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Effect of RMS models (reading, mind mapping and sharing) based on e-learning to the learning outcomes of students in the teaching and learning subject

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Abstract. This study aims to determine the effectiveness of the RMS model (Reading, Mind Mapping and Sharing) based on e-learning in the subject of teaching and learning on student results. This study was a quasi-experimental type. The sampling technique was carried out through purposive sampling technique. The study population was the entire class of students of Faculty of Teacher Training and Education Universitas Papua second semester of the 2017-2018 academic year who contracted teaching and learning subjects. The sample in this study were 11 students of the Department of Physics Education and 19 students of the Department of Mathematics Education so that 30 students. To measure and find out the student learning outcomes the tests were conducted using multiple-choice questions totalling 20 questions. The results of the analysis show that there were significant differences in the average student learning outcomes before and after learning using the e-learning based RMS model as evidenced by the acquisition of sig values <0.05. The effectiveness of the RMS model based on e-learning can be seen from the effect size value of 1,976 which is in the high category. So it can be concluded that physics learning through an e-learning based RMS model was effectively applied to student learning outcomes in teaching and learning subjects.

1. Introduction

Subject teaching and learning is a compulsory subject for students in the Faculty of Teacher Training and Education Universitas Papua. This course contains theories of teaching and learning. Group discussion methods usually do this course, but this method is felt to be less effective because only the student groups will appear who study the material before the lecture [1]. The learning model that is considered capable of making students responsible for the material in each meeting is the RMS learning model (Reading, Mind Mapping and Sharing).

The RMS is a learning model that requires students to construct their knowledge [2]. The use of the RMS model is very effective in learning because students can work together to design mind mapping that contains the scope of the subject matter [3]. Mind mapping is alternative learning in the classroom to improve the creativity and learning outcomes of students. Through the application of this model, a student not only expects information from lecturers or other groups who present but can dig information independently. The existence of learning using the RMS model makes students easy to receive the material delivered. As for the steps of the RMS learning model as in Table 1 [4].

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Table 1. The learning stage of the RMS model

No	Learning Steps	Lecturer Activity	Student Activity
1	Reading	Ask students to learn about a topic independently.	Students search and read references according to the topics to be studied.
2	Mind Mapping	Ask students to make mind mapping according to the topic.	Students make mind mapping about material that has been read individually.
		Divide students into groups.	Students discuss the results of mind mapping in the group.
		Ask students to make mind mapping based on the results of group discussions.	Students make mind mapping based on the results of group discussions.
3	Sharing	The lecturer asked several groups to display mind mapping in front of the class.	The student group presented the results of the group discussion.

In today's modern era, student interest in online-based learning is very high. Therefore, a lecturer must be able to facilitate this, one of them is by using E-learning in the learning process [5]. The use of E-learning is very helpful for students and lecturers. Students are easier to prepare material at each meeting, check the tasks given by the lecturer and collect their assignments [6,7]. Lecturers are also very helpful because they can control students' discipline in gathering assignments and can easily check the assignments of each student because they are well archived [8,9]. Based on these problems, research on the application of an RMS-based e-learning model is used to measure student learning outcomes in teaching and learning courses.

2. Methods

This research was a type of quasy experiment with one group pretest-posttest. The sampling technique was carried out through purposive sampling technique. The population in this study were 2nd-semester students in the Department of Physics Education, Mathematics Education, Biology Education, Chemistry Education, Indonesian Language Education, and English language education at the Universitas Papua, which contracted the teaching and learning courses of even semester 2017-2018. The sample in this study were students of Department of Physics Education totaling 11 people and Department of Mathematics Education totaling 19 people, bringing a total of 30 students. To measure and find out the student learning outcomes the test was conducted using multiple-choice questions totaling 50 questions. The measurement of the effect of RMS-based learning on e-learning on student learning outcomes was done using the SPSS program. The analysis technique used to determine the improvement of student learning outcomes was the measurement of <g> values as according to Hake [10] with equation (1).

$$< g >= \frac{\% < S_f > - \% < S_i >}{100 - \% < S_i >} \quad (1)$$

With, <g> is the normalized gain, $< S_i >$ the pretest, and $< Sf >$ value of the posttest value. The <g> criteria are categorized according to Table 2.

Table 2. Normalized average score criteria

Value <g>	Criteria
$<g> > 0,7$	High
$0,3 < <g> \leq 0,7$	Medium
$<g> \leq 0,3$	Low

The effectiveness of the e-learning based RMS model can be known from the effect size value as in equation (1).

$$d = \left(m_A - m_B\right) \Big/ \left[\left(sd_A^2 + sd_B^2\right) \Big/ 2\right]^{1/2} \quad (1)$$

Where d is the effect size, m_A is the average posttest value, m_B is the average value of the pretest, sd_A is the standard deviation of the posttest, and sd_B is the standard deviation of the pretest [11]. Effect size assessment category as in Table 3 [12].

Table 3. Effect Size Category

Effect Size	Category
$d < 0{,}2$	Small
$0{,}2 < d < 0{,}8$	Medium
$d > 0{,}8$	High

3. Results and Discussions

The initial stage in the application of RMS learning in the classroom was reading; in this case, the lecturer asks students to study material topics independently from various reading sources related to the material. The next step was mind mapping. Students make mind mapping about the material that has been read individually using the e-draw mind map program, then discuss the results in the group. Students then make mind mapping based on the results of group discussions. The final stage in RMS was sharing. At this stage, the student group presented the results of the group discussion. RMS learning was done using e-learning. The use of e-learning was very effective because students can directly discuss with their friends anytime and anywhere [13,14]. Each assignment given to students is done through e-learning so that students can directly know their work and the lecturer can directly control student learning activities [15,16].

Students can understand the subject matter well through learning using e-learning based RMS model. Students can learn to find their concepts and share with their group friends. Learning using an e-learning based RMS model can enable all students in learning. Some students explain the material, ask questions, answer questions or present their work in groups. The active involvement of students in learning has a positive effect on improving their learning outcomes.

Measurement of student learning outcomes obtained an increase as intended in Table 4, namely before the application of the e-learning based RMS model obtained an average value of 39.666 ± SD 11.214 and after e-learning based RMS learning obtained an average value of 56.500 ± SD 16,461. The increase in learning outcomes is in the medium category based on the results of the <g> measurement of 0.4.

Table 4. The test results of <g> of students in the subject of teaching and learning

	Pretest	Posttest	g	<g>	Criteria <g>
Average	39.667	56.500	16.833	0.380	Medium
Standard Deviation	11.214	16.461	14.999	0.300	

Measurement of the effect of e-learning based RMS learning on student learning outcomes is analyzed by first testing the distribution and homogeneity of their learning outcomes. Table 4 shows the results of testing the normality of student learning data. The measurement results show that the pretest data was not normally distributed (0.016<0.05), while the posttest data was normally distributed (0.198>0.05). The results of homogeneity testing as shown in Table 5 obtained that the data is not homogeneous (0.026<0.05).

Table 5. Test results for normality and homogeneity

		Kolmogorov-Smirnov			Shapiro-Wilk			Levene			
		Statistic	df	Sig.	Statistic	df	Sig.	Statistic	df1	df2	Sig.
Value	Pretest	0.195	30	0.005	0.911	30	0.016	5.255	1	58	0.026
	Posttest	0.120	30	0.200*	0.953	30	0.198				

The results of testing the normality and homogeneity of the data showed that the data on student learning outcomes were not normal and homogeneous so that it was followed by a non-parametric analysis, the Wilcoxon test. The Wilcoxon test was used to measure the significance of differences in student learning outcomes before and after learning. The Wilcoxon test results can be seen in Table 6.

Table 6. Wilcoxon test results

	N	Mean Rank	Sum of Ranks	Z	Asymp. Sig. (2-tailed)
Negative Ranks	0	0.000	0.000	-4.567	0.000
Positive Ranks	27	14.000	378.000		
Ties	3				
Total	30				

Table 6 shows that the asymp sig (2-tailed) column for testing two sides was 0,000. Because the case was a one-sided test, the probability was 0.000/2 = 0.000. Here the probability was below 0.05, so H_o was rejected, or the application of RMS does have a real effect on student learning outcomes. Learning through RMS based on e-learning is effectively applied because it can train creative students in designing mind mapping. Students more easily understand the subject matter through the use of mind mapping [17,18].

Measurement of the effectiveness of learning using the RMS model based on e-learning was done through effect size testing as shown in Table 7. The effect size value was 1,976 or in the high category. These results indicate that learning based on e-learning RMS model was beneficial to be applied to improve their learning outcomes.

Table 7. Effect size test results

Learning outcomes	Average	Standard Deviation	Effect size	Category
Pretest	39.667	11.214	1.976	High
Posttest	56.500	16.461		

Improved student learning outcomes show that RMS models based e-learning were effectively used, even though their average results were still insufficient categories. Student understanding can be developed through RMS models based e-learning because students can discuss and exchange ideas with their friends through the forums that exist in e-learning. Students can directly design their mind mapping through lecturer instructions. The lecturer delivers the instruction in the e-learning and provides software to design mind mapping, namely the e-draw mind map program so that students can easily access information and do their assignments properly. In e-learning systems, students have their respective accounts as students so that individuals can be active in learning [19].

The combination of the RMS model and e-learning was very useful because, at each stage of RMS, students can directly learn to use e-learning. At the reading stage, students can search and review material directly from the references provided by the lecturer. In the mind mapping stage, students were also helped because they can individually design mind mapping and re-upload their work on e-learning. At the sharing stage, students can share with their group friends through discussion forums that exist on e-learning. Online learning activities through e-learning can help lecturers in controlling student activities both in collecting assignments, responding to questions, and discussions that are

available in the open forums [20]. Student responses in learning were analyzed through Rasch modeling as shown in Figure 1. In general, it was seen that the students' responses were excellent towards the learning done. Good student responses to learning significantly affect their learning outcomes.

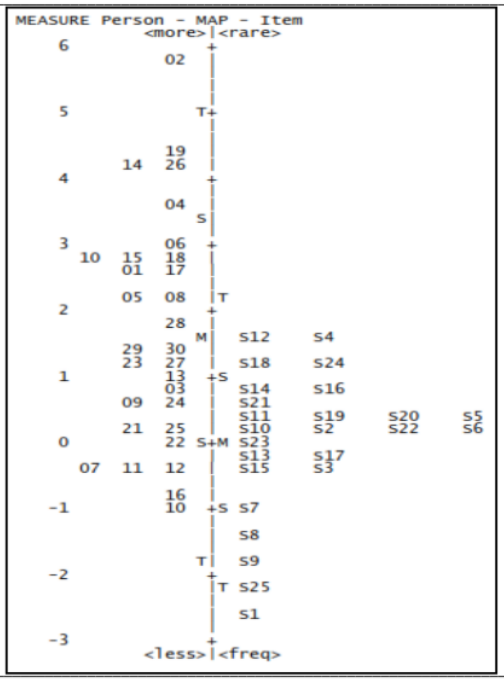

Figure 1. Rasch modeling student responses to e-learning based RMS learning.

Figure 1 shows that on the right-hand map there were two of the most challenging statements to be approved, namely S12 and S4, which were about the students' responses to the granting of the grid or evaluation details by the lecturer before the implementation of the evaluation test. Giving a grid before the implementation of the evaluation test of student learning outcomes was not done because all the material covered has been found in mind mapping media. Mind mapping media showcases general subject matter material so that students can understand the material flow and concepts well [21]. On the right map, it appears that students generally approve all questionnaire statements given. This shows that the learning done creates a good response for students.

4. Conclusion

The implementation of the RMS model assisted by e-learning in teaching and learning courses was effectively used to develop student learning outcomes. In general, students respond well to RMS model assisted by e-learning.

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7