



The Effectiveness of the Practicum Video Guide on Distance Learning in Improving Biology Learning Outcomes in Enzyme Content

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ABSTRACT

This study aims to analyze the effectiveness of video practicum guides on distance learning in improving biology learning outcomes on enzymes. This research was conducted with the stages of problem identification, planning, action (cycles I-III), observation, and reflection. All stages of learning were carried out in distance learning (online). The research was conducted on 35 students at a high school in Bandung. The assessment instrument in this study consisted of observation sheets and students' cognitive tests at the end of the cycle. The results of observations and cognitive tests of students showed that the average score for the biological value of the enzyme material had increased. There was a significant increase in each cycle, showing the success of the learning strategy by listening to video practicum. Student learning outcomes were also influenced by the teacher management in carrying out the online learning process. This research was expected to provide new information regarding the use of video media in distance learning.

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1. INTRODUCTION

Since the Covid-19 pandemic hit, distance education has become a new trend in the world of education. After the pandemic, people are getting used to distance learning. Distance learning can be a model for future education (Shearer *et al.*, 2020). Many studies are conducted by teachers and learning experts to support the success of distance learning. Nonetheless, there are some drawbacks to distance learning. Students are required to be able to organize themselves independently, student conditions become uncontrollable, parental cooperation is needed, skill learning cannot be done in distance learning, electronic devices, facilities, and infrastructure must support each other (Rasheed, 2007).

The use of technology is an important point of distance learning activities. Technology in Education can be used for (Hamidi *et al.*, 2011):

- (i) Capturing key content for students to access whenever and wherever and to fulfill their pace of learning (e.g. lecture materials, readings, interactive multimedia).
- (ii) Learning materials come in a variety of formats to suit different learning styles and multimodal learning (e.g. text, video, audio, multimedia).
- (iii) Provide opportunities for discourse and interaction in and out of the classroom (e.g. voting tools, discussion tools, content creation tools).
- (iv) Deliver timely information, updates, and reminders to students (e.g. micro-blogging, announcement tools).
- (v) Provide immediate and anonymous feedback to teachers and students (e.g. quizzes, polls) to signal revision points; Capture data about students to analyze their progress and identify 'at-risk' students (e.g. analysis).

One form of using technology in distance education is the use of practicum videos. Learning activities with the strategy of listening to practicum videos are not a new way, a shift in traditional learning, or the use of technology (Aldini *et al.*, 2022). Learning activities with a strategy of listening to practicum videos combine pedagogy and technology learning in a way that provides great opportunities for students to learn from various applications and discussions. Learning activities using the strategy of listening to practicum videos is a learning approach that presents the latest learning methods by providing material online outside the classroom (Haryani & Sa'diah, 2021). Students are given material in the form of videos and online presentations that can be accessed from anywhere. On-line videos are used as the main learning media from learning strategies to listening to practicum videos by posting videos to online portals that are used as media by teachers. Learning activities using the strategy of listening to practicum videos are an active learning approach that combines student involvement, and various learning methods and disseminates learning resources by broadcasting videos, sounds, images, and documents in the form of pdf, doc, and others. Learning activities with the strategy of listening to practicum videos have many variations in combining learning methods, including students studying the material or watching a 10-15 minute video made by the teacher and then taking tests on the web portal. From the results of these tests, the teacher learns which points need to be explained in class. Then, the teacher leads discussions in class and accompanies students while studying in class.

Several studies on the use of practicum videos in learning have been carried out, including research by Anggraeni *et al.* (2020) regarding the use of experimental videos to demonstrate making sago crackers to students. Nandiyanto *et al.* (2020) also used a practicum video to demonstrate the process of making biobriquettes from biomass to vocational high school students. Research Putri *et al.* (2021) also used a video experiment to convey the concept of adsorption to vocational students. This study identified

misconceptions that occurred in students regarding their understanding of the abstract concept of adsorption after learning using a video practicum. Experimental demonstration videos are also used to teach the concept of making bioplastics to vocational high school students (Nandiyanto *et al.*, 2022a). The practicum video was also used in chemistry learning through distance learning to teach the concept of isotherm adsorption using carbon particles to vocational high school students (Nandiyanto *et al.*, 2022b). In addition, there are many other studies regarding the use of practicum videos as learning media to convey various abstract concepts to students.

Although there have been many studies on the use of practicum videos in distance learning, the use of practicum videos in distance learning in improving biology learning outcomes is still rarely done. Therefore, this study aims to analyze the effectiveness of video practicum guides on distance learning in improving biology learning outcomes on enzymes. Enzyme material is very closely related to everyday life because enzymes are catalytic proteins found in the human body. Therefore enzymes are an essential Biology material concept to be conveyed to students. Distance learning should not be a barrier for teachers to convey the concept of enzymes to students. Therefore the originality of this research is to present an analysis of the effectiveness of using video labs in conveying the concept of enzymes to students which is carried out in three learning cycles. This research was expected to provide new information regarding the use of video media in distance learning.

2. METHOD

The object of this study was to increase the learning outcomes of Class XII Science students at a public high school in Bandung in the subject of biology on enzymes. The learning outcomes in question were to improve students' skills in biology subjects after implementing learning strategies in learning activities by listening to practicum videos. The subjects in this study were 36 students consisting of 19 girls and 17 boys because the learning outcomes in this class were lower compared to other classes.

This research was divided into three cycles, and each cycle consisted of planning, action, observation, and reflection. The research model used was the Kemmis and McTaggart model. The steps of classroom action research by Kemmis and McTaggart were as follows preparation of activities, planning and implementation of online actions, observation, and reflection.

2.1. Preparation of Activities

Preparation of activities divided into:

- (i) Surveys and assessments were carried out directly to find out the possibility and availability of the school concerned to be used as a research location. Another purpose of the survey is to obtain information both physically and non-physically on the condition of the school and the learning atmosphere in the classroom.
- (ii) Preparation of proposals or action plans was done in consultation with the school principal.
- (iii) Licensing and permission were obtained by existing procedures with permits and recommendations from the relevant institutions for research permits.

2.2. Planning and Implementation of Online Actions

Online action planning activities begin with:

- (i) Create learning activity instruments, namely learning activity sheets, the sequence of lesson plans for teachers, media, and methods to be applied. Activity sheets were used as instructions and directions for learning activities.
- (ii) Create data collection instruments consisting of observation sheets of student learning outcomes with observers, and post-test instruments, and prepare media and methods that are adapted to the subject matter.

Meanwhile, the implementation and action stages consisted of:

- (i) The lesson began with a greeting.
- (ii) The teacher informed the learning objectives.
- (iii) The teacher explained the material to be studied using media that is adapted to the material.
- (iv) The teacher formed online groups to carry out learning activities by listening to practicum videos.
- (v) The teacher gave problems for all groups to solve.
- (vi) Each group discussed how to solve the problem.
- (vii) Each group presented the results of their group discussion.
- (viii) The joint group concluded from the results of online group discussions.

The implementation of online actions is carried out in several cycles, in each cycle the teacher uses learning strategies to listen to practicum videos and media that are adjusted to the subject matter. Furthermore, an evaluation of each cycle is given, the results of which are used as material for planning and improvement for the next cycle.

2.3. Observation

During the learning activities, observations were made by researchers on the learning outcomes of students.

2.4. Reflection

This reflection was held based on the notes and observations made by the researcher. The researcher together with the observer then discussed the resulting impact and compared it with the situation before the action was given.

Meanwhile, in more detail, the learning activities carried out are shown in **Table 1**.

Table 1. Application of learning activities by watching practicum videos.

No	Moment	Activities
1.	Before class begin	Students study the subject matter in their respective Android videos as well as various materials that have been given and collect some of the questions they find. The teacher prepares learning material and distributes it to students who have prepared it.
2.	Beginning of online classes	Students have prepared certain questions after studying the material provided. The teacher prepares all questions that might be asked by students and prepares a discussion room to resolve questions that might arise.

Table 1 (continue). Application of learning activities by watching practicum videos.

No	Moment	Activities
3.	During online classes	Students discuss in online classes with friends and teachers and practice to improve their abilities according to the expected abilities. The teacher guides students during the learning process by providing clarification of learning material from questions that arise from students.
4.	After online class	Students continue to apply their knowledge skills after clarification and feedback from the teacher. Teachers post additional subject matter on student androids that have been prepared to increase student knowledge.
5.	Outside class hours	Students are encouraged to always find out what things they don't understand. Teachers always guide students to deepen students' understanding.

3. RESULTS AND DISCUSSION

3.1. Pre-Action Activities

3.1.1. Identify learning problems

Before the research process was carried out, the researchers first conducted a pre-survey in May 2020. This activity was carried out to convey the intention of conducting classroom action research by applying learning strategies to listen to practicum videos to improve student learning outcomes in biology subject matter of enzymes in class XII Science 7 in Senior High School 1 Bandung.

3.1.2. Planning activities before research

The sequence of actions consisted of:

- (i) Survey and assessment. The purpose of the survey is to obtain information both physically and non-physically on the condition of schools and learning facilities.
- (ii) Preparation of proposals. Preparation of proposals or action plans in consultation with the school principal.
- (iii) Licensing. Permission was obtained by existing procedures with permits and recommendations from the relevant institutions for permission to research.

In the research implementation, we need a design that is used as a guide in the learning process. This research plan is a design strategy for learning to listen to practicum videos with an effort to improve students' biology learning outcomes so that they can achieve the expected goals.

3.2. Cycle I

3.2.1. Online action planning

The basic competency which determined was to explain the factors that influence enzymes using collision theory. The material studied was the enzyme concept. The action Hypothesis was:

- (i) Efforts to improve learning outcomes by explaining the factors that influence enzymes using collision theory can be achieved by implementing learning strategies by listening to practicum videos.
- (ii) Improving learning outcomes in competency Explaining the factors that affect enzymes using collision theory by applying learning strategies and listening to practicum videos can be proven by comparing the average value of the final test in each cycle with the average pre-action value.

3.2.2. Implementation of online actions

Learning activities are carried out based on the stages presented in **Table 1**. During the activity, observations are made of student learning outcomes in the biology lesson on enzymes. At this first meeting, the number of students who attended and were examined was 35 students out of 36 students because one student was sick. Student learning outcomes at this first meeting were still low or not as expected. Students are still passive in participating in learning. The results of observations at this first meeting can be seen in **Table 2**.

In **Table 2**, it can be shown that students who asked questions were four students (11%), responded to the responses of other students by six students (17%), answered teacher questions by six students (17%), paid attention to teacher explanations by 21 students (60%), Using learning tools by 14 students (40%), class discussions by 19 students (54%).

Table 2. Student observation results in cycle I.

No	Identification	f	f%
1.	Ask an online question	4	11%
2.	Respond to other students' responses online	6	17%
3.	Answering online teacher questions	6	17%
4.	Pay attention to the teacher's explanation in the video	21	60%
5.	Using Android to Study Online	14	40%
6.	Online class discussion	19	54%

The results of the teacher's observations are presented in **Table 3**. At the first meeting, the teacher had not made apperception. The teacher has explained the learning material according to the design that has been set. In addition, the teacher answered questions asked by students. Teachers seem unable to manage learning properly, so there are still many students who are engrossed in chatting with their friends and using Android not used in learning. Teachers always suggest that students work together in discussions, but students tend to work independently. At this first meeting, the teacher had not summarized and concluded the problem because the time allotted for discussion exceeded the time planned.

At the end of the cycle I meeting a test was held to find out how far the role of the learning strategy by listening to the practicum video was carried out on student learning outcomes on enzymes. **Table 4** shows the results of student tests in cycle I.

In **Table 4** it can be seen that in this first cycle, the number of students present was 35 people because one student was sick and could not take part in online learning. Based on the test results obtained a value of 75 totaling 25 students (71%), and students who obtained a score of 60 totaled 5 students (14%). The number of students who scored 50 was 5 students (14%). Then the average score of class XII Science 7 students in cycle I was 69.29 with an average percentage of 71% completeness.

Reflection based on the learning outcomes of cycle I shows that the objectives to be achieved from learning in cycle I have not been achieved and the learning activities need to be recommended in the next cycle. Judging from the student learning outcomes in cycle I, several student learning outcomes have emerged, including the learning outcomes of asking online questions, using Android for online learning, and offline class discussions. Meanwhile, the results of teacher observations in managing online classes so that students are active in online learning activities, guiding the use of Android for online learning, and teaching

students to work together in online groups still need to be reminded again. In cycle I the teacher's learning outcomes that have not been carried out are asking student questions. This happened because the teacher the first time using the learning strategy of listening to the practicum video so some people still forgot. Based on the results of this first cycle, then in the second cycle, the learning design must be carried out in a more interesting and fun way for students so that learning can run smoothly.

Table 3. Results of the cycle I teacher observations.

No	Observed Aspect	Yes	No
1.	Doing apperception online		√
2.	Describe online materials	√	
3.	Ask questions online		√
4.	Answer student questions online	√	
5.	Giving online student comments		√
6.	Raise online problems	√	
7.	Conclude the discussion		√
8.	Form an online group	√	
9.	Determine the length of time for online discussions		√
10.	Driving online	√	
11.	Monitor student work online		√

Table 4. Cycle I student test results.

Score	f	%	fx
80	0	0%	0
75	25	71%	1875
60	5	14%	300
50	5	14%	250
Total	35	100%	2425
Mean		69.29	

3.2. Cycle II

The learning activities in Cycle II were an improvement to the learning activities carried out in Cycle I. During the activity, observations were made of student learning outcomes in learning biology on enzymes. Student learning outcomes in cycle II have made more progress. Students are already active in participating in online learning. The problems encountered and found were that students were busy with their friends during the discussion, students were brave enough to answer questions posed by the teacher without being appointed beforehand, students were brave enough to express opinions so that teaching and learning outcomes went well, the class atmosphere became more lively. The results of observations in cycle II can be seen in **Table 5**.

The results of the teacher's observations are shown in **Table 6**. In this second cycle, the teacher has already done apperception. The teacher has tried to carry out learning according to a predetermined design. The teacher can raise and formulate problems, the teacher can direct and monitor student discussion work, by rotating from one group to another. The teacher in cycle II did not conclude the results of the discussion and gave assignments because there was not enough time. At the end of this meeting, the teacher only reminded students to want to study at home so that at the next meeting they would be even more active.

Table 5. Student observation results in cycle II.

No	Identification	f	f%
1.	Ask an online question	20	57%
2.	Respond to other students' responses online	25	71%
3.	Answering online teacher questions	30	86%
4.	Pay attention to the teacher's explanation in the video	30	86%
5.	Using Android to Study Online	30	86%
6.	Online class discussion	32	91%

Table 6. Results of teacher observations in cycle II.

No	Observed Aspect	Yes	No
1.	Doing apperception online	√	
2.	Describe online materials	√	
3.	Ask questions online	√	
4.	Answer student questions online	√	
5.	Giving online student comments	√	
6.	Raise online problems	√	
7.	Conclude the discussion		√
8.	Form an online group	√	
9.	Determine the length of time for online discussions		√
10.	Driving online	√	
11.	Monitor student work online	√	

At the end of the cycle II meeting a test was held to find out the role of the learning strategy by listening to the practicum video on student learning outcomes in the subject of enzymes. The results of students' cognitive tests are presented in **Table 7**. Based on **Table 7**, it can be seen that in this second cycle, the number of students who got a score of 60 was six students (17%), and students who got a score of 75 were four students (11%). The number of students who scored 80 was 25 students (71%). Then the average score of class XII Science 7 students in cycle II was 76.86 with an average mastery of 83%.

Table 7. Student test results in cycle II.

Score	f	%	fx
80	25	71%	2000
75	4	11%	300
60	6	17%	360
Total	35	100%	2660
Mean		76.84%	

Reflection based on the results of observations and tests shows that the objectives to be achieved from learning in cycle II have been achieved. Judging from the results of student learning in cycle II, the results of student observations have emerged, including the learning outcomes of asking online questions, using Android for online learning, and online class discussions. The results of teacher observations in managing classes so that students are active in online learning activities, guiding the use of Android for online learning, and teaching students to work together in online groups are good. In cycle II the teacher did not make conclusions because time was up by evaluating group work with online question and

answer. Based on the results of cycle II, it was not successful, so cycle III was needed to improve learning and learning outcomes.

3.3. Cycle III

Learning activities in cycle III are improvements to learning activities carried out in cycle II. Student learning outcomes in cycle III experienced a lot of improvement. At this meeting, there were no online groups that were not cooperative in learning. Students have an interest and concern in completing each task that is their responsibility. Offline student cooperation was evident at this meeting. Observation results in cycle III can be seen in **Table 8**.

Table 8. Student observation results in cycle III.

No	Identification	f	f%
1.	Asking question	31	89%
2.	Respond to the responses of other students	32	91%
3.	Answer the teacher's questions	34	97%
4.	Pay attention to the teacher's explanation	35	100%
5.	Using Android to Study	35	100%
6.	Class discussion	35	100%

The result of the teacher observation in cycle III is shown in **Table 9**. At this meeting, the teacher has tried to do an apperception. In addition, the teacher allows asking students about the problems they face during online discussions. The teacher has managed the class well so that the atmosphere for offline group discussions is more conducive. The teacher looks more active in supervising each group of students in learning. Teachers always motivate students to study harder and contribute ideas to their groups. At the end of learning the teacher evaluates and concludes the results of the discussion.

Table 9. Results of teacher observations in cycle III.

No	Observed Aspect	Yes	No
1.	Doing apperception online	√	
2.	Describe online materials	√	
3.	Ask questions online	√	
4.	Answer student questions online	√	
5.	Giving online student comments	√	
6.	Raise online problems	√	
7.	Conclude the discussion	√	
8.	Form an online group	√	
9.	Determine the length of time for online discussions	√	
10.	Driving online	√	
11.	Monitor student work online	√	

At the end of the cycle III meeting an online test was held to find out the role of learning strategies by listening to practicum videos on student learning outcomes on enzymes. Below are the results of student tests in cycle III. Student test results are presented in **Table 10**. In this third cycle, the number of students who scored 80 was 8 students (23%), students who scored 90 were 20 students (57%) students who scored 100 were 7 students (20%)). Then the average score of class XII Science 7 students in cycle III was 89.71 with an average of 100% completeness.

Reflection on the results of observations of students and teachers in cycle III has shown significant progress. In cycle III, students become more active in offline groups, trying to research and analyze data and solve problems. Student cooperation has also experienced a lot of improvement. In cycle III, the teacher has been able to manage online classes well so that a conducive online learning class atmosphere can be created. In cycle III, the average value of students experienced an increase compared to the previous cycle, which was 89.71. In cycle III, there were no significant obstacles, but teaching should need to be improved by using learning strategies to listen to practicum videos. Based on the actions that have been taken, it can be concluded that the learning strategy of listening to practicum videos can improve student learning outcomes.

Table 10. Student test results in cycle III.

Score	f	%	fx
100	7	20%	700
90	20	57%	1800
80	8	23%	640
Total	35	100%	3140
Mean		89.71	

The availability of material in video form gives students the freedom to stop or repeat material at any time in parts they don't understand (Wulandari, 2017). In addition, the use of offline study sessions for projects or group assignments makes it easier for students to interact and learn from each other (Wang, 2010).

However, even though it has many advantages, learning using the strategy of listening to practicum videos requires careful preparation so that it can run optimally (Lubis, 2023). The teacher must of course make learning videos that are interesting, of high quality, and can be understood by students without face to face face to face; while students, on the other hand, must have access to an internet connection.

4. CONCLUSION

This study aims to analyze the effectiveness of video practicum guides on distance learning in improving biology learning outcomes on enzymes. The results of observations and cognitive tests of students in distance learning using video lab media showed that the average score for the biological value of the enzyme material had increased, namely in cycle I of 69.29, cycle II of 76.89 and cycle III of 89.71 there was an increase in each cycle significantly and shows the success of learning with learning strategies listening to practicum videos. Student learning outcomes in learning are also influenced by the results of teacher management in carrying out the online learning process. Apart from observing students, the observer also made observations of the online learning process in class. Teachers have tried to create a conducive learning atmosphere online. This can be seen from the increase in the teacher's role at each meeting. Even in cycle III, the teacher's role in the class can be said to be perfect because he/she has completed all stages of lesson planning. This research is expected to provide new information regarding the use of video media in distance learning.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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