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Comparison of Concept Understanding Using the Scramble Learning Method Between Courselab Interactive Media and Microsoft Powerpoint Media

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Abstract
This study aims to analyze the difference in concept understanding between students who use CourseLab and Microsoft PowerPoint interactive learning media in the Scramble learning method in class XI Mathematics Natural Sciences State Islamic Senior High School Wajo. The study used a quasi-experimental design with a Non Equivalent Control Group Design, involving two classes as samples taken by convenience sampling technique. The experimental class learns using CourseLab, while the control class uses PowerPoint. The results showed that the experimental class obtained a more significant increase in concept understanding compared to the control class, which was shown through higher posttest and N-gain scores. The results of the t-test analysis in the posttest showed a significant difference between the two groups ($p < 0.05$), supporting the effectiveness of CourseLab in improving concept understanding. The novelty of this research lies in the use of CourseLab media in the Scramble learning method, contributing to the development of technology-based interactive learning media for active learning in high schools.

Keywords: Learning Method, Microsoft Powepoint , Scramble

INTRODUCTION

Education in the current digital era requires innovation in learning in order to be able to adapt to technological developments and the needs of students (Dewi et al., 2022; Gürsoy, 2021; Kennett et al., 2018). Information and communication technology is an important part of the learning process to support the delivery of more interactive, effective, and efficient materials (Glazkova et al., 2020; Lin et al., 2020; Romero et al., 2012). One of the main challenges faced in learning is creating a method that not only attracts students' attention but is also able to improve their understanding of concepts in depth (Dearamae et al., 2021; Ratana-Ubol & Henschke, 2015; Vartiainen & Kumpulainen, 2020). In this context, the selection of the right learning media, especially in science subjects at the secondary education level, is crucial to support the success of learning.

The Scramble learning method is one of the methods that is often used to increase student involvement and participation in the learning process. This method provides opportunities for students to compile the information or concepts they have learned in a more creative and independent way (Gumara

et al., 2023; S. Nahar et al., 2022; Science et al., 2023). This is in line with the curriculum goals that emphasize students' critical thinking skills, collaboration, and creativity (Ghavifekr & Rosdy, 2015; Mawardi, 2019; L. Nahar, 2023). Through the Scramble method, students are expected to develop a deeper understanding of the concepts taught, especially in science subjects that require analytical skills and a thorough understanding of concepts.

Learning media also plays an important role in supporting the effectiveness of the learning methods used (Khasanah, 2021; Purwanti & Heldalia, 2023; Tytova, 2022). Interactive media, such as CourseLab and Microsoft PowerPoint, each has its own advantages in presenting engaging and interactive learning materials (Keiler, 2018; Setiyani et al., 2024; Yustika & Iswati, 2020). CourseLab, as an interactive medium, provides features that allow teachers to create dynamic content with animations, simulations, and assessments that can help students understand concepts in a more visual and engaging way (Astatke et al., 2023; Giglio et al., 2020; Syafa et al., 2022). On the other hand, Microsoft PowerPoint is also known as an easy-to-use medium and is quite effective in delivering systematic and structured material.

These two media, CourseLab and Microsoft PowerPoint, have different characteristics in supporting learning methods (Bellová et al., 2017; Miranda et al., 2021; Tytova, 2022). The multimedia-based CourseLab allows for interactive simulations and automatic assessment features that can provide direct feedback to students (Martinez, 2022; Munawaroh et al., 2022; Sumbawati et al., 2020). Meanwhile, Microsoft PowerPoint has the power to present material with structured slides, which can help students follow the learning flow systematically (Biarty, 2021; Suantara et al., 2023). This difference in characteristics provides the possibility of differences in concept understanding between students who use CourseLab and those who use Microsoft PowerPoint.

Research on the comparison of the effectiveness of CourseLab and Microsoft PowerPoint media in the Scramble learning method is important to be carried out to find out which media is more effective in improving students' understanding of concepts (Sarumaha & Laiya, 2023; Zhou et al., 2021). Based on previous research, it is known that interactive media has great potential in improving students' understanding of concepts because it offers a more active and meaningful learning experience (Aradea et al., 2022; Ayal et al., 2022; Firman, 2022). However, the differences in characteristics between CourseLab and Microsoft PowerPoint allow for variations in the learning outcomes obtained by students (Karepesina et al., 2023; Nafisah et al., 2020).

This study focused on grade XI Mathematics Natural Sciences students in State Islamic Senior High School Wajo, Wajo Regency, who were the subject of the research. The selection of this subject is based on the need to understand the extent to which the use of interactive learning media can help improve the understanding of concepts in students at the upper secondary education level, especially in science lessons. By comparing these two media, it is hoped that the results of the study can provide recommendations for teachers and educational institutions in choosing learning media that suit the needs and characteristics of students at State Islamic Senior High School Wajo.

This study aims to measure the effectiveness of the use of CourseLab and Microsoft PowerPoint media in the Scramble learning method on students' understanding of concepts. The existence of this comparison is expected to provide a clear picture of more effective media to improve understanding of the concept, so that it can be used as a reference for teachers and education practitioners in choosing and developing the right learning media. The results of this research are also expected to be the basis for the development of more innovative and effective learning methods to support student learning achievement in the digital era.

RESEARCH METHODS

Research Design

This study uses the Quasi-Experiment method with a Non Equivalent Control Group Design. This design was chosen because it allowed researchers to compare two groups that were not randomly selected,

namely the experimental class and the control class, to find out the differences in learning outcomes caused by different treatments (Fuad et al., 2017; Nielsen et al., 2018; Ping et al., 2020). In this design, the experimental class will be given learning using the Scramble method using CourseLab media, while the control class will use Microsoft PowerPoint media (Yasin et al., 2020). The design scheme of this study can be described as follows:

- Experimental Class (XI Mathematics Natural Sciences 4) : O1 X O2
- Control Class (XI Mathematics Natural Sciences 3) : O1 - O2

Information:

- O1: Pretest in both groups.
- X: Treatment using the Scramble learning method with CourseLab media.
- -: Treatment using the Scramble learning method with Microsoft PowerPoint media.
- O2: Posttest in both groups.

Research Target/Subject

The sample in this study is students of grades XI Mathematics Natural Sciences 4 and XI Mathematics Natural Sciences 3 in State Islamic Senior High School Wajo, Wajo Regency. The sampling technique used is Non Probability Sampling with the Convenience Sampling type, which is samples taken based on the availability and ease of access provided by the school. Class XI Mathematics Natural Sciences 4 was chosen as the experimental class, while class XI Mathematics Natural Sciences 3 was chosen as the control class. Each class consists of a number of students who are considered to have balanced characteristics in understanding concepts.

Research Procedure

This research procedure consists of several stages as follows:

Instruments, and Data Collection Techniques

The instrument used in this study is a concept comprehension test arranged in the form of multiple-choice questions or essays in accordance with the learning material (Denton et al., 2020; Hasibuan & Nugraha, 2023; Midway et al., 2020). This test consists of several indicators that represent aspects of understanding the concept to be measured (Ardiyanto et al., 2023; Purwanti & Heldalia, 2023). This instrument is tested for validity and reliability before being used in research. In addition, observation sheets were also used to monitor the learning process in both groups.

Data analysis technique

The data obtained from the pretest and posttest were analyzed using the appropriate statistical test, namely the t-test or the Mann-Whitney test, depending on the results of the normality and homogeneity test of the data (Astutik et al., 2019; Özyurt, 2015; Palermo et al., 2019). Data analysis is carried out with the following steps:

- Normality Test: To find out if the data is normally distributed, the normality test is carried out on the pretest and posttest results of both groups.

- Homogeneity Test: This test is performed to ensure that the variance of both groups is homogeneous, as one of the conditions for the use of the t-test.
- T-test or Mann-Whitney Test: If the data is normally distributed and homogeneous, the t-test is used to determine the difference in learning outcomes between the experimental class and the control class. If the data is not normally distributed or is not homogeneous, then the Mann-Whitney test is used as an alternative.

RESULTS AND DISCUSSION

This study aims to determine the comparison of concept understanding between students who use CourseLab media (experimental class) and Microsoft PowerPoint (control class) in learning the Scramble method. The following are the results of data analysis from the pretest and posttest of the two groups:

Table 1. Table 1: Pretest and Posttest Results of Experimental Class and Control Class

Class	N	Average Pretest	Average posttest	N-gain (average)	Standard deviation of pretest	Standard deviation posttest
Experimental classes	30	60,3	85,7	0,63	8,2	5,9
Control class	30	59,8	78,4	0,49	7,9	6,4

Based on table 1. The average pretest and posttest scores showed that both the experimental class (CourseLab) and the control class (PowerPoint) experienced an increase in concept understanding after being given treatment. The average pretest of the experimental class was 60.3, and increased to 85.7 on the posttest, while the control class increased from 59.8 to 78.4. The experimental class had *a higher average N-gain* (0.63) than the control class (0.49), which showed a greater increase in conceptual understanding.

Next, a normality test was carried out from the pretest and posttest values presented in table 2. below:

Table 2. Pretest and posttest normality test

Class	Data	Significance Value (p)	Distribution
Experimental Classes	Pretest	0,067	Usual
	Posttest	0,092	Usual
Control Classes	Pretest	0,075	Usual
	Posttest	0,080	Usual

The normality test was carried out to find out if the data was normally distributed. The significance value of all pretest and posttest data in table 2 for the experimental class and control class is more than 0.05, so the data is declared to be normally distributed. Furthermore, the homogeneity test can be seen in table 3 below:

Table 3. Pretest and posttest homogeneity test

Data	Significance Value (p)	Conclusion
Pretest	0,083	Homogeneous
posttest	0,056	Homogeneous

Based on table 3 above, the results of the homogeneity test show that the pretest and posttest data have a homogeneous variance ($p > 0.05$). Thus, the results are eligible for a t-test.

Table 4. Results of pretest and posttest t-test

Data	t-count	t-table	The value of sig. (p	Conclusion
Pretest	0,282	2,001	0,779	There was no significant difference
posttest	3,271	2,001	0,002	There are significant differences

The t-test showed no significant difference between the experimental class and the control class in the pretest (p = 0.779), which means that both groups had a balanced understanding of the initial concept. However, in the posttest, there was a significant difference (p = 0.002) between the two groups, indicating that the treatment given in the experimental class (CourseLab) provided a greater increase in conceptual understanding compared to the control class (PowerPoint).

Furthermore, the researcher conducted an N-Gain test on the experimental kels and control class presented in table 5 below:

Table 5. N-Gain Test Experimental class and control class

Data	Average N-Gain	Categories
Pretest	0,63	Keep
posttest	0,49	Keep

The N-gain analysis showed that the experimental class had an average N-gain value of 0.63, which was included in the category of moderate and higher improvement compared to the control class with an average N-gain value of 0.49. This confirms that the Scramble learning method using CourseLab media is more effective in improving students' understanding of concepts.

The results of this study show that the Scramble learning method using CourseLab media is more effective in improving students' understanding of concepts compared to the use of Microsoft PowerPoint media. This can be seen from the higher average posttest results in the experimental class (85.7) compared to the control class (78.4) and the average *N-gain value* in the experimental class (0.63) which is greater than that of the control class (0.49). This difference is statistically significant, which indicates that CourseLab's interactive learning media has a positive impact on students' conceptual understanding. The use of CourseLab allows for interactive simulations, animations, and self-evaluations that make the material easier to understand and engaging, thereby increasing student engagement and learning outcomes.

Microsoft PowerPoint, despite its role in presenting material systematically, tends to be less interactive than CourseLab. PowerPoint is still limited to presenting information in the form of text, images, and slides, which are more passive and less able to stimulate students in critical and deep thinking (Suantara et al., 2023). This difference can be seen from the results of the posttest and N-gain, which shows that students in the experimental class (CourseLab) experienced a more significant increase in concept understanding compared to students in the control class (PowerPoint) (Martawijaya et al., 2023; Matsun et al., 2019).

This study fills a gap in the study of the effectiveness of technology-based learning media in interactive learning methods in Indonesia, especially in the context of high school education (Rizaldi et al., 2020; Suroso et al., 2024). Many previous studies have focused on the effectiveness of PowerPoint media, but not many have specifically explored the potential of CourseLab in active learning methods such as Scramble (Cole et al., 2018; Lee & Fanguy, 2022; Sirait, 2023). Another gap is the lack of a direct empirical comparison between these two media in the context of learning science concepts in high school students. The results of this study provide empirical data that show the advantages of CourseLab media compared to PowerPoint, especially in improving students' understanding of concepts.

The novelty of this study lies in the approach that combines the Scramble learning method with CourseLab interactive media and compares it with Microsoft PowerPoint. This combination has not been widely explored, especially in the context of learning in Indonesia. In addition, the use of CourseLab as an interactive learning medium in this study offers a new approach that allows the presentation of material

that is more interesting, dynamic, and able to develop active student engagement, so that it can improve concept understanding better compared to conventional media (Campbell et al., 2020).

The results of this study have important implications for learning practices in secondary schools, especially for technology-based learning. The use of CourseLab as an interactive learning medium can be an option for teachers in designing more interesting and effective learning, especially for materials that require an in-depth understanding of concepts. In addition, these findings can encourage educational institutions to make more use of technology-based interactive media in the learning process to improve overall student learning outcomes. The implementation of the Scramble method with CourseLab media can also enrich teaching strategies in the classroom, motivate students to actively participate, and improve their critical thinking skills. On the other hand, these results can be used as a basis for further research in developing other interactive learning media that can be applied to various active learning methods.

This research has the potential to provide a significant impact on improving the quality of biology learning, both for students and teachers. For students, the use of interactive and visual learning videos can increase interest in learning, deeper understanding of concepts, and critical thinking skills in solving biology problems. Meanwhile, for teachers, these videos can be an effective tool for delivering complex material in a more interesting and easy-to-understand way. The broader impact of this research also includes the creation of more inclusive learning, where students with different learning styles—such as visual and auditory—can gain more optimal benefits, and support the application of technology in education in line with the demands of the digital era.

CONCLUSION

The conclusion of this study shows that the use of CourseLab media in the Scramble learning method is significantly more effective in improving students' understanding of concepts compared to the use of Microsoft PowerPoint. Students who study with CourseLab show higher learning outcomes, as seen from posttest scores and *N-gain* which is larger than the class that uses PowerPoint. CourseLab, with its interactive features, provides opportunities for students to learn more actively and independently, thereby deepening their understanding of the material. This study emphasizes the importance of using technology-based interactive learning media to support active learning methods, which has implications for improving the quality of learning and student learning outcomes at the secondary education level.

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