

Profile of Implementation Direct Instruction and Physics Problem Solving Skills of Senior High School Students

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Abstract

This research aims to determine the profile of high school student's ability to solve physics problems by applying the direct instruction learning model based on audiovisual Sparkol video scribe media. The research used is preliminary. This study uses the method of applying the ACCES problem-solving skill level criteria (A-Assen the problem, C-Create a drawing, C-Conceptualize the strategy, E-Execute the solution, S-Scrutinize your Desult), with 101 students of class XI SMA Negeri 1 Now. Data were obtained by using problem-solving tests, questionnaires, and interviews with students and teachers of physics subjects. Data analysis was carried out in a qualitative descriptive manner. The results of the study: (1) Based on the results of the problem-solving tests that students have in the low category with a score range of 0 to 10, 87 students, 12 students in the medium category with a score range of 11 to 20, and 2 students in the high category with a score range of 21. up to 30. (2) Based on the results of the questionnaire on student learning experiences and teacher performance in delivering physics learning in class, it can be seen that: (a) students do not like physics subjects, (b) teachers often teach using the lecture method, rarely use other learning media, (c) students have difficulty working on the problem-solving skills test. (3) results Based on teacher and student interviews, it can be seen that problem-solving in physics is important to know. According to students, the obstacles in improving problem-solving skills were due to a lack of interest in physics subjects, and the characteristics of physics subjects were quite complicated. Likewise, the teacher's response cannot be made well because of student interest, so that improving problem-solving skills cannot be done effectively and can only be done in certain classes. Thus, it can be said that the problem-solving skill profile based on the ACCES criteria in class XI students of SMA Negeri 1 Sekaran can be categorized as low and difficult to train.

Keywords: Direct Instruction; Problem Solving Skills

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INTRODUCTION

Learning is an activity that takes place in a learning environment where there is an interaction between teachers and students. Learning is a process to acquire

knowledge by students whom teachers assist as intermediaries. It can be said that learning is an activity by the teacher to help students get good knowledge. Problem-solving skills are one of the

many learning goals students must achieve in learning (Devanti, Achmadi, & Prahani, 2020). It is very important to provide problem-solving skills to students to follow the development of education (Dewi, Kaniawati, & Suwarma, 2018).

Problem-solving skills are thinking skills to obtain solutions and achieve the goals of a problem to be solved and looking for answers. Problem-solving skills are an activity that aims to solve problems and obtain a gradual and structured solution (Lestari, Purwanto, & Sakti, 2019). Problem-solving skills require special abilities that must be possessed by each student, which allows there to be differences in abilities between students (Hastuti, Sahidu, & Gunawan, 2016). Students need problem-solving skills to hone their scientific analytical thinking process skills to get strategies that can be used to solve problems effectively (Markawi, 2013). A good and appropriate step is to make a teacher prepare students creative, independent, critical students, and reliable problem solvers (Aji, Hudha, & Rismawati, 2017). To find out students' problem solving skills, it can be seen using ACCES indicators: A-assessing the problem, C-making pictures, C-formulating goals, E-executing solutions, S-Researching results (Teodorescu, Bennhold, Feldman, & Medsker, 2014). In indicator A, students identify problems to understand how to find solutions to problems that have been identified. In indicator C, students express their understanding of the problem in the form of pictures. In indicator C, students formulate goals systematically to facilitate the problem-solving process. In indicator E, students use formulas to make it easier and can solve problems correctly. Students write the reasons that underlie the sure and not sure answers (Meisaroh, Achmadi, & Prahani, 2020).

The learning process is an activity of transferring knowledge from teachers to students. Teachers must have good

abilities in conveying good, effective, and efficient knowledge in the hope of achieving learning objectives (Sri Murjani, 2019). Physics is a subject that contains many concepts with a high level of complexity for high school students. Therefore, one of the strategies that can be used to make the learning objectives successful is to use the direct instruction method. The Direct Instruction learning model has the advantage that it can provide opportunities for students to learn to observe well, remember, and then apply the understanding given by the teacher (Marlina, Hamid, & Marwan, 2015). Through the direct instruction model, students can digest the lesson well because this learning model is direct by the way the teacher conveys the material to students so that students will be accompanied continuously during the learning process (Arianti, Sahidu, Harjono, & Gunawan, 2016).

Learning physics, a subject classified as complicated and tedious, is necessary to have a creative idea that can change students' views regarding this matter. One of them can be by using learning multimedia to make the learning atmosphere exciting and not only focused on the teacher (Marselina & Anaperta, 2020). Teachers can prepare media by following the development of existing technology, one of which is learning media in the form of audiovisual, namely media consisting of sound and images (Kausar, Salasi, & Hidayat, 2020). The learning media is Sparkol video scribe. The Sparkol video scribe media can present learning content by combining images, sounds, and attractive designs to enjoy the learning process (Pamungkas, Ihsanudin, Novaliyosi, & Yandari, 2018). Media Sparkol video scribe is software that can create white background animation designs very easily (Wijayanti, 2018). The features provided by this software are very diverse and can be adapted to the material, and are easy to apply by all teachers (Dewi, Suprpto, &

Badriah, 2019). Therefore, it is hoped that Sparkol video scribe audiovisual media in the learning process can improve high school students' physics problem-solving skills.

This research was conducted through a preliminary study conducted at SMA Negeri 1 Sekaran, Lamongan. The research was conducted using instruments in problem-solving skills test questions, questionnaires, and interviews with students and teachers of physics subjects. Through the research instrument, the results obtained that (1) on the problem-solving skills test questions, students obtained scores belonging to the low category, (2) the questionnaire obtained the results that students were less interested in physics subjects, some classes had been trained by teachers to problem-solving skills, and students have never received physics learning using the Audio Visual Sparkol Videoscribe learning media, (3) in interviews with students, it was found that some students in the class had been trained and the problem-solving skills teacher had never trained some classes. In the results of interviews with teachers and students, with the questions: (1) What are the challenges and obstacles in learning physics in the classroom?, (2) What is the learning model that the teacher uses in conveying the material?, (3) Have the skills to fix physical problems ever happened? taught in class?, (4) Was Sparkol video scribe known beforehand? Moreover, has it ever been used in adding learning in the classroom?. Students and teachers have almost the same answers. The answer to the first question is the child's lack of interest in physics. The answer to the second question is that teachers teach using a lecture or direct instruction learning model. The answer to the third question wants to know problem-solving skills but is only limited to doing simple questions. Moreover, the fourth question answers both students and teachers who do not know and have never

carried out teaching and learning activities using Sparkol video scribe. However, the results have different problems with the test results. Although students and teachers have carried out problem-solving activities in the interviews, the test results show that students still have low problem-solving skills. Therefore, the purpose of this study was to determine the profile of the implementation of direct instruction and problem-solving skills of high school students and consider the effect of using Sparkol video scribe to increase interest in learning and problem-solving skills. So that students become fond of physics subjects and can have good problem-solving skills.

METHOD

The research used is preliminary. This research uses the method of applying the ACCES problem-solving skill level criteria (A-Assen the problem, C-Create a drawing, C-Conceptualize the strategy, E-Execute the solution, S-Scrutinize your Desult). The results of this study will be used as a consideration for implementing learning models and learning media that can improve high school students' physical problem-solving abilities.

This research was conducted at SMA Negeri 1 Sekaran, Lamongan. Research subjects found 101 students, with details, class XI MIPA 1 odd absent, class XI MIPA 2 odd-even, class XI MIPA 3 odd absent, class XI MIPA 4 odd absent, class XI MIPA 5 odd absent, and class XI MIPA 6 absent. Odd. The reason for selecting the sample addressed to class XI MIPA is because it adapts to the material for the problem-solving skills test. One class, namely class XI MIPA 2, is entirely odd and even absences because, at the time of data collection, the class was tested twice, namely in the first week for odd absences and the second week for the second week even absences. Meanwhile, there were only odd absences for other classes because the school limited the

time for data collection. After all, it was still during the COVID-19 pandemic. The sampling technique used was the purposive sampling technique. The implementation time is three days on February 24, 2021, February 25, 2021, and March 2, 2021. The data analysis technique uses problem-solving skills tests, questionnaires, and interviews with students and subject teachers.

Student problem-solving test questions are equipped with an indicator of problem-solving skills, namely ACCES (Teodorescu *et al.*, 2014). The questionnaire consisted of ten questions for students about student learning experiences and teacher performance in delivering physics lessons in class. Interview questions are written on the last sheet on the questionnaire sheet for interviews with students, so interviews with students are carried out in writing due to the efficiency of available time. Meanwhile, interviews with teachers were conducted orally. The activities of test questions, questionnaires, and interviews with students were carried out simultaneously, namely when entering each class for data collection, and interviews with subject teachers were carried out on the last day when all data were collected in class. Interviews with students and teachers to obtain more information about teaching and learning conditions in the classroom, whether or not activities are carried out to practice problem-solving skills, and the use of learning media, namely audiovisual Sparkol video scribe in learning. Interviews were conducted with students and teachers intended to harmonize answers between the two. The research was conducted using descriptive qualitative data analysis techniques to describe the actual situation based on the facts that occurred in the field. Figure 1 below is the steps in the research.

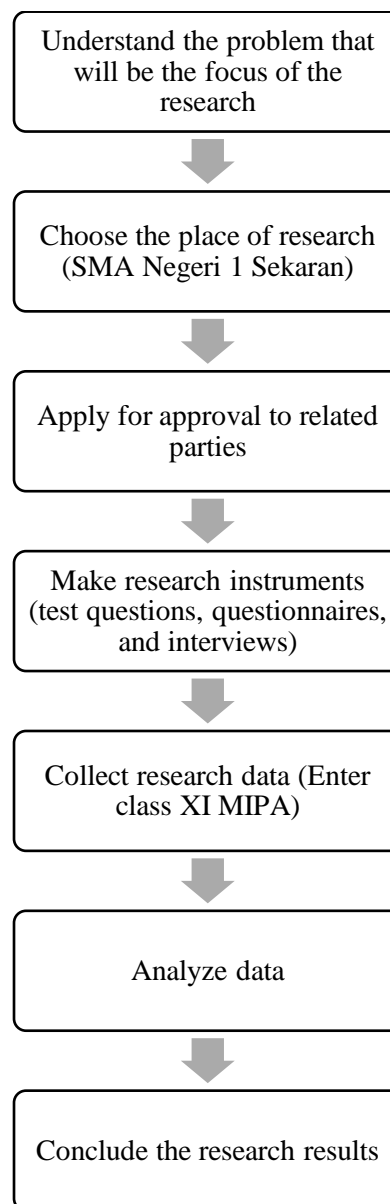


Figure 1 The steps in the research

RESULT AND DISCUSSION

Physics Problem Solving Skill Test

The test questions for students' problem-solving skills consist of three questions, and for each question, the ACCES indicator has been equipped. Based on the research that has been done, the results of the physics problem-solving skill test are shown in Figure 2.

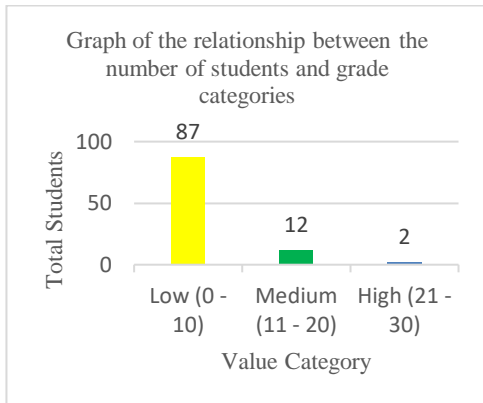


Figure 2 Graph of the relationship between the number of students and grade categories

The score for one question is 10, divided into five ACCES problem-solving indicators, namely two for each indicator. So that the maximum value of the three questions is 30. Figure 1 shows that the problem-solving skills possessed by students are in the low category with a value range of 0 to 10, namely 87 students, 12 students are in the medium category with a value range of 11 to 20, and 2 students fall into the high category with a vulnerable score of 21 to 30. From the results of this study, steps that can be taken to find the causes and solutions to the problem that students have difficulty solving problem-solving skills test questions are to analyze the results of student answers to the test questions that already equipped with ACCES problem-solving skill indicators, as follows. The following are examples of student answers based on problem-solving skills (ACCES) indicators:

Figure 3 is an indicator of problem-solving (ACCES). A-Aspen the problem (a problem is identified so it can be solved). At this indicator stage, it aims to determine the extent to which students can identify problems on a question, for example, identifying what material is being discussed on the question.

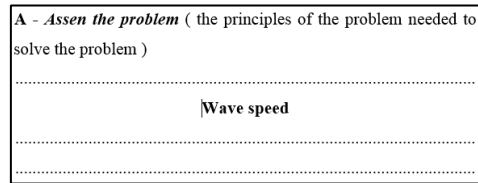


Figure 3 A-Aspen the problem

Figure 3 shows that students have been able to identify the questions, but the answers given are still less specific and inaccurate because the correct answer should be the classification of waves, namely transverse waves.

Figure 4 below shows problem-solving skills (ACCES) indicators. C-Create a drawing (translate words in the form of pictures). At this stage of the indicator, students can translate questions into pictures to find out the extent to which students' skills in solving problems.

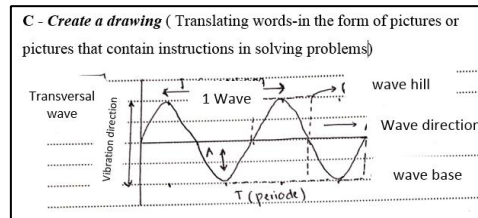


Figure 4. C-Create a drawing

Figure 4 shows that students can translate the questions into pictures, but the descriptions still cannot be presented in detail. So, the study results showed that students were only able to explain the questions in the form of pictures, but the pictures were also still presented in general, had not yet reached a detailed and detailed explanation.

Figure 5 below is problem-solving skills (ACCES) indicators C-Conceptualize the strategy (problems are solved by first explaining how to solve them). At this stage, it is to measure the extent to which students' skills in solving problems exist in the problem by developing a coherent strategy to solve it, such as knowing the material in the problem, writing equations, translating

questions in the form of pictures for work, and much more. so that it will be easier to solve the problems that exist in the problem

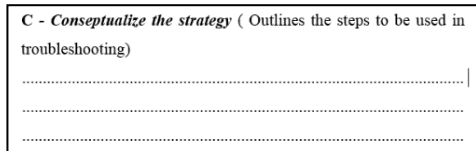


Figure 5 C-Conceptualize the strategy

In Figure 5, the description of how to find a solution has not been done by students. This is indicated by the results of the answers that are still empty in the indicator section. This is due to the reduced hours of lessons due to the establishment of an odd-even system so that for one to two hours of lessons it is only enough to explain a material and practice questions, and do not have time to discuss in detail the material and the problem. So that when answering the problem-solving test questions in this indicator section, the answers are left blank by students.

Figure 6 below is problem-solving skills (ACCES) indicators E-Execute the solution. In this indicator section, students are expected to formulate formulas or equations that can be used to solve problems.

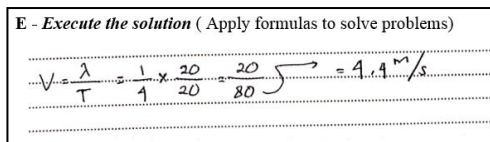


Figure 6 E-Execute the solution

Figure 6 shows that students can already write down the formula used to solve the problem, but the answer from the calculation is still not entirely correct. From the results of students' answers in this indicator section, it can be said that students already understand and understand the use of the right formula to solve a problem, but there needs to be further and in-depth learning so that the

final calculation can be precisely according to the expected answer.

The last one for the indicator of problem-solving skills is shown in the following picture. Figure 7 below is problem-solving skills (ACCES) indicators S-Scrutinize your result (are you sure). In this indicator section, after students work on a series of questions and find answers to these questions. They then asked whether the student was sure or not with the answer.

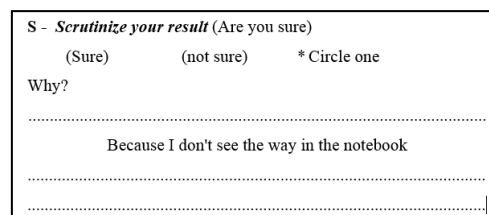


Figure 7 S-Scrutinize your result

Figure 7 shows that students answered that they were not sure about why they did not see the notes; from this, it can be concluded that students' understanding of concepts is still low because they have to open notebooks to work on questions. The results of the problem-solving skills test results obtained the average score of students on each indicator of problem-solving skills can be seen in Figure 8 below

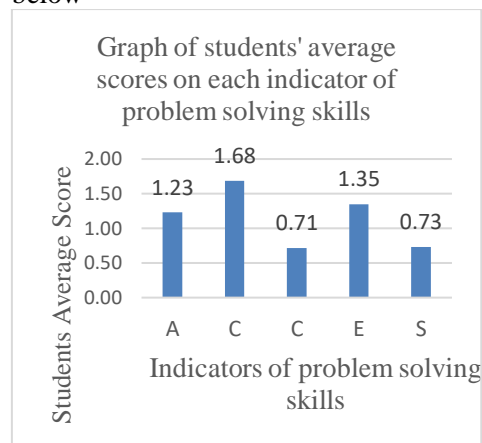


Figure 8 Graph of Students' Average Scores on Each Indicator of Problem Solving Skills

C-Create a drawing is the highest score than other indicators; this means

that the average student can represent the words in the problem in pictures. C-Conceptualize the strategy to be the lowest value, which means that These problems are still not solved by students with their current abilities.

Questionnaire

Based on the results of a questionnaire about student learning experiences and teacher performance in delivering physics learning in class, it can be concluded that (1) students do not like physics subjects, (2) mechanical wave material is important to understand, (3) mechanical wave material is difficult to understand, (4) teachers often teach using the lecture method, rarely use other learning media, (5) dominant students have never done activities to improve problem-solving skills, (6) students have been trained by teachers in problem-solving skills, (7) students have difficulty working on problems test the problem-solving skills test, (8) students feel that problem skills are important to be trained, (9) students have never received learning using Audio-Visual Sparkol Videoscribe media, and (10) students are interested in

learning using Audio-Visual Sparkol Videoscribe media.

Teacher and student interviews

Based on the results of teacher and student interviews, it was concluded that problem-solving skills had been trained in teaching and learning activities.

Problem-solving skills in physics are essential to practice. According to students, the obstacles in improving problem-solving skills are due to a lack of interest in physics subjects and the characteristics of physics subjects which are quite complicated. Likewise, with the teacher's response, which cannot be appropriately trained because of the student's interest, practising problem-solving skills cannot be carried out effectively and can only be carried out in certain classes. Furthermore, both teachers and students have never known Sparkol Videoscribe Audio-Visual Media, an alternative medium for learning physics. The following research is relevant to this research, from research in 2012 to research in 2021, as shown in Table 1.

Table 1 Relevant research related to this research starts from research in 2012 to research in 2021

Author (Year)	Research Sample		Finding
(Prahani et al., 2021)	Senior high school student	1.	The purpose of the study was to determine the profile of students' physics problem-solving skills.
		2.	This type of research uses Descriptive Research Design (DRD)
		3.	Methods of data collection using tests, questionnaires, and interviews
		4.	The results showed that only a few students were able to work on the material using the ACCES problem-solving indicator
(Rofiqoh, Manan, & Aprilianto, 2020)	Senior high school student	1.	Types of associative research
		2.	The sampling technique used was the stratified random sampling technique
		3.	How to collect data using a questionnaire about learning media and student interests
		4.	The results of the study show that there is an effect of using Sparkol video scribe on students' interest in learning

Author (Year)	Research Sample	Finding
(Rukiyah, Widiyastuti, & Thahir, 2020)	Senior high school student	<ol style="list-style-type: none"> 1. The purpose of the study was to examine the effect of the DMR learning model on mathematical representation abilities 2. The research method uses quasi-experimental 3. The research instrument uses a mathematical representation ability test 4. Data analysis techniques using analytical comparison 5. The results show that the DMR model is better than the conventional model 6.
(Devanti et al., 2020)	Senior high school student	<ol style="list-style-type: none"> 1. The purpose of the study was to determine students' problem-solving skills 2. The type of research used is preliminary research 3. Data collection techniques using tests, questionnaires, and interviews 4. The data analysis technique is descriptive qualitative 5. The results of the study can be concluded if students' problem-solving skills are still low
(Yusnia, 2019)	College student	<ol style="list-style-type: none"> 1. Research design in the form of Classroom Action Research 2. Data collection techniques using observation, interviews, documentation, and tests 3. The results showed that students were more active, and there was an increase in understanding of the material after the application of video scribe media
(Fitriyani, Supeno, & Maryani, 2019)	Senior high school student	<ol style="list-style-type: none"> 1. The purpose of the study is to determine problem-solving skills 2. Types of quasi-experimental research 3. Methods of data collection using pretest and posttest essay questions 4. LKS has a significant effect, with an average value in the experimental class of r 72.22, while in the control class, it is 45.46
(Imamah & Ma'ruf, 2018)	Junior high school student	<ol style="list-style-type: none"> 1. The highest score of students before the application of video scribe media was 65 2. The highest score of students after the application of video scribe media is 80 3. There is an effect of applying video scribe media to increase understanding.
(Sani, Rahayu, & Hikmawati, 2018)	Senior high school student	<ol style="list-style-type: none"> 1. The purpose of research is to determine learning outcomes 2. The population is all students of class XI SMAN 1 Kopang, with a total of 83 students 3. XI IPA 2 as the experimental class, and XI IPA 1 as the control class 4. The results of the study the average class XI IPA 2 was 70.71 and XI IPA 1 was 62.04 5. The application of the learning model directly affects student learning outcomes
(Sutarno, Setiawan, Suhandi, Kaniawati, & ...)	College student	<ol style="list-style-type: none"> 1. The research objective is to explore problem-solving skills 2. Type of quasi-experimental research with non-equivalent control group design group 3. Subjects 70 students were divided into control and experimental groups

Author (Year)	Research Sample		Finding
Putri, (2017)		4.	The results showed an increase in the problem-solving skills of the experimental group students with the control group significantly different
(Riyanto, Arifin, & Ardiyansah, 2017)	College student	1. 2. 3. 4. 5.	1. The purpose of research is to determine the improvement of learning outcomes. 2. Types of CAR research (Classroom Action Research) 3. Data collection techniques: observation and tests 4. The data analysis technique uses the percentage technique 5. The results showed that there was an increase in student learning outcomes
(Amrita, Jamal, & Misbah, 2016)	Senior high school student	1. 2. 3. 4.	1. The research objective is to improve students' problem-solving skills 2. Data collection using test observations, as well as documentation 3. Data analysis techniques are descriptive quantitative, and qualitative 4. The results show that the direct learning model can improve students' problem-solving skills
(Venisari, Gunawan, & Sutrio, 2015)	Senior high school student	1. 2. 3.	1. The research objective is to improve problem-solving skills 2. This type of research is classroom action research 3. The results of the study show that the application of the direct learning model mind mapping method can improve problem-solving skills
(Utama, Kentjana ningsih, & Rahayu, 2014)	Senior high school student	1. 2. 3.	1. The research objective is to improve student learning outcomes 2. The qualitative descriptive data analysis technique 3. The following research concludes that the application of high school biology learning media using the direct instruction model can improve student learning outcomes
(Sakti, 2013)	Senior high school student	1. 2. 3. 4.	1. The purpose of the study was to determine the effect on students' interest in learning and understanding. 2. Including the type of quasi-experimental research 3. Data collection techniques using tests and questionnaires 4. The results of the study are that there is an influence of animation media indirect learning on students' interest in learning and students' understanding
(Sakti, Puspasari, & Risdianto, 2012)	Senior high school student	1. 2. 3. 4.	1. The purpose of the study was to determine the effect on interest in learning and understanding concepts. 2. Types of quasi-experimental research 3. Data collection techniques in the form of questions and questionnaires 4. The results of the study show a significant value on students' interest and understanding

This research has research limitations in the form of: (1) the research is class XI MIPA SMA Negeri 1 Sekaran, (2) the material tested in the test is the chapter on mechanical waves, (3) this research is only limited to knowing the profile of direct instruction implementation and

skills solve the problems of high school students. The implication of this research is to know the profile of the application of learning by using direct instruction and to know the profile of students related to problem-solving. Based on Table 1 regarding several relevant studies ranging

from research in 2012 to research in 2021, as well as the results of problem-solving skills tests to determine the profile of high school students' physics problem-solving skills, it can be said that the application of direct learning based on video scribe audiovisual media to improve students' physics problem-solving SMA can be applied to improve physics problem-solving skills.

The following is an image display of Sparkol Videoscribe, which is shown in Figure 9. Moreover, the next is a display of the results of making videos using Sparkol Videoscribe, which is open in the video player application shown in Figure 10.

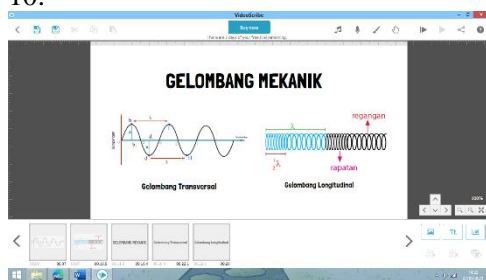


Figure 9 Worksheet view in Sparkol video scribe



Figure 10 Display the results of making videos using Sparkol video scribe, which is played through the video player application

CONCLUSION

Based on the research results with a preliminary study design, it can be found that students' problem-solving abilities can be classified into the low category. Therefore, there is a need for innovations that can be done to improve students' problem-solving abilities. Efforts can be made to apply the latest and interesting

learning models and learning media, namely the direct learning model based on audiovisual media Sparkol video scribe. The effort was made because the application of learning using video-based learning media made through the Sparkol video scribe application can produce interesting learning videos, making it possible to attract students' interest in learning. Then problem-solving skills can be learned so that students can have good problem-solving skills.

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