationship between self-efficacy and learning outcomes. Then a regression test was carried out between self-efficacy and learning outcomes which can be seen in Table 6.

Table 6. Self Efficacy Regression Results with Learning Outcomes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	10.634	4.704		2.261	.025
Self efficacy	.916	.067	.764	13.592	.000
Dependent Variable: Learning Outcomes					

Based on Table 6, it shows that the Constant value is 10.634, meaning the consistency value of the learning outcomes variable is 10.634 while the self-efficacy value (regression coefficient) is 0.916, meaning the regression coefficient of learning outcomes is 0.916. So if every addition of 1% self-efficacy, learning outcomes increase by 0.916. Coefficients Sig 0.00 <0.05 and it is known that the tcount value is 13.592 > ttable 1.660. Therefore, it can be concluded that self-efficacy with learning outcomes has a positive and significant relationship.

This positive relationship between self-efficacy and learning achievement is consistent with the opinion of Tutuk (2009) which states that high self-efficacy will result in better achievement and increased test scores. In line with previous research conducted by Rorimpandey & Midun (2021), there is a positive relationship between self-efficacy and learning achievement. The results of the study by Rasmitadila et al., (2020) also show that blended learning that uses internet access can add to learning experiences, knowledge, variations in learning models and makes learning more flexible and independent and can increase self-efficacy and student learning outcomes.

To see a picture of the regression between self-efficacy and learning outcomes can be seen in figure 4. Figure 4. Explaining the direction of regression between the two variables. From this equation, the data obtained is y = 0.6369x + 22.044, meaning that if self-efficacy is 45, student learning outcomes are 50.39. This equation is in accordance with the data obtained R^2 = 0.5833, meaning that 58.33% of learning outcomes are influenced by self-efficacy. The remaining 41.77% is influenced by other variables.

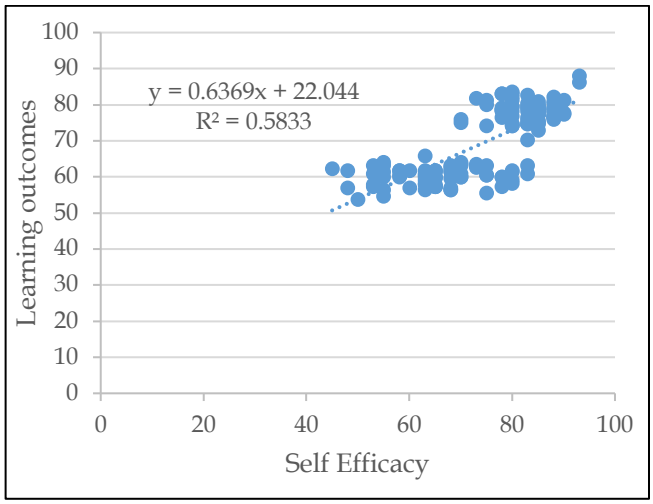

Figure 4. Regression between Self Efficacy and Learning Outcomes

One of the intrinsic factors that influence learning outcomes is self-efficacy. There are four internal factors that influence self-efficacy, namely mastery experience, other people's experiences, verbal persuasion and physiological conditions (Schunk & Dibenedetto, 2020). These four factors can be realized through learning with blended learning. Mastery experience is the factor that most influences self-efficacy (Firmansyah et al., 2018). This factor is based on experience in the form of success and failure. An increase in self-efficacy occurs when a learner succeeds in completing a task, but if he fails, then his self-efficacy will decrease. Other people's experience factors are based on people who are around like classmates. In this study, these factors were realized when group discussions were carried out, students would observe the performance of their group mates in facing challenges and problems.

Another source of self-efficacy is verbal persuasion. When students study online through facilitated chat rooms, verbal persuasion will be carried out through the cues, encouragement and means provided by the teacher and classmates. This encouragement can increase self-efficacy towards academic abilities (Sihaloho, 2018). To be effective, the person giving the encouragement must be considered competent enough for the recipient (Indayani, 2021). Physiological conditions refer to the state of a person in facing a task. Negative emotional and psychological states of students such as stress, anxiety and bad moods affect self-efficacy so that it makes them doubt their abilities (Fitriani & Pujiastuti, 2021).

The results of the study show that students with high self-efficacy tend to be more persistent, work hard, choose difficult tasks and are able to manage anxiety well. Students who work harder when facing failure are able to get good grades. On the other hand students with high self-efficacy believe that self-ability can change and is determined by effort, in contrast to low self-efficacy students who tend to think that self-ability is fixed and consider the task given as a burden.

In short, the results of this study provide an indication that self-efficacy is related to learning outcomes. Self-efficacy plays an important role in achieving learning outcomes because self-efficacy determines one's cognitive processes, motivation and actions. Self-efficacy can encourage student involvement in learning and can be used as a strength in a person so they don't give up easily when facing obstacles.

In fact, chat room-based blended learning has not fully increased self-efficacy and student learning outcomes so that there are still sub-optimal results. The obstacles experienced during the research process were that during online classes, students did not fully respond directly to the directions and explanations given by the teacher via chat room, not all students at the same time had a quota to access the material distributed by the teacher. So it is necessary to have directions or notifications given personally by the teacher, so that students can participate in online learning based on the chat room. The new thing in this research is that students can not only access materials in the form of materials, pictures and videos, but students can open chats or ask questions directly in the chat room available to the teacher.

Conclusion

The conclusion of this study is that there is an effect of implementing chat room-based blended learning on self-efficacy and student learning outcomes and there is a significant relationship between self-efficacy and learning outcomes.

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Author Contributions
Conceptualization: Ria Andriani, data curation: Muhibbuddin & Khairil, funding acquisition: Ria Andriani, methodology: Ria Andriani, Muhibbuddin & Khairil, writing–original draft: Ria Andriani, writing–review & editing: Muhibbuddin, Khairil, Safrida & Andi Ulfa Tenri Pada

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Conflicts of Interest
No Conflicts of interest.

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