Comparison of Discovery Learning Models Assisted by Student Books and Videos on Student Motivation, Activity, and Learning Outcomes

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Abstract: The quality of learning requires innovation in teaching methods to improve student motivation, activity and learning outcomes. This pseudo-experimental research aims to determine the differences in motivation, activity, and learning outcomes of students taught using the Discovery Learning learning model assisted by student books (DL 1) and videos (DL 2). This study involved all students of class X at SMAN 8 Makassar and randomly selected class X.3 and X.7 as samples. Data were collected using a motivation questionnaire, observation sheet, and learning outcome test. The data collected were analyzed using descriptive statistics in the form of averages and inferential in the Manova Test. The results of this study show that there is a significant difference in the effect of the two treatments on student motivation, activity, and learning outcomes. Where students who were taught using a video-assisted discovery learning model were better than student books, the findings in this study imply that increasing the motivation, activity, and learning outcomes of students in high school should be given more attention through the application of appropriate learning models and media.

Keywords: Discovery learning; Learning activity; Learning model; Learning motivation;, Learning Outcomes

Introduction

The learning process is an action that includes interaction between teachers and students to accomplish learning goals. As stated by Lavie et al. (2019), learning is a study action that is executed gradually so that students can understand the purpose and meaning of the activities carried out. The goal of learning is to increase students' knowledge of the material to the maximum. According to Parrales et al. (2020), the teaching and study process helps students follow the material or concepts taught by the teacher. As the implementers of learning, teachers need to be competent in organising the implementation of good study by paying attention to student learning motivation (Czerkawski & Lyman, 2016). We know that learning

motivation is learners' exclusive goals and desires that relate to the learning process and condition their engagement in learning activities (Vermunt & Donche, 2017). Student engagement and achievement when carrying out learning can be determined by the motivation that students have (Adnan et al., 2014; Yu et al., 2024). This aligns with the viewpoint of Lin et al. (2017) learning motivation is often considered a factor that affects student outcomes and performance. High learning motivation will positively impact students' activity and learning outcomes. According to Filgona et al. 2020), learning success depends on the motivation possessed by students.

Student learning activity is one of the essential cues of learning because learning activities are designed to provide various learning experiences to students (Busa,

2023). These experiences are obtained when students are actively involved in learning (Arisah & Amira, 2021; Lestari et al., 2024). Learning activities are related to the entire activities students perform in the context of learning to reach certain goals. Without activity, the learning process will not run effectively. Learning activities are not only limited to writing but students are also expected to ask questions, answer, be active in discussions, and complete assignments on time (Lature, 2024). High activity indicates deep student involvement in learning, which is usually deeply related to good learning results (Yusuf et al., 2020).

Learning outcomes are the level of achievement that students get after following a series of lessons, which are measured in the form of scores or grades based on assessments made by teachers (Dukalang & Sudirman, 2024; Fernando et al., 2024). Learning outcomes are a measure of how far students have mastered the material taught. According to Sujarwo et al. (2023), Learning outcomes are skills acquired after completing learning tasks, evident from alterations in student behaviour that can be observed and assessed with adjustments in attitudes and abilities. This transformation can be interpreted as an improvement and development of behaviour which includes cognitive, affective, and psychomotor fields (Hafidzah et al., 2023).

Motivation and learning outcomes have an important role in learning as they are interrelated and influence each other (Howard et al., 2021). High intrinsic and extrinsic motivation can help to understand the material taught and increase understanding of complex concepts (Cheng, 2019). In addition, good learning outcomes are an indicator of learning success. When students achieve satisfactory learning outcomes, it shows that they have successfully mastered the material and can apply it in various situations (Ofem et al., 2024). Good learning outcomes also motivate for students to continue learning and improve their abilities (Kriegbaum et al., 2018). Thus, high learning motivation and satisfactory learning outcomes are important components in creating an effective learning environment and positively influence students' overall development (McInerney, 2019). However, in the implementation of learning, there are still many problems such as low student motivation and learning outcomes.

There are still many students who show low involvement and participation in the learning process, causing learning to be passive and less interactive, which will hurt their learning outcomes student involvement is an indicator of learning success (Ginting, 2021). Low student activity and learning outcomes can be caused by several reasons. One of them is the lack of student motivation to learn (Zhang et al., 2022). When students do not have motivation they tend to be less active during the learning (Liu et al., 2012; Lo et al., 2022). Students tend to be unmotivated in learning if the teacher dominates the learning (Moreno-Murcia et al., 2018). The lack of relevance of the subject matter to everyday life can also reduce students' motivation to learn. When students do not see the connection between what they learn in school and their real lives, they tend to lose interest and motivation to learn (Albrecht & Karabenick, 2018). In addition, monotonous and less interactive teaching methods can also make students feel bored and lose motivation to learn.

The accomplishment of the learning process is heavily reliant on the learning methods and models applied (Bulkini & Nurachadijat, 2023). Along with the times, many experts recognise the potential of technology, information and communication to positively influence learning and the improvement of 21st-century abilities (Liesa-Orús et al., 2020). Various innovative learning models continue to be developed to improve the level of learning. In particular, learning models are based on constructivism theory. According Adnan & Jihadi, (2019) constructivism is a learning theory that states that knowledge cannot be passively transferred from one individual to another, but must be actively built by each individual through experience and interaction with the surrounding world. In this context, constructivism directs students to produce their knowledge through the process of interaction with the environment and experiences they have (Kanphukiew & Nuangchalerm, 2024). There are many learning models based on constructivism theory, among others discovery learning (DL). Discovery learning refers to a pedagogical method, where students learn through their exploration and discovery of a particular topic (Stoffová, 2020).

Discovery learning emphasises the process of searching, discovering concepts, and developing scientific attitudes independently by students (Inde et al., 2020; Muhammad & Juandi, 2023; Sofeny, 2017). The discovery learning model directs students into learning situations that allow them to explore and discover the concepts learned (Rahmayanti, 2021; Syarif et al., 2020). Discovery Learning offers chances for students to uncover concepts for themselves with examples they encounter in everyday life (Sunarsih et al., 2020). In this model, students are imperative to perform varied activities such as collecting data, comparing, categorising, analysing, integrating, and making conclusions. This is believed to increase students' active participation in learning, improve their creative thinking ability, grow critical thinking skills and improve their comprehension of the subject (Winita et al., 2020). Discovery learning emphasises more on the process of

discovering knowledge (Aldalur & Perez, 2023; Ermawati et al., 2023) in their research obtained results on the implementation of the discovery learning model which was able to improve student learning achievement. This is evident from the acquisition of student learning outcomes tests before being treated obtained an average of 55.52 and after being treated increased to 77.38.

Students have diverse ways of learning so it is necessary to develop a more effective presentation of learning materials (Shiu et al., 2020). In addition to learning models, motivation, activity and student learning outcomes can be influenced by learning resources and media. Learning resources are components that have a very important role in improving the level of learning which consists of various materials, tools, and facilities used to assist the student's academic process and improve learning outcomes (Samsinar, 2019). According to Bušljeta (2023), Learning resources can be explained as instruments for the presentation and delivery of predetermined items such as sketches, maps, drawings, photographs, films, diagrams, and written materials such as textbooks, clippings, newspapers or scientific articles. The learning media are tools or materials used by teachers or students that can support the successful implementation of learning (Marpaung et al., 2020). Learning media is essential in the implementation of learning activities in the classroom. Learning media aims to make the teaching process more effective and efficient (Mweene & Muzaza, 2020). Learning media can be anything that can increase motivation, and stimulate thoughts, feelings, attention and willingness of students to learn (İlhan & Oruç, 2016). In this study using learning resources student books and media in the form of videos.

However, until now, research that specifically compares the effectiveness of discovery learning using student books and videos on student motivation, activity, and learning outcomes, especially at the high school level is still lacking. Therefore, this study aims to fill the void by researching the comparison of the discovery learning model assisted by student books and videos at SMAN 8 Makassar. This research offers a new perspective by directly comparing the impact of different supporting media in the application of this model. This research is planned to provide new insight into the effectiveness of using both learning media in the context of discovery learning. This research is also important because curriculum development continues to encourage the application of innovative learning models and media. By knowing the comparison of the effectiveness between student books and videos in the application of discovery learning, teachers can make more informed decisions in choosing suitable models and media to improve student motivation, activity, and learning outcomes.

Method

This study aims to determine the differences in the influence of discovery learning models assisted by student books and videos on student motivation, activity, and learning outcomes. This study uses a quasi-experimental research type (Goldfarb et al., 2022) with a design using Pretest-Posttest Only Control Group Design.

The population in this study was all students of grade X at SMAN 8 Makassar in the 2023/2024 academic year consisting of 9 classes. The researcher chose class X because it is homogeneous, does not have superior classes, uses the same textbooks, and follows the same curriculum. The sample used was taken using the Random Sampling technique which aims to generalize the population by selecting small groups (Kesemen et al., 2021). After the data collection technique was carried out, two classes were selected, namely class X.3 as experimental group one which was taught using the discovery learning model assisted by student books (DL 1), and class X.7 as experimental group two which was taught using the discovery learning model assisted by videos (DL 2). The number of students in experimental group 1 and experimental group 2 was 32 and 33 people.

The research instruments include a learning motivation questionnaire to measure the level of student learning motivation, an observation sheet to monitor student learning activities, and a test to evaluate student learning outcomes. The learning motivation questionnaire uses a Likert scale (Pescaroli et al., 2020). The motivation questionnaire used consists of 28 statements based on four indicators (Malik, 2014): Attention; Relevance; Confidence; and Satisfaction. The questionnaire assessment scale consists of five choices: Strongly Agree (SS), Agree (S), Neutral (N), Disagree (TS), and Strongly Disagree (STS) (Mazahreh et al., 2019). Student learning activities are measured using an observation sheet that includes initial, core and final activities. The observation sheet contains statements based on several indicators of learning activities, such as Visual activities, Oral activities, Writing activities, Motor activities, Mental activities, and Emotional activities (Mamba'ul, 2022). Learning outcomes are evaluated through a multiple-choice test of 20 questions.

Learning motivation data were collected twice, namely before (pretest) and after (posttest) the application of the discovery learning model with the help of student books and videos. Student learning activity data were collected using an observation sheet in the form of a checklist and filled in by several

designated observers. Observers will observe and record each student's activity during the learning process. Learning outcome data were collected through tests given twice, namely before (pretest) and after (posttest) treatment. After data collection, the scores of each student were processed and analyzed. The treatment given to the two experimental groups refers to the syntax of the discovery learning model which includes: 1) Stimulation, 2) Problem Identification, 3) Data Collection, 4) Data Processing, 5) Verification, and 6) Generalization. However, there were different treatments given to the two experimental groups. Experimental group one presented images of stimulation syntax while experimental group two presented videos. In the syntax of data collection and data management, experimental group one used the help of student books while experimental group two used the help of videos.

The data analysis technique in this study consists of two test statistics, namely descriptive and inferential statistics. Descriptive statistics are used to describe or summarize data on student motivation, activities, and learning outcomes after learning with the discovery learning model assisted by student books and videos (Bryant, 2016). Inferential statistics are used to draw conclusions about the population based on the sample data taken. In this study, inferential statistics involve prerequisite tests such as normality and homogeneity of

data, as well as hypothesis testing to test whether there are differences in learning motivation, learning activities, and student learning outcomes through the discovery learning model using student books and discovery learning using videos. The hypothesis test used is the MANOVA test. According to Smith et al. (2020), the MANOVA test is a statistical method for testing the average difference of several dependent variables simultaneously between two or more independent groups. This MANOVA analysis was carried out using SPSS software version 24.0.

Result and Discussion

According to the research findings by applying the discovery learning model with the assistance of student book and video, descriptive and inferential analyses were found as follows.

Descriptive Statistical Analysis
This is the result of the descriptive statistical analysis regarding students' motivation, activity, and learning achievement in each experimental group.

Student Learning Motivation
Descriptive data regarding the learning motivation of class X students at SMAN 8 Makassar in both experimental groups are listed in Table 1.

Table 1. Descriptive Value of Student Learning Motivation

Groups	N	Pretest			Posttest		
		Mean	Min	Max	Mean	Min	Max
Experiment 1 (DL 1)	32	69,37	48.00	83.00	78.28	56.00	96.00
Experiment 2 (DL 2)	33	68,33	45.00	88.00	82.96	67.00	96.00

The descriptive statistical analysis results from Table 1 show changes in student learning motivation in each experimental group before and after treatment. For example, Experimental Group 1 using the discovery learning model with a student book experienced an increase in the mean value of the pretest from 69.37 to 78.28 in the posttest. in the experimental group 2 who used the discovery learning model with the assistance of video, the pretest average value reached 68.33 and the posttest reached 82.96. From these findings, it can be concluded that the most significant rise in learning motivation occurred in experimental group 2 using the discovery learning model with video assistance.

The achievement of student learning motivation indicators in experimental group 1 which was taught using the discovery learning model assisted by student books and experimental group 2 which used the discovery learning model assisted by videos can be seen in Table 2.

Table 2. Percentage of Achievement of Student Learning Motivation Indicators

No.	Indicators	Experiment 1 (DL 1)		Experiment 2 (DL 2)	
		Pretest	Posttest	Pretest	Posttest
1.	Attention	69,28	77,50	66,32	82,94
2.	Relevance	68,03	77,94	66,92	80,86
3.	Confidence	70,08	78,21	69,95	83,63
4.	Satisfaction	70,17	79,64	70,38	84,67

Table 2 shows that the calculation results of the achievement of student learning motivation indicators in experimental group 1 through the discovery learning model assisted by student books that obtained the highest pretest score were in the satisfaction indicator with a percentage of 70.17% and the highest posttest score was also in the satisfaction indicator with a percentage of 79.64%. The lowest pretest score was in the relevance indicator with a percentage of 68.03% and the

lowest posttest score was in the relevance indicator with a percentage of 80.86%. Experimental group 2 through the discovery learning model assisted by videos obtained the highest pretest score in the satisfaction indicator with a percentage of 70.38% and the highest posttest score was also in the satisfaction indicator with a percentage of 84.67%. The lowest pretest score was in the attention indicator with a percentage of 66.32% and the lowest posttest score was in the relevance indicator with a percentage of 80.86%.

Student Learning Activities

Descriptive data regarding the learning activities of class X students at SMAN 8 Makassar in both experimental groups are listed in Table 3.

Table 3. Descriptive Value of Student Learning Activities

Descriptive	Groups	
	Experiment 1 (DL 1)	Experiment 2 (DL 2)
Minimum score	53.00	56.00
Maximum score	92.00	94.00
Mean	73.90	80.54
Standard Deviation	10.63	11.07
Number of Samples	32	33

The results of descriptive statistical analysis of learning activities listed in Table 3 show that there are variances in the average learning activities between the two experimental groups. The average results of student learning activities of experimental group 1 obtained an average learning activity of 73.90. Meanwhile, experimental group 2 recorded an average learning activity of 80.54. then it can be concluded that students who follow learning with the discovery learning model using video assistance show better gains compared to those who use student book assistance in discovery learning.

The achievement of student learning activity indicators in experimental group 1 taught using the discovery learning model assisted by student books and experimental group 2 taught using the discovery learning model assisted by videos can be seen in Table 4.

Table 4. Percentage of Achievement of Student Learning Activity Indicators

No.	Indicators	Experiment 1 (DL 1)	Experiment 2 (DL 2)
1.	Visual Activity	86,11	83,50
2.	Oral Activity	69,66	79,29
3.	Writing Activity	64,93	72,72
4.	Motor Activity	100,00	100,00
5.	Mental Activity	72,39	81,90
6.	Emotional Activity	95,31	95,45

Table 4 shows that the results of the calculation of the achievement of student learning activity indicators in experimental group 1 through the discovery learning model assisted by student books that obtained the highest value were in the motor activity indicator of 100.00% and emotional activity of 95.31%. While the lowest value was in the writing activity indicator of 64.93%. Experimental group 2 through the discovery learning model assisted by videos obtained the highest value were in the motor activity indicator of 100.00% and emotional activity of 95.31%.

Student Learning Outcomes

Descriptive data regarding the learning activities of class X students at SMAN 8 Makassar in both experimental groups are listed in Table 5.

Based on Table 5, descriptive statistical analysis was conducted on student learning outcomes in each experimental group before and after the treatment was given. Experimental group 1 taught with the discovery learning model assisted by student books showed an average pretest value of 40.93 and a posttest of 71.09 Meanwhile, experimental group 2 using discovery learning with video assistance recorded an average pretest value of 41.36 and a posttest of 75.90. From these results, it can be concluded that the highest increase in learning outcomes occurred in experimental group 2, where students were taught using the discovery learning model with video assistance.

Table 5. Descriptive Value of Student Learning Outcomes

Groups	N	Pretest			Posttest		
		Mean	Min	Max	Mean	Min	Max
Experiment 1 (DL 1)	32	40.93	25.00	55.00	71.09	50.00	90.00
Experiment 2 (DL 2)	33	41.36	25.00	60.00	75.90	60.00	95.00

The achievement of student learning outcome indicators in experimental group 1 taught using the discovery learning model assisted by student books and experimental group 2 taught using the discovery learning model assisted by videos can be seen in Table 6.

Table 6. Percentage of Achievement of Student Learning Outcome Indicators

No.	Indicators	Experiment 1 (DL 1)		Experiment 2 (DL 2)	
		Pretest	Posttest	Pretest	Posttest
1.	Identifying facts of environmental change	45,60	84,40	46,70	84,00
2.	Analyzing the impact of environmental change	45,00	76,90	35,80	68,00
3.	Identifying human activities that cause environmental change	47,50	80,00	56,40	76,00
4.	Creating solutions to address environmental change	25,60	63,10	26,70	75,00

Table 6 shows that the results of the calculation of the achievement of student learning outcome indicators in experimental group 1 through the discovery learning model assisted by student books that obtained the highest pretest score were in the indicator of identifying human activities that cause environmental change with a percentage of 47.50% and the highest posttest score was in the indicator of identifying facts of environmental change with a percentage of 84.40%. The lowest pretest score was in the indicator of creating solutions to overcome environmental change with a percentage of 25.60% and the lowest posttest score was in the indicator of creating solutions to overcome environmental change with a percentage of 63.10%. Experimental group 2 through the discovery learning model assisted by videos obtained the highest pretest score in the indicator of identifying human activities that cause environmental change with a percentage of 56.40% and the highest posttest score was in the indicator of identifying facts of environmental change with a percentage of 84.00%. The lowest pretest score was in the indicator of creating solutions to overcome environmental change with a percentage of 26.70% and the lowest posttest score was in the indicator of analyzing the impact of environmental change with a percentage of 68.00%.

Inferential Statistical Analysis

Hypothesis testing is useful to determine whether the two treatment groups have differences in motivation, activity and student learning outcomes. However, before using the hypothesis test, several assumption tests or prerequisite tests must be carried out on the data on motivation, activity and student learning outcomes. The normality test used is the Kolmogorov-Smirnof statistical test to test whether the distribution of data in the sample is normally distributed or not. The results of the normality test are presented in Table 7.

Table 7. Analysis results in The Normality test Kolmogorov-Smirnov

Groups	Learning Motivation			Learning Activity			Learning Outcomes		
	Statistic	df	Sig.	Statistic	df	Sig.	Statistic	df	Sig.
Experiment 1 (DL 1)	0.127	32	0.200*	0.087	32	0.200*	0.131	32	0.178
Experiment 2 (DL 2)	0.110	33	0.200*	0.147	33	0.068	0.125	33	0.200*

Based on Table 7 shows the results of the normality test that has been carried out that both groups of data samples for all variables have a normal distribution. This is because the results of the statistical analysis obtained in both experimental groups obtained a significance value above 0.05. In addition to the normality test, one of the other prerequisite tests is the homogeneity test which is used to see whether the variance of student motivation, activity, and learning outcomes data is homogeneous or not. The homogeneity test in this study can be seen in Table 8.

Table 8. Results of Homogeneity Test Analysis Levene's Test of Equality of Error Variances

Parameters	F	df1	df2	Sig.
Learning Motivation	0.350	1	63	0.556
Learning Activity	0.002	1	63	0.967
Learning Outcomes	0.541	1	63	0.465

Table 8 shows that the data on students' motivation, activities, and biology learning outcomes have a significance value above 0.05. This means that the data on students' learning motivation, learning activities, and learning outcomes have homogeneous or equal variances. With these criteria met, the next step is to analyze the data using the multivariate analysis of variance (MANOVA) test to evaluate the differences in the influence of the discovery learning model assisted by student books and the discovery learning model assisted by videos on students' motivation, activities, and learning outcomes. The results of the inferential analysis using the MANOVA test are presented in Table 9.

Table 9. Manova Test Analysis Results

	Effect	Value	F	Error df	Sig.
Groups	Wilks' Lambda	.742	7.066[b]	61.000	.000

Table 9 shows the results of the analysis using the Manova test with a significance value of 0.000 or 0.000 <0.05, which means that there is a difference in the application of the discovery learning model assisted by student books and the discovery learning model assisted by videos on learning motivation, learning activities, and overall learning outcomes. Therefore, the discovery learning model assisted by student books and the discovery learning model assisted by videos have different impacts on learning motivation, learning activities, and student learning outcomes.

This study proposes to compare the effectiveness of the application of discovery learning assisted by student books and discovery learning assisted by videos on motivation, activity, and student learning outcomes at SMAN 8 Makassar. Discovery learning is learning that emphasises students' active participation in searching, discovering ideas, and acquiring new knowledge through exploration and problem-solving (Rahmadhani et al., 2020). This learning model can increase curiosity because it has a syntax that can direct students to find their own things that are not understood, in other words constructing the initial understanding they have gained (Palennari et al., 2018).

Based on the test findings, it was found that there was a significant difference between the implementation of the discovery learning model with the assistance of student books and video-assisted discovery learning on student motivation, activity, and learning outcomes together. This can be seen in Table 9 which shows the results of the hypothesis test analysis which obtained a significance value of 0.000 < 0.05. The experimental group taught with the video-assisted discovery learning model showed better results than the experimental group taught with the student book-assisted discovery learning model.

Table 1 shows that experimental group 2 taught with a video-assisted discovery learning model displayed a higher rise in learning motivation compared to students in experimental group 1 taught with discovery learning assisted by student books. This is due to the visual and audio appeal of videos that can attract students' attention better than text in books (Atmaja, 2018). Videos are also able to present information more interactively and dynamically, thus increasing students' interest and involvement in learning (Barut & Dursun, 2022; Beege et al., 2017). The use of videos will also give a different impression on students because videos will increase the variety of learning so that it will create a sense of interest and high interest for students in

following the entire series of learning processes. This is in line with Adnan et al. (2016) that a variety of variations in learning activities can ultimately lead to learning motivation for students. Furthermore, according to Qaddumi et al. (2021), material presented in different ways by displaying visual elements is considered to increase student motivation which is in line with students' interest in rapidly developing technology.

Table 2 shows that students taught using video-assisted discovery learning obtained a higher average value of learning activities than students taught with discovery learning assisted by student books. Video is often used in learning to help achieve learning objectives. This is because videos provide demonstrations, simulations, and practical examples (Nickl et al., 2022). Demonstrations allow students to see first-hand how a concept is applied in a real situation. Practical examples provide a concrete picture of how theoretical concepts are applied in everyday life, which helps students connect theory with practice. Higgins et al. (2018) show how watching videos that incorporate contextualised examples offers an opportunity to construct scientific literacy. Learning presented with various kinds of multimedia not only creates an interesting learning experience or atmosphere for students but can also affect student participation in learning (Lin & Li, 2018). Student engagement in learning triggered by the video is by cognitive theory which explains that media that have components in presenting audio and visual information can improve the learning process (Mayer, 2002).

The achievement of learning outcomes of students who applied the video-assisted discovery learning model obtained a better average than students who were taught with discovery learning assisted by student books. This is because videos can help clarify complex concepts through visualisation and animation to facilitate understanding and retention of information by students. Research conducted by Kalas & Redfield 2022) stated that the use of videos in learning can help understand abstract biological concepts such as mitosis and meiosis. Video not only presents the visual component of information but also conveys interesting audio elements. This is what helps students understand difficult concepts effectively. In addition, Plass et al. (2009) discussed how videos can improve students' understanding of complex concepts. Using materials that are presented with dynamic visualisations can enable students to understand subject matter that is usually difficult to achieve through text alone. In a scientific context, videos with visualisations play an important role in developing and associating knowledge. Findings from research by Evagorou et al.

(2015) claim that visual representations can help in developing concepts, revealing relationships between elements, and making abstract concepts more concrete.

The use of learning videos has good flexibility for students, this is because videos can be played back as needed, permitting students to learn at their own speed, supporting independent learning and student self-regulation. Flexible learning allows students to explore concepts more comprehensively, without being limited by time constraints that are generally characteristic of conventional learning. According to the findings of Broadbent et al. (2021); Rizki et al. (2022), innovations in educational technology, especially the use of video media, allow students to set their learning pace according to their individual needs. This has the potential to raise student's involvement in the learning process and may ultimately contribute to improving their academic outcomes.

This study is consistent with past research that shows that learning models using video media learning can improve students' motivation, activity and learning outcomes. For example, a study conducted by Wang (2015) found that the utilisation of interactive learning applications such as Kahoot, which combines video content with game aspects, allows for strengthening the learning drive and active participation of students. This approach is also able to shape a more responsive and more active learning atmosphere, encouraging more intensive interaction in the course of learning. In addition, Calvert & Hume (2023) showed that science learning becomes more effective with the help of virtual reality (VR) and video technologies. Both create an engaging and more immersive learning experience. The use of these interactive media is proven to improve the achievement of learning outcomes by engaging them emotionally and cognitively.

This research has important implications for education. This finding confirms the theory of multimedia learning originally proposed by (Mayer, 2002), by showing that the use of video media that combines visual and audio elements is more effective in enhancing students' motivation, activity and learning outcomes compared to student books. This finding supports the concept that audiovisual media can make learning more engaging and interactive (Barut & Dursun, 2022), thus increasing student engagement and understanding (Lin & Li, 2018). In addition, this study supports Jerome Bruner's discovery learning theory, which emphasises the importance of students' active contribution to learning through exploration and discovery (Ozdem-Yilmaz & Bilican, 2020). Video as a tool in Discovery Learning provides more opportunities for visual exploration and interaction, which was found to be more effective in facilitating learning. This finding

is also consistent with the cognitive theory of information processing, which asserts that information presented in a structured and meaningful way is easier for students to process and remember (Fatah & Risfina, 2023). Thus, this study not only provides empirical evidence on the effectiveness of using videos in learning but also enriches the literature on the role of multimedia technology in enhancing the standard of education. This research has important implications for education.

Conclusion

According to the analysis that has been completed, it follows that jointly there is a significant difference in the use of the discovery learning model with the assistance of student books and discovery learning with the assistance of videos on motivation, activity, and learning achievement of class X students at SMAN 8 Makassar, with a p-value <0.05. This finding reinforces the implication that the application of multimedia technology, especially video, has a positive influence on enhancing students' motivation, activity, and learning outcomes. Videos provide a more dynamic and interactive learning experience, combining visual and audio elements to strengthen students' understanding of the material. These advantages are seen in the increase in students' learning motivation, where the video's ability to attract and maintain students' attention plays a key role. In addition, the use of video also enhances student learning activities by providing simulations, demonstrations and visualisations that assist students in understanding complex concepts. With stronger visual interaction, students tend to be more engaged and active in the learning process. Academically, the application of videos in Discovery Learning has been shown to provide better results compared to the use of student books. Therefore, this research emphasises the importance of integrating multimedia technology in education to improve learning effectiveness. Recommendations for further development are to expand the use of video in learning strategies at SMAN 8 Makassar and other educational institutions, as well as explore various contexts and subjects to optimise student learning outcomes more broadly. Thus, training to utilise multimedia technology for teachers or educators can make an essential contribution to improving the level of education in the future.

Author Contributions

Budi Setiawan contributed to conceptualizing the research idea, designing the methodology, conducting the research process, managing the data, analyzing the data and writing the article. Adnan and Firdaus as supervisors contributed to guiding the research process and editing the article.

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The authors declare no conflict of interest.

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