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Fostering Critical Thinking Skills in Elementary Schools With Video-Assisted Discovery Learning

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Abstract: This study aims to examine the implementation of video-assisted discovery learning to improve the critical thinking skills of elementary school students. The approach is qualitative to the type of classroom action research. The research subjects were 20 students and 1 teacher at fourth-grade Public Elementary School 35 Pammanu, Luwu Regency, South Sulawesi, Indonesia. The approach is qualitative with the type of classroom action research (CAR). This research was carried out in two cycles on sains with force and motion material. Each cycle is completed in two learning meetings. Observation, tests, and documentation obtained data. The data analysis procedures used are condensation, data presentation, and conclusion. The results showed that the learning process using video-assisted discovery learning showed changes in student learning activity and engagement, learning interaction, learning atmosphere, and student learning focus getting better. The category of students' critical thinking skills has increased from 60% of students in the sufficient and very critical categories in Cycle I to 85% in Cycle II. Thus it can be concluded that implementing discovery learning assisted by video media can improve the learning process and students' critical thinking skills in the science learning in fourth-grade Public Elementary School 35 Pammanu, Luwu Regency, South Sulawesi.

Keywords: Critical Thinking, Discovery Learning, Science Learning, Video-Assisted.

Abstrak: Penelitian ini bertujuan untuk mengkaji penerapan pembelajaran penemuan berbantuan video untuk meningkatkan kemampuan berpikir kritis siswa sekolah dasar. Pendekatan yang digunakan adalah kualitatif dengan jenis penelitian tindakan kelas. Subjek penelitian adalah 20 siswa dan 1 guru di kelas IV SDN 35 Pammanu, Kabupaten Luwu, Sulawesi Selatan, Indonesia. Pendekatan yang digunakan adalah kualitatif dengan jenis penelitian tindakan kelas (PTK). Penelitian ini dilaksanakan dalam dua siklus pada materi IPA materi gaya dan gerak. Setiap siklus diselesaikan dalam dua kali pertemuan pembelajaran. Observasi, tes, dan dokumentasi diperoleh data. Prosedur analisis data yang digunakan adalah kondensasi, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa proses pembelajaran menggunakan pembelajaran penemuan berbantuan video menunjukkan perubahan aktivitas dan keterlibatan belajar siswa, interaksi pembelajaran, suasana belajar, dan fokus belajar siswa menjadi lebih baik. Kategori kemampuan berpikir kritis siswa mengalami peningkatan dari 60% siswa pada kategori cukup dan sangat kritis pada Siklus I menjadi 85% pada Siklus II. Dengan demikian dapat disimpulkan bahwa penerapan pembelajaran penemuan berbantuan media video dapat meningkatkan proses pembelajaran dan keterampilan berpikir kritis siswa pada pembelajaran IPA di kelas IV SDN 35 Pammanu Kabupaten Luwu Sulawesi Selatan.

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Kata Kunci: Berpikir Kritis, Discovery Learning, Pembelajaran IPA, Berbantuan Video.

Introduction

Science learning is one of the main subjects in the education curriculum in Indonesia, including at the elementary school level. Providing students with an understanding of science concepts is useful and can be applied in their daily lives. In addition, science learning is a means of developing curiosity and a variety of positive attitudes in the form of awareness about the existence of mutually influencing relationships with the surrounding environment so that concern for the natural surroundings emerges (Darling-Hammond et al., 2020; Jirout, 2020; Lindholm, 2018). Therefore science learning should provide learning experiences for students through various meaningful learning such as experiments, investigations, discovering new things, and getting to know natural phenomena further (Ann Haefner & Zembal- Saul, 2004; Bae & Lai, 2020; Darling-Hammond et al., 2020; Tyler et al., 2018). Critical thinking skills are one of the student skills developed in science learning through meaningful learning experiences. Because, indeed, one of the objectives of learning science is to develop students' critical thinking skills about natural phenomena around them (Bailin, 2002; Santos, 2017).

With the development of an increasingly globalized economy and rapidly developing technology in the 21st century, critical thinking has become a skill that has attracted great attention from various groups, including researchers in learning, and has even been identified as a very desirable skill or "vital need" in 21st-century life (Dilekçi & Karatay, 2023; Dong et al., 2023). The big challenges of the 21st century require the ability to think critically for every individual, even more so in previous eras, because they must be able to deal with the flood of information that is accessed, modern jobs, and even the rise of fake news (Lombardi et al., 2021). critical thinking is an individual's way of thinking to provide a response and ability to solve a problem by utilizing the information and experience it has (Amijaya et al., 2018). Critical thinking makes individuals capable of considering and making decisions based on information and experience that is owned and available in abundance around them (O'Reilly et al., 2022). Critical thinking is very important in the learning process because by thinking critically, students can understand the material and improve students way of thinking, besides being able to improve their ability to absorb and manage the information received to be used in making decisions or solving problems faced (Salamudin & Amelia, 2022). So it is important and urgent to build and develop students' critical thinking skills so that schools, especially teachers, need to integrate the development of critical thinking into their curriculum and learning process (Lombardi et al., 2021).

However, the ideal critical thinking skills in science learning in elementary schools still need to be fully realized in learning classes. One occurred at Public Elementary School 35 Pammanu, Luwu Regency, South Sulawesi. The results of observations and interviews with class teachers show that students' critical thinking skills still need to be higher because teachers have not used varied learning methods and do not facilitate the development of students' critical thinking skills. Learning still prioritizes science material as a product, so the teacher explains and passive students as recipients of the knowledge transfer process. Science as a process and attitude is reduced in expository learning, answering questions, and memorizing. So automatically, the ability to think critically in learning science must be facilitated properly. Various previous studies also show that in general the critical thinking skills of Indonesian students have not yet developed as expected, including among elementary school students (Anisa & Ipungkarti, 2021; Fajari, 2021). Given the importance of developing critical thinking skills, this issue needs to be urgently followed up with efforts to improve students' critical thinking processes and skills. One of them is through appropriate and relevant learning models. Designing learning activities that students will experience in various experiences will significantly improve students' creative thinking skills (Dilekçi & Karatay, 2023).

One alternative that is suitable for improving the learning process in science content and has the potential to have an impact on increasing students' critical thinking skills, namely the discovery learning model. Various literature confirms that critical thinking is a form of individual high-level thinking that involves all thinking processes to access, understand and analyze information and then correlate, interpret, evaluate, and make decisions about good and bad or right and wrong (O'Reilly et al., 2022; Unlu, 2018). This concept is relevant and synergistic with discovery learning because, in its syntax, students are facilitated and guided to think through several stages, such as stimulation in capturing and understanding problems, formulating problem statements, collecting and processing data for solving problems, verifying the data collected, concluding and generalization of problem-solving

discovery processes (Safa'at et al., 2020; Sukartiningsih & Jacky, 2019; Wale & Bishaw, 2020).

To support and strengthen the implementation of learning models, media and teaching materials that are relevant to be combined with certain models are also needed. Teachers or students use the media and teaching materials to facilitate the learning process, including media and digital teaching materials such as videos (Kosasih, 2021). Video media is a learning tool that is relevant to the characteristics of the digital generation and effectively facilitates fun and attractive learning (Shyu, 2000; Su & Chiu, 2021), besides that, it also has the potential to improve student's critical thinking skills (Hsu et al., 2022; Stobaugh, 2013; Zipp & Maher, 2010).

Based on the previous description, it can be emphasized about the importance of action research, which will describe the implementation of the video-assisted discovery learning model to improve students' critical thinking skills, especially in the science learning of fourth-grade Public elementary school 35 Pammanu, Luwu Regency. So, this study aims to examine the implementation of video-assisted discovery learning to improve the critical thinking skills of elementary school students.

Method

The research was conducted in fourth-grade of Public Elementary School 35 Pammanu, Luwu Regency, South Sulawesi, Indonesia. The research subjects were 20 students. This research was conducted in May 2023. The research design used in this study is the Classroom Action Research model developed by Elliot (Elliott, 2001). Learning improvement is designed through several stages, namely: 1) planning; 2) implementation; 3) action observation; and 4) reflection. The implementation of the action refers to the five steps of the discovery learning model, namely; 1) The stages of giving stimulation, 2) The stages of problem identification, 3) The stages of collecting data, 4) The stages of analyzing data, and 5) The stages of making conclusions. At the end of learning in each cycle, students are given an evaluation by being given reading material and five essay questions. The results of student answers are scored based on indicators measuring critical thinking skills, as described in Table 2. The results of scoring student answers are used to categorize the level of students' critical thinking skills with the following categorization table guide.

Table 1: Categorization of Students' Critical Thinking Skills

Score	Categorization
80< x ≤ 100	Very Critical
60 < x ≤ 80	Critical
40 < x ≤ 60	Critical Enough
20 < x ≤ 40	Less Critical
0,0 < x ≤ 20	Not Critical

Source: adaptation of (Endriani et al., 2018)

The research data collected were: 1) student and teacher activity data taken using observation sheets. This data is to determine the learning process and the implementation of discovery learning using infographics; 2) evaluation test by being given reading material and five essay questions. The results of student answers are scored based on indicators measuring critical thinking skills, as described in Table 2. Each student's answer is not only corrected for right or wrong and then given a score but continued with the analysis in the form of a level of critical thinking ability based on predetermined indicators of critical thinking ability. Giving action was stopped if 76% of all students in the research class reached the Sufficiently Critical and Very Critical levels according to the indicators of critical thinking skills, as summarized in Table 2.

Table 2: Indicators for Measuring Critical Thinking Skills

Indicator	Explanation of Indicators	Measurement Statement
Give a simple explanation	Utilize facts and data correctly and appropriately	Students can provide explanations by utilizing facts and data in problem information.
Build basic skills in decision making	Organizing thoughts and expressing them as a form of decision-making in structured, clear, and logical answer sentences	Students can make answer sentences according to the information in a structured, clear, and logical way.
Conclude	Summarize the valid information obtained	Students can conclude the information obtained and use it in solving problems.
Provide further explanation	Explain further to confirm his opinion using relevant facts, data, and conclusions based on the information obtained.	Students write further answers to strengthen their opinions using facts, data, and conclusions obtained from the information about the questions.
Set strategy	Provide opinions and views in a logical and easy-to-understand sequence.	Students can write opinions and views sequentially, logically, and easily understood.

Source: Adapted from critical thinking measurement indicators (Endriani et al., 2018; Nuridha & Hardianti, 2022)

Result and Discussion

Implementation of Cycle I Actions

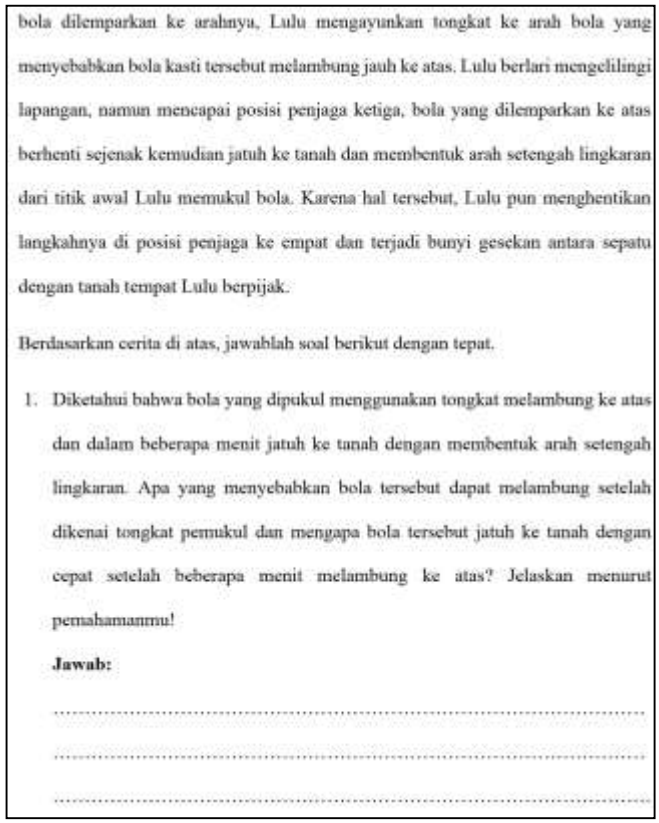
Implementation of learning activities based on the steps of the discovery learning model, the teacher carries out five steps, namely as follows:

1) The stages of providing stimulation, namely, the teacher motivates students. The teacher shows a learning video about style and motion, and then the teacher conducts questions and answers to students regarding the video they have watched. The following is an example of a video screenshot used in the cycle I action.

Figure 1. An example of a video screenshot used in the cycle I action

2) The problem identification stage involves dividing students into different groups to work on problems related to the learning video shows. These students work in groups based on worksheets that the teacher has distributed. The following is an example of a student worksheet from cycle I.
3) The stages of data collection, in which the teacher helps pupils focus on the information in the instructional video. Students are instructed by the teacher to record the data and information they gain from the instructional video.
4) The data analysis stage is where students debate with their group members how to resolve some of the issues that were posed in the earlier stages using the data and knowledge they have learned from instructional videos. The use of extra facts and information from other sources, such as textbooks, is also permitted by teachers for their pupils.
5) The teacher invites each group to draw conclusions on the issues they addressed in their different groups throughout the stage of drawing conclusions. Each group was then requested to present their findings, and subsequent groups were invited to remark on the presentations of the previous groups. The teacher then comes to a conslusions.

At the end of the second cycle I learning meeting, the students were given reading material and five evaluation questions in the form of essay questions, which had to be completed individually. The results of their work are then analyzed and used in determining the categories of their critical thinking skills. The following is an example of questions in cycle I.



bola dilemparkan ke arahnya, Lulu mengayunkan tongkat ke arah bola yang menyebabkan bola kasti tersebut melambung jauh ke atas. Lulu berlari mengelilingi lapangan, namun mencapai posisi penjaga ketiga, bola yang dilemparkan ke atas berhenti sejenak kemudian jatuh ke tanah dan membentuk arah setengah lingkaran dari titik awal Lulu memukul bola. Karena hal tersebut, Lulu pun menghentikan langkahnya di posisi penjaga ke empat dan terjadi bunyi gesekan antara sepatu dengan tanah tempat Lulu berpijak.

Berdasarkan cerita di atas, jawablah soal berikut dengan tepat.

1. Diketahui bahwa bola yang dipukul menggunakan tongkat melambung ke atas dan dalam beberapa menit jatuh ke tanah dengan membentuk arah setengah lingkaran. Apa yang menyebabkan bola tersebut dapat melambung setelah dikenai tongkat pemukul dan mengapa bola tersebut jatuh ke tanah dengan cepat setelah beberapa menit melambung ke atas? Jelaskan menurut pemahamanmu!

Jawab:

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Figure 2. Example of an evaluation question for measuring students' critical thinking skills in cycle I action

Learning Process & Critical Thinking Improvement Results After Cycle I

After implementing the actions in cycle I, various changes occur in the learning process in the classroom, for example, changes in student learning activities to become more active, and there appears to be learning involvement from the beginning of learning to the end. These changes can be seen when the teacher provides stimulation by displaying learning media,

namely learning videos about the relationship between force and motion. From the beginning, students began actively listening and seeking important information from the learning media. Students observe and are guided to relate the information obtained with examples of force and motion that occur in everyday life. Thus the process of understanding students occurs more easily and is more contextual because they link it to the real conditions of their everyday students. Learning steps in student worksheets following the syntax of discovery learning also facilitate and encourage students to be active in each learning step, from the first step of providing stimulation to the fifth drawing of conclusions.

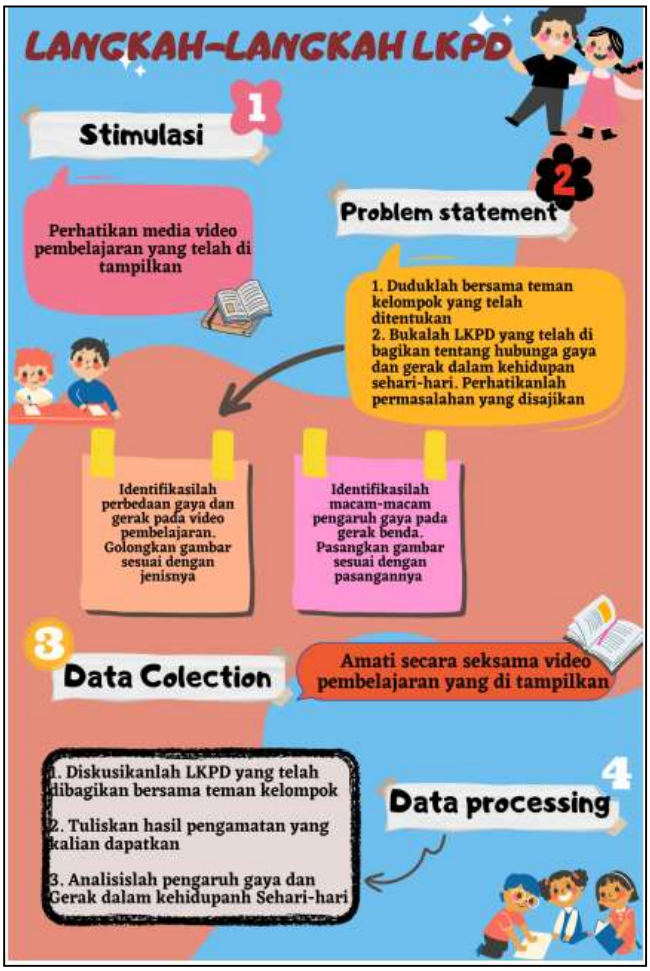

Figure 3. Example of student worksheets used in cycle I actions

Changes that occur next are in learning interactions seen in the group discussion process and working together to complete a series of activities according to worksheets. The existence of media support in the form of learning videos is very helpful and encourages students to make connections between the knowledge they have and the information they get from the video. Interactions between students, teachers, and students with teaching materials and video media are very intense during learning. Because during the step-by-step implementation, at least students are guided to use the information in the video. The next change is that the classroom's condition or atmosphere of learning is quite conducive; this condition can be seen in the students who focus on paying attention to step-by-step learning that discusses the relationship between force and motion. Students focus on listening to the learning videos broadcast by the teacher, completing worksheets in their respective groups, working in groups, and paying attention to other groups in presenting the results of their discussions.

Based on the results of observations of the learning process from the teacher and student aspects carried out by observers, it can be stated that the learning process from the point of view of the implementation of learning by the teacher has reached the fairly category with a percentage of 71% of the learning indicators that have been carried out. As for the results of the observation of the learning process from the student's point of view, it reached a fairly category with a percentage of 65% of the learning indicators that had been carried out.

As for some of the deficiencies in the results of reflection during the implementation of the action in cycle I, including 1) There were still students who were less orderly when dividing groups; this was because the teacher did not arrange the distribution of group seats in advance so that students were confused, 2) Students were not used to using video media in discovery learning and group learning, 3) Students do not follow the teacher's directions in listening to the videos shown, 4) Students do not know and do not understand how to identify data because of a lack of direction and guidance from the teacher, 5) Students are still unsure and afraid to ask questions related to material that is not yet understood, this is due to the lack of encouragement from the teacher so that students actively ask questions, 6) Students lack confidence in making presentations and are embarrassed to answer in front of the class.

Based on the deficiencies found in the actions of cycle I, improvements need to be made so that the action process is of better quality, namely: 1) When dividing groups, the teacher must arrange chairs for each group first so that students are orderly and the class atmosphere is conducive, 2) Delivery of material carried out in no hurry so that it is easy for students to understand and the teacher needs to master the material to be taught, 3) At the stage where students discuss and process data the teacher must provide opportunities and encourage students to ask questions, 4) When students are less disciplined in discussing the teacher gives ice breaking then refocuses students' attention on

discussing, 5) At the guiding stage of identifying data the teacher needs to teach how to identify data properly using language that students can easily understand, 6) The teacher provides motivation to students not to be embarrassed and point at each other to make presentations at the front of class.

After applying discovery learning with the support of learning videos, there has been an increase in students' critical thinking skills. This can be seen in the analysis of the results of measuring students' thinking skills through student evaluation answers. Before the teacher takes action, students' critical thinking skills are still in the low category. After implementing the actions in cycle I, the first meeting and the second meeting, it can be seen that of the 20 students, there were five students (25%) who were included in the Very Critical category, seven students (35%) were in the Critical Enough ability category. Only eight students (40%) are in the Less Critical category. Thus there are still 40% of students who are in the Less Critical or Low category. Based on the observations, reflection, and the results of achieving students' critical thinking skills, the research needs to be continued to cycle II.

Implementation of Cycle II Actions

The steps for implementing cycle II actions are still the same as those for cycle I, namely implementing the five steps or discovery learning syntax. The difference is the topic of the material being studied, video media given to students, and various efforts to improve the learning process as a follow-up to the reflection results in cycle I.

Learning Process & Critical Thinking Improvement Results After Cycle II

The results of observing the actions in cycle II showed that the activeness and involvement of students in learning, learning interactions, and the learning atmosphere and focus of student learning were improving. These changes appear to have occurred when: 1) Students can find, critically find, process, and convey information obtained through learning videos to increase their understanding in giving examples of force and motion relationships, 2) Students can collect data, process and analyze based on the videos they observe and 3) Students are more courageous in explaining orally the results of data processing and their conclusions about the types of force and motion relationships found in the learning videos.

Based on the results of observations of the learning process from the teacher and student aspects conducted by observers in cycle II, it can be stated that the learning process from the point of view of the implementation of learning by the teacher has reached the good category with a percentage of 96% of the learning indicators that have been carried out. As for the results of the observation of the learning process, from the point of view of students reaching the good category with a percentage of 91%, the learning indicators have been carried out.

The increase in students' critical thinking skills can be seen in the results of student evaluation tests which have increased. In cycle I, data on students' critical thinking skills showed that eight students (40%) were in the less critical category, seven students (35%) were in the Critical Enough category, and only five students (25%) were in the very critical category. However, after applying the discovery learning model in cycle II, it can be seen from the 20 students who were the subject of the study, the remaining three students (15%) were in the less critical category, five students (25%) were in the Critical Enough category, and 12 other students (60 %) is in the very critical category.

Based on observational data during the implementation of cycle I to cycle II, there was a change in the learning process. In Cycle II, the process of implementing learning using the discovery learning model assisted by learning video media went well because students were already familiar with the learning steps used. Implementing the discovery learning model assisted by learning videos makes science learning more varied and increases enthusiasm, supporting student learning responses. Students are enthusiastic about participating in the learning process; this can be seen when the teacher displays media and divides them into groups. When students identify problems on student worksheets, this is in line with the opinion (Damayanti et al., 2022) stating that using instructional media can stimulate students' interest in learning to expedite the learning process and improve learning outcomes. This is also in line with the assertion of various literature that video media is a learning tool that is relevant to the characteristics of the digital generation and effectively facilitates fun and attractive learning (Shyu, 2000; Su & Chiu, 2021), that it also has the potential to improve thinking skills. critical students (Hsu et al., 2022; Stobaugh, 2013; Zipp & Maher, 2010).

With students getting their information through learning video media, they begin to think critically to make science learning more meaningful. This is relevant because, indeed, one of the objectives of learning science is to develop students' critical thinking skills regarding natural phenomena around them (Bailin, 2002; Santos, 2017). It was further explained that the discovery learning model indirectly makes students more creative and critical in thinking; not only that, this model can also make students more independent in finding a conclusion (Sunarto & Amalia, 2022). They also emphasized that the discovery learning model is, in

principle, an activity carried out by students to find a concept or knowledge that was previously unknown to students so that it encourages students to be able to do analysis or think deeply. It was also explained that applying a learning model can improve students' thinking abilities, and the discovery learning model in learning can train students to improve these abilities (Sutoyo & Priantari, 2019).

Various changes in the learning process, as described above, then encourage the improvement of students' critical thinking skills. The category of students' critical thinking skills has increased from 60% of students in the sufficient and very critical categories in Cycle I to 85% in Cycle II. Thus, applying the discovery learning model, if used properly and supported by relevant video media, can improve processes and critical thinking skills in science content about style and motion in fourth-grade Public Elementary School 35 Pammanu. This conclusion is in line with various literature which also emphasizes that critical thinking is a form of individual high-level thinking that involves all thinking processes to access, understand and analyze information and then correlate, interpret, evaluate, and make decisions about good and bad or right and wrong (O'Reilly et al., 2022; Unlu, 2018). Then this concept becomes very relevant and synergistic with discovery learning because, in its syntax, students are facilitated and guided to think through several stages, such as stimulation in capturing and understanding problems, formulating problem statements, collecting and processing data for solving problems, verifying the data collected, concluding and generalizing the problem-solving discovery process (Safa'at et al., 2020; Sukartiningsih & Jacky, 2019; Wale & Bishaw, 2020).

The conclusion of this study is also relevant to previous research, which concluded that there was an increase in critical thinking skills in science learning through the Discovery Learning learning model for students (Setyawan & Kristanti, 2021; Fadillah et al., 2021); Safitri & Mediatati, 2021). Other studies have also concluded differences in the pretest and post-test results; namely, the results of the discovery learning model assisted by video learning are higher than the discovery learning model alone (Djepy et al., 2022). Furthermore, other studies have also concluded that discovery learning-based video learning is valid to be applied in learning activities and is effective for improving student learning outcomes so; that this media can be used as a support for learning activities so that it can improve student learning outcomes (Setiadi et al., 2022).

Conclusion

Based on the results of learning improvement, it was concluded that implementing discovery learning models assisted by learning videos could improve students' learning processes in natural science content. Implementing these actions can improve the critical thinking skills of fourth-grade students at Public Elementary School 35 Pammanu, Luwu Regency, South Sulawesi.

Based on the results of the implementation of the action, there are several suggestions or recommendations. First, teachers are advised to use the discovery learning model assisted by this learning video as an alternative to improving students' critical thinking processes and skills, especially in science subjects. However, teachers need to spend more time developing videos to be relevant and aligned with the steps of discovery learning. For future researchers to further develop research using the discovery learning model assisted by video learning with variable aspects other than critical thinking skills, for example, the effect on learning motivation, interest in learning, learning engagements, and so on, quantitatively and qualitatively.

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