Development of Problem-based Motion Graphic Video on the Global Warming Theme to practice High-Level Thinking Skills and Collaborative Ability for Junior High School Students

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Abstract

Higher order thinking skills are an important part of the 21st century because it demands that a teacher be able to foster students' thinking abilities. In addition, the demands for special skills that need to be empowered in learning activities that must be possessed are collaboration skills. The results of the observations show that SMP N 38 Semarang still needs to be developed to deliver students to have higher-order thinking skills and collaboration abilities. Problem-based motion graphic video media is one of the media developed to train higher-order thinking skills and collaboration skills of students. The results of the feasibility analysis of the media before being tested were very feasible with an average percentage of 95.8% of the results of the media experts and 92.6% of the results of the validation of the material experts. The characteristics of video motion graphics are (1) a two-dimensional animation media, (2) the motion graphics developed based on the characteristics of problem-based learning, (3) contain question exercises combined with motion graphics that can train students' high-order thinking skills, (4) there are discussion activities that can train collaboration skills, (5) it can be used anytime and anywhere. The results of the analysis of high-order thinking skills of students got a percentage of 68% in the good category. The results of the discussion analysis on collaboration ability get a percentage of above 62.5% in the very good category and the good category.

INTRODUCTION

The education system in Indonesia adheres to the 2013 Curriculum system. The implementation of the Education system in Indonesia is regulated in the Education and Culture Government Regulation Number 37 of 2018 concerning core competencies and basic competencies with the aim of the curriculum covering four competencies, namely competence in spiritual attitudes, social attitudes, knowledge and skills. Education is becoming increasingly important to ensure that students have the skills to learn and innovate, as well as the skills to use information media technology. Digitalization of education is a must in order to create learning in the context of 21st century learning. However, in reality in the world of education students are less required to face social life in terms of sensitivity, tolerance, cooperation, criticality, information literacy in order to be able to solve problems that occur.

Science learning materials are expected to be better planned and packaged to increase students' curiosity so that the delivery of learning material is meaningful and more attractive to students. Science subjects are one part of the world of education that can play a role in training students to develop higher-order thinking skills and train the behavior or attitudes of students to face technological and scientific developments. In the current era of globalization, the development of science and technology is increasingly advanced so that it can be used in all fields, especially the field of education. According to Ole et al. (2019) the development of science and technology increasingly encourages renewal efforts in the use of technology results in the teaching and learning process. One of the science materials taught at the junior high school level in grade 7 is global warming. Global warming is a material that is closely related to environmental life that can be felt directly by students. Delivering global warming material certainly requires a medium that is able to combine the concepts of global warming appropriately, so that it is hoped that it can equip students to think. Learning activities will be more effective when used with interesting learning media. Learning objectives can be achieved if it is influenced by one of the learning components, one of which is learning media. The media can be in the form of visual or audio visual. The existence of learning media can encourage 21st century skills.

Skills in the 21st century in the learning process are developed to be trained in the 2013 curriculum. Education in the 21st century aims to build students' intelligence abilities in learning to be able to solve problems around them. Education that is able to support humans in global competition is education that develops the potential of students. The low level of thinking skills of Indonesian students can also be seen in the Study Program for International Student Assessment (PISA). The results of the study relating to higher-order thinking skills show that Indonesia is ranked 64th out of 65 countries in 2012 and 69th out of 75 countries in 2015, ranking number-in 2018 (Saputri et al., 2019). This makes it clear that the ability of Indonesian students to solve problems that require higher-order thinking processes is still lacking so that Indonesia is placed at the bottom and generally still below the Organization for Economic, Cooperation and Development (OECD) average score standard. Learning that is applied in the 21st century requires that a teacher be able to foster students' thinking abilities. The ability to think that is tailored to the needs of the 21st century is the ability to think at a high level (High Order Thinking).

Higher order thinking skills can make a person curious about new knowledge. Students have good high-order thinking skills, they will easily understand the material being studied and be able to relate it to problems in everyday life (Wardani & Dwikoranto, 2019). This is necessary because in the real world, students are entering the era of the information age where students are surrounded by an infinite variety of information. Therefore, high-order thinking skills need to be developed during the learning process so that students have provisions to face the various challenges that will be lived in. In addition, the demands of special skills that need to be empowered in learning activities that must be possessed are collaborative skills.

Current collaboration skills make collaboration as an interaction structure designed in such a way as to facilitate collective efforts to achieve common goals. Collaboration has become an important skill to achieve effective results (Fitriyani et al., 2019). With the ability to collaborate, students are also expected to collaborate their knowledge with information obtained in the learning process. Collaborative ability is the ability to work together in synergy to adapt to various roles and responsibilities.

Based on a preliminary study at SMP N 38 Semarang, it can be seen that learning in class VII has used the 2013 curriculum. Learning is a process of communication between students, teachers and learning materials. Communication will not run without the help of means of conveying messages or the media. Learning media should be seen as an integral part of a learning system and not only as an auxiliary tool that is used when deemed necessary and only used occasionally.

There are facts about the less than optimal use of technology-based media that supports the delivery of information from teachers to students. The selection and use of appropriate learning media can be stimulating. Learning media used in learning activities are only in the form of Power Points which are less attractive because they only contain the same text as books. This makes students only able to pay attention and does not involve students directly so that the activeness of students becomes less well channeled. In addition, the focus of students during learning activities is still less directed, some students still talk with their friends about things that are not related to learning. Low student learning outcomes and not meeting the Minimum Completeness Criteria (KKM) that have been set at school, namely 70. In this study, data were obtained from class VII A, VII B, VII C, VII D, and VII E students in the 2018 academic year tests. 2019 even semester at SMP N 38 Semarang as many as 163 students, who managed to reach the KKM only 36 students or 22.09% of students and as many as 127 students or 77.91% of students have not reached the KKM.

The value obtained from year to year on this global warming material has not increased, many are not complete according to the KKM because students are not trained to solve problems during learning. So that the passive attitude of students which results in low activity in learning so that it affects students' high-order thinking skills (Wardani & Dwikoranto, 2019). Therefore, the low activity in learning results in the cooperative attitude and social interaction of students being less than optimal. Therefore, exploration activities provide opportunities to train students to learn to work together and respect the differences they have such as their backgrounds, experiences, abilities and views. Therefore, additional learning media are needed that support learning activities for students both inside and outside the classroom.

In this research, learning media will be developed in the form of problem-based motion graphics which aims to train higher-order thinking skills and collaboration skills. According to research from Oktaviani et al. (2018) stated that the motion graphic video developed is a motion graphic that creates the illusion of motion that contains an explanation of the material aimed at the textbook so that the motion graphic video is monotonous and less attractive. In addition, research from Ichsan et al., (2019) states that the motion graphic video developed is to make a learning video containing the process of teaching and learning activities using animation to help teachers imitate it. Although many researchers carry out research related to the development of video motion graphics, what distinguishes this research from other research is the development of 2D motion graphic animation which contains problem-based question exercises so that students can apply their thinking skills in practicing high-order thinking skills and 2D motion graphics. contains discussion activities so that students can express their opinions in practicing collaboration skills. The 2D motion graphics that will be used in this study are animations that have different visual characteristics. Video motion graphics are compiled by applying audio and visuals whose appearance has a sequential plot packed with several phenomena and cases of contextual problems. Media video motion graphics provide sound and moving images so that they can attract students' interest in learning. Video media is media that has audio and visual elements designed to actively involve the user. With this media students will be more interested because it involves two senses, namely the sense of sight and the sense of hearing (Purwanto et al., 2019). The presence of media, especially problem-based motion graphics in learning activities, will help foster students' initial interest which is expected to stimulate further curiosity about the material being taught. This requires students to be more active in expressing opinions.

The teacher has implemented various learning methods, such as discussion and question and answer as an effort to sharpen the mind so that students can have higher-order thinking skills, but this still cannot take place optimally, the teaching and learning process carried out by the teacher has not been able to foster higher-order thinking skills because the questions and answers that are carried out are still at the C1 (remembering) and C2 (understanding) levels. This requires an increase in the quality of the questions and answers at the C4 (analyzing), C5 (evaluating), and C6 (creating) levels. In addition, the group discussion method has been carried out, but in conveying the opinions of students, they are not trained in communicating the results of the discussion. This requires an increase in the quality of collaboration in group discussions. With the problem-based motion graphics video, it is hoped that it can train higher-order thinking skills and collaboration skills.

Based on the description of the background, a research will be conducted with the title: "Development of Problem-based Motion Graphic Video on the Global Warming Theme to train Higher-Level Thinking Skills and Collaboration Ability of Students in Junior High Schools"

Based on these descriptions, the problem formulations in this study are: (1) What are the characteristics of the motion graphic video based

on the problem of global warming that is developed? (2) What is the profile of higher-order thinking skills after participating in the lesson using motion graphic video based on the theme of global warming? and (3) What is the profile of the collaboration ability after participating in the lesson using motion graphic video based on the theme of global warming?
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METHOD

The research subjects were students of SMP Negeri 38 Semarang class VIII and VII D. Class VIII as a small-scale trial and class VII D as a large-scale trial. The type of research used is development research (R n D) with the ADDIE model, namely Analysis, Design, Development, Implementation, and Evaluation.

The data collection methods in this study are as follows: (1) The method of observing information about the potential and problems that exist in SMP N 38 Semarang, (2) The questionnaire method used in this study is the validity questionnaire of media experts and material experts, used at this stage. validation of the design to test the feasibility of the media, the readability questionnaire and students' use of the media being developed, was used in the small-scale and large-scale test stages and the questionnaire for assessing student collaboration abilities was used at the large-scale trial stage, (3) the test method was used to know for high-order thinking skills of students after using motion graphic video on global warming material.

The test instrument for the analysis of high-order thinking skills of students used the Aiken's V formula, the Aiken V formula was written as equation 1.

$$V = \frac{\Sigma S}{n\,(c-1)} \qquad (1)$$

where, S = r – lo
Information:
V = validation value
S = The total of the difference between the score given by the expert with the lowest score of importance rating
r = number given by the assessor
lo = the lowest number of validity assessments (for example 1)
c = the highest number of validity assessments

The results of students' higher order thinking skills were analyzed for each indicator with the equation 2

$$P = \frac{f}{N}\,x\,100\,\% \qquad (2)$$

Information :
P = percentage of score obtained
f = total score obtained
N = maximum number of scores

The results of the collaboration ability of students are analyzed for each indicator with the equation 3

$$P = \frac{f}{N}\,x\,100\,\% \qquad (3)$$

Information :
P = percentage of score obtained
f = total score obtained
N = maximum number of scores

RESULT AND DISCUSSION

This research is a research and development of motion graphic video media in which the research that has been conducted has obtained results including (1) Characteristics of Problem-Based Motion Graphic Video Media; (2) Profile of high-order thinking skills after learning by using problem-based motion graphics video; (3) The profile of the ability to collaborate after participating in learning using problem-based motion graphic video.

Feasibility and Characteristics of Problem-Based Motion Graphic Video Media

The first stage is an analysis that defines the problems in the classroom. The second stage is the design stage, which is a systematic process starting from designing the concept and content in the product. The third stage is the development stage which contains the activities of the realization of product designs that have previously been made. Based on the feasibility test from material and media experts, it was found that the motion graphic video media was very suitable for use for research because it obtained a percentage score above 81.25%. Hidayah & Pohan (2021) also did the same thing, where at the development stage, namely the activity of validating the draft of development products and revisions according to expert input. The implementation stage is the stage of trying out products that have been developed in a real learning or environment to research subjects (Farida & Danuri, 2021). The implementation stage is intended to obtain feedback on the products made / developed. Initial feedback (initial evaluation) can be obtained by asking questions related to product development goals. Application is carried out referring to the product design that has been

made. After the revision was made, the motion graphic video media was again validated to experts who provided suggestions for improvements. The following is a slide show of the media before (left image) and after (right image) being revised according to suggestions from the validator.

Figure 1. Revision of addition and size of animal motion graphic video

Revision of the addition and size of video motion grap animals Media experts provide suggestions that the image size is made close to the proportions, this is to show a harmony between the original state and animation so that there is no imbalance and the addition of animal images so as not to stare. This also happened in research conducted by Jundu et al., (2020) where he received advice from expert judgment so that the appearance and layout of the image is expected to be proportional to the quality and the point of view of the image must be attractive. percentage scores were 96%, 93%, 94%, 100% and 98%, respectively. From these scores then averaged and obtained a percentage of 95.8%. Based on the score obtained from material and media experts, it can be said that the media is very suitable to be used in collecting research data.

Based on the results of students' responses to small-scale trials, it can be said that the motion graphic video media is very suitable to be used for data retrieval. This is evidenced by the responses of ten students on a small-scale trial which gave a score above 86% in the very feasible category. Students' responses to large-scale trials provide more mixed results. As many as 3% of class VII D students responded that the video mption graphic media was feasible to use. Meanwhile, 97% of class VII D students responded that the motion graphic video media was very suitable for use. Even so, the percentage scores given by students varied from the lowest at 82% and the highest at 100%. Based on the overall responses of students both on small-scale trials and large-scale trials, they showed positive results. Where it can be concluded that the video

motion graphic media developed is feasible for use in learning activities with the acquisition of an eligibility percentage score above 62.50%.

The characteristics of problem-based motion graphics used in the media are combined with higher-order thinking and collaboration indicators so that they can train higher-order thinking skills and collaboration abilities of junior high school students. The activities in the graphic motion video are adjusted to the problem-based characteristics.

Orientation and organize on the problem stimulus in the form of a problem is presented in a motion graphic video that is broadcast on the 01.01 to 01.09 minute on the problem of global warming, then students are given the opportunity to identify these problems. This activity is an initial activity in learning, besides that there are learning objectives so that students can focus more on learning to achieve learning goals. Based on the results of the assessment by the validator regarding the delivery of learning objectives in each focused sub-section, the average result of the assessment percentage is 90% with very good criteria and providing stimuli related to real life, the average result of the assessment percentage is 80% which is included in good criteria. . The purpose of providing a stimulus is to provide any stimulus that can be provided by the teacher to their students in learning discoveries, in order to be able to develop thinking skills, and to be able to construct new knowledge in an effort to improve better mastery of the subject matter.

Problem-based learning is used to stimulate higher-order thinking in problem-oriented situations. This given problem is used to bind students to curiosity about the intended learning. Problems are given to students, before students learn the concepts or material with respect to problems that must be solved. This is in line with the research of Sajiwo et al., (2019) which states that problem-based learning can help students focus on problem solving in real-world contexts which will encourage students to think about problem situations when students try to solve problems. Besides developing higher order thinking skills, it also encourages students to collaborate. Solving a problem really requires cooperation and sharing between members.

Figure 2. Display of Orientation and Organizing Activities on Problem-Based Motion Graphic Video Problems

An activity "Let's Discuss" is presented in a motion graphic video which is broadcast from 01.10 to 01.49 minutes about global warming, then students are given the opportunity to hold group discussions. Discussion activity is an effort to express ideas, ideas, and opinions about a problem that is the topic of discussion. Based on the results of the evaluation by the validator regarding the discussion activities in each sub-section that were clearly focused, the average score of the assessment was 85% with good criteria. Discussion activities can train students to contribute individually and practice responsibility and respect with the diversity of other group members in collaboration. In addition, the ability to collaborate fosters awareness of social interactions in learning as an effort to create meaningful learning. Through learning with collaborative skills, social interactions can be seen that will help individual development. This is in line with the research of Fuad et al., (2019) that discussion activities can train collaboration skills.
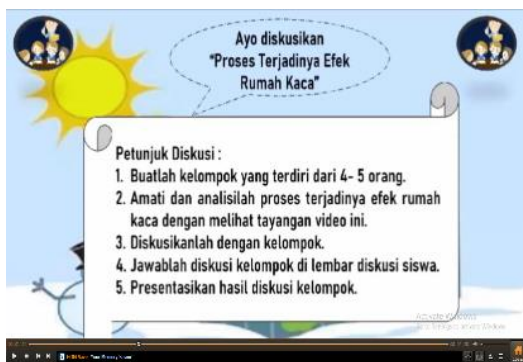

Figure 3. Display of Problem-Based Motion Graphic Video Group Inquiry Activity Display

A discussion question was presented on the "Observe and Analyze" activity in a motion graphic video that was broadcast from 01.50 to 02.55 minutes. Then students are given the opportunity to answer the analysis group discussion questions. Based on the results of the assessment by the validator regarding the contextual analysis in each sub-section that is clearly focused, the average result of the assessment is 90% with very good criteria. Problem solving is a method used to stimulate learning to learners to be able to make them think in real terms and analyze, solve problems and then draw conclusions. As for the steps in analyzing the problem: 1) there is a problem that must be solved. 2) Looking for data, facts or information used in solving problems that are being faced or discussed. Facts, data and information can be obtained through reading books and other literature, researching, asking questions, discussing and so on, 3) Making conclusions, meaning that students must come to the final conclusion about the answer to the problem (Syofyan & Halim, 2016) . The goal is for students to gather enough information to create and build their own ideas. Discussion questions related to problems in real life increase the curiosity and interest of students to solve them..
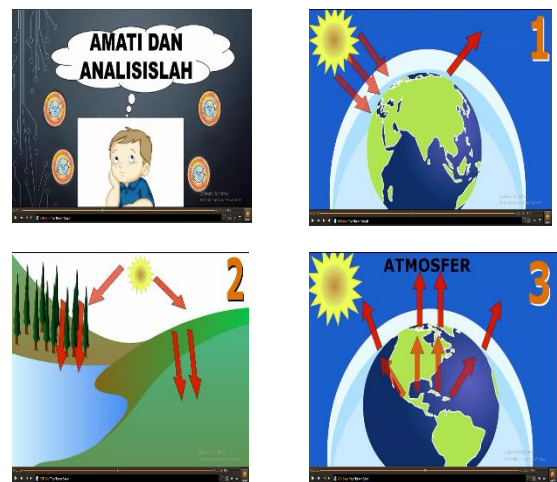

Figure 4 Display of Activities to Analyze Problem Based Motion Graphic Video Problems

Some problem-based questions were presented in the "Let's Work on" activity in a motion graphic video that was broadcast from 02.57 to 04.20 minutes. Then students are given the opportunity to answer some problem-based questions integrated in motion graphic video. Based on the results of the assessment by the

validator regarding several questions in each sub-section that are clearly focused and in accordance with the indicators of high-level thinking, the average percentage of the assessment is 90% with very good criteria. Student activities also show that students are very enthusiastic in trying every new thing for them and students also do not hesitate to ask questions if they feel that there is material that has not been understood during science learning. Good student activities in learning support students to build their knowledge and help their thinking become more logical. This is in accordance with the opinion of Prastiwi, (2018) who views that most of the cognitive development of children depends on how active the child is in building understanding through experiences and interactions with their environment. In addition, in carrying out investigations, students will gain experience so that they can find the concept of learning through themselves.

Figure 5 Display of Problem Solving Activity Video Motion Graphic Problem

Based on the description above, it can be concluded that for the characteristics of problem-based motion graphics, namely (1) it is a two-dimensional animation media (2) the video motion graphic developed is compiled based on the characteristics of problem-based learning, (3) contains question exercises combined with

motion graphics. can train students' higher order thinking skills, (4) there are discussion activities that can train collaboration skills, (5) can be used anytime and anywhere.

Profile of high-order thinking skills after participating in the lesson using problem-based motion graphics video

Analysis of students' high-order thinking skills is carried out by analyzing the results of the answers to the questions. Integrated problems in the motion graphic video. Indicators of high-order thinking skills used in this study refer to Megawati et al., (2020) with these six indicators, including (1) Students can solve problems, (2) Formulate and relate them to contexts in life, (3) Students can provide arguments, (4) Students can criticize a problem, (5) Make generalizations, (6) Students can design an idea.

Based on the criteria for assessing students' high-order thinking skills against the Motion Grpahic video which is used if it is declared good when it gets a score of more than 62.50% and less than 81.25%. If the assessment of high-order thinking skills of students on Video Motion Grpahic gets a score of more than 81.25% and less than 100% it means very good. Based on the overall value analysis, it can be concluded that the percentage achievement of the overall indicators of higher-order thinking skills is seen in Figure 6.
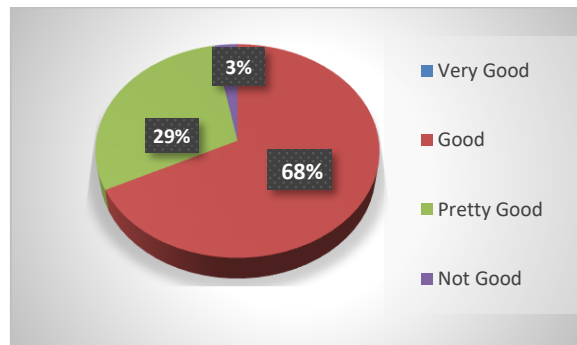

Figure 6. percentage attainment of all indicators of higher order thinking skills

Based on Figure 6, the overall percentage achievement of indicators for high-order thinking skills can be concluded that overall the results of the analysis of the high-order thinking skills test conducted by students obtained good results and were in good criteria with a percentage of 68%. Good criteria are found in indicators of solving problems, designing ideas, formulating and connecting with contexts in life. Problems integrated in video motion graphics

can train higher-order thinking skills. This is similar to research conducted by Syofyan & Halim (2018) that problem solving activities can improve critical thinking and high-level thinking with a percentage of above 60% in the very good category. In addition, research according to Primayana et al., (2019) activities to formulate and connect with contexts in contextual life have higher results because it encourages students to link the knowledge and experiences they get at school with their lives. Good criteria are found in indicators of providing arguments, criticizing a problem and making generalizations. According to research by Agoestanto et al., (2019) the activity of providing arguments produces good results because students need to be accustomed to providing arguments for the answers given in learning. This is in line with Ahmad's research (2020), the problems he faces directly, there is an increase in the ability to think criticism will arise by searching for answers or solutions to the problems he faces because of individual curiosity about the problems at hand. In addition, according to research activities to make generalizations obtained high results because students are required to make conclusions or conclusions based on knowledge (experience) developed through case examples.

The questions are arranged in such a way as to support these six indicators. For the last indicator, a poster final project on efforts to tackle global warming is taken.

The problem solving indicators for this problem is found in questions number 2, 3, 6, 8, 10, 12, 16 and 22. Solving a problem is stimulating students to pay attention, examine and think about a problem to further analyze the problem as an effort to solve it. problem. In this indicator students work on questions about the analysis of the process of the greenhouse effect and global warming which is shown by a problem in the form of motion graphics. The results of this indicator are for questions 3, 8 and 22 with the same percentage results 82%, namely the highest percentage falls in the very good category while the lowest percentage falls in the good category. For questions number 16 and 2 with the same percentage results, namely the highest percentage fell in the good category while the lowest percentage fell on the unfavorable category. For questions number 10 and 12 with the same percentage results 82%, namely the highest percentage fell in the very good category while the lowest percentage fell in the fairly good category. For question number 6

with the result that the highest percentage fell in the good category while the lowest percentage 60% fell in the very good category. This shows that students have been able to analyze questions arranged based on problem solving indicators.

The problem on indicators to formulate and relate to the context in life is contained in questions number 1, 5, 7, 9, 11, 14 and 19. This indicator helps students connect learning material with the context of students' lives so that they can find deep meaning for what studied. In this indicator, students work on the causes of global warming, which is indicated by a phenomenon in the form of motion graphics.

The results of this indicator are for questions number 1, 11 and 14 with the same percentage results, namely the highest percentage falls in the good category while the lowest percentage falls in the good enough category. For Questions 5, 7 and 19 with the same percentage results, the highest percentage falls in the very good category while the lowest percentage falls in the good category. For Question number 9 with the same percentage results, namely the highest percentage falls in the very good category while the lowest percentage falls in the fairly good category. This shows that students are able to understand contextual questions.

Problems on indicators of providing arguments are contained in questions number 13, 17 and 20. Giving arguments is an activity to strengthen a statement through an analysis with logical evidence and reasons. On this indicator students are asked to give their opinion about actions in an effort to tackle global warming. The results of this indicator are for questions number 13 and 20 with the same percentage results, namely the highest percentage falls in the good category while the lowest percentage falls in the good enough category. For Problem number 17, the percentage result is that the highest percentage falls in the very good category while the lowest percentage falls in the unfavorable category. This shows that students are able to give their opinion about the problem.

The problem on indicators of criticizing a problem is in questions number 4, 15 and 18. Criticizing a problem is the ability to think critically with curiosity about the problem at hand. On this indicator, students are asked to criticize the impact of global warming. The results of this indicator for Problems number 15 and 18 with the same percentage results, namely the highest percentage falls in the very good category while the lowest percentage falls in the

fairly good category. For Problem number 4, the percentage results are that the highest percentage falls in the good category while the lowest percentage falls on the good enough and unfavorable categories. This shows that students have been able to criticize the problem.

Problems on indicators of making generalizations are contained in questions number 21 and 23. Making generalizations is an activity in reasoning in making conclusions. On this indicator students are asked to make generalizations about the importance of the greenhouse effect for life. The results of this indicator for Problems number 21 and 23 with the same percentage results, namely the highest percentage falls in the very good category while the lowest percentage falls in the fairly good category.

Indicators of designing an idea can be seen in the results of students' final assignments to make posters about efforts to tackle global warming. Based on the percentage results, the highest percentage falls in the very good category while the lowest percentage falls in the unfavorable category.

This research is related to the development of problem-based motion graphics videos that are used as a means for students to have higher-order thinking skills and good collaboration. This is in line with research by Yunita & Suprapto (2021) who also conducted similar research by developing Higher Order Thinking Skill-based learning media which aims to introduce students' thinking skills and eliminate rote learning or repetition of information or facts. Based on the data above, it can be concluded that the problem-based motion graphic video media used can train students' higher order thinking skills with a percentage of 68% in the good category.

The profile of the ability to collaborate after participating in learning using problem-based motion graphic video

The support of digital technology, the collaboration ability of students is measured through WhatsApp and Google Documents with a collaboration ability sheet guide which contains four aspects of the collaboration skills adopted by Fitriyani et al., (2019), namely (1) collaboration, (2) responsibility, (3) compromise, and (4) communication.

The collaboration of students if declared good when they get a score of more than 62.50% and less than 81.25%. If the collaboration ability

assessment of students gets a score of more than 81.25% and less than 100%, it means that it is very good. Based on the overall value analysis, it can be concluded that the assessment of students' collaboration abilities at meeting 1 to meeting 5 can be seen in Figure 7.
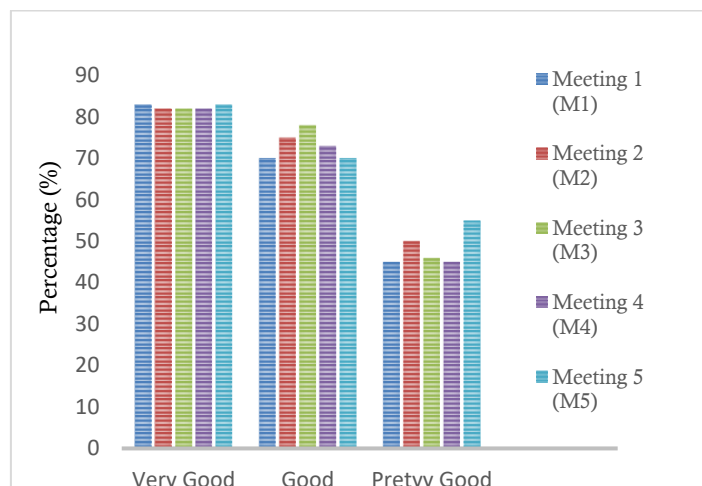

Figure 7. The percentage results of the Collaboration Ability of Class VII D students 1-meeting 5

Based on the overall achievement from meeting 1 to meeting 5 it can be said that the research carried out has been successful. This can be seen from the treatment carried out through problem-based motion graphic video media on the collaboration ability of students to get a very good category and a good category with a percentage above 62.50%. The problem-based motion graphic video media developed can be used as a means to train students' collaboration skills through the motion graphic video that is presented. Where in the implementation of online learning, students ask about the purpose of the animation displayed in the media by providing comments and comments on YouTube.

The first aspect is working with the indicators, namely conducting problem-oriented activities at the beginning, creating a solution, answering based on knowledge, and helping each other members in the group can be trained through discussion activities by answering the results of online discussions on google documents by involving the use of media that have been uploaded on YouTube. The second aspect of responsibility with the indicators is carrying out individual tasks well, doing group assignments well, expressing opinions with reasons, and expressing clear responses trained

through discussion activities by answering the results of online discussions on google documents and providing comments / responses to motion graphic based video. problems that have been uploaded on YouTube. The third aspect of compromise with indicators, namely submitting opinions according to what is being discussed, proposing an exchange of opinions between groups, asking permission to ask questions, and expressing opinions and focusing on a particular problem, training is not improving because students are less active in proposing an exchange of opinions between groups in an online presentation using google meet. In addition, another reason students have difficulty joining online presentations on Google Meet is due to signal difficulties and some students do not have the quota to join Google Meet.

The fourth aspect of communication with its indicators is using good language, the language used is not ambiguous, not convoluted, and the language used is easy to understand. During the process of learning activities in the network (online), students are invited to communicate where there are always questions and answers both in the process of delivering material by the teacher via WhatsApp, google meet and google documents both orally and in writing. The teacher's questions regarding the material are always related to the video of the global warming process presented in the media. So that to answer these questions students must understand the video that is presented. When answering questions, they tend to use problem-based motion graphic video media as assistance such as giving comments or comments on YouTube and google documents to strengthen their arguments.

Based on the data in Figure 4:15, it can be seen that the results of students' collaboration abilities are seen in each indicator from the highest percentage from meeting 1 to meeting 5 with the 13th indicator about using good language getting 63% meaning that students in delivering the results of their discussion using standard language, not ambiguous and straightforward. This is similar to research by Fitriyani et al., (2019) who also conducted a similar study where according to the results of her research, the audio visual media she developed can train communication skills seen from the results of the presentation of language indicators that are easily understood above 60%. The first meeting was the result of students' collaboration abilities

seen per indicator with the second highest percentage, namely the 6th indicator about doing group assignments well, getting 62%, meaning that each student has the responsibility to carry out group assignments through google documents and whatapss well. This is in line with Rostyanta et al., (2020) who also conducted a similar study where according to the results of their research, the interactive video media that he developed can foster an attitude of responsibility both individually and in groups seen from the results of the presentation of indicators above 60%.

The second meeting was the result of students' collaboration abilities seen per indicator with the second highest percentage, namely the 4th indicator about helping each other in the group, getting 62% meaning that in doing good cooperation among group members This is similar to Saputra et al., (2020) who also conducted a similar study where according to the results of their research, the media developed can train cooperation seen from the percentage of indicators above 60%. The third meeting to the fourth meeting was the result of students' collaboration abilities seen per indicator with the second highest percentage, namely the 16th indicator about the language used which was easy to understand, getting 62% meaning that students in communicating the results of their discussions using standard language This is in line with Hendriyani & Novi (2020) also conducted a similar study where according to the results of his research, the video presentation developed was able to train communication seen from the indicators of language use.

The profile of collaboration ability after participating in learning using problem-based motion graphic video can be seen in Figure 4.8, it can be seen that students have the ability to collaborate which for meetings 1 to 5 there are 49 students in the very good category with a percentage above 82%. The results of the collaboration ability for meetings 1 to 5, there were 89 students in both categories with a percentage above 70% and the results of collaboration abilities for meetings 1 to 5 there were 32 students in the fairly good category with a percentage above 45%. At the first, second meeting, the third meeting, the fourth meeting and the fifth meeting tended to fluctuate, which means that the value from the first meeting to the fifth meeting had increased some decreased even though there were students who had fixed values at each meeting. Based on the data above,

it can be concluded that the problem-based motion graphic video media used can train collaboration skills to obtain a percentage above 62.50% in the very good and good categories.
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CONCLUSION

Based on the results of research on "Problem-based Motion Graphic Video Development on the Global Warming Theme to practice High-Level Thinking Skills and Collaborative Ability for Junior High School Students" the following conclusions can be drawn:

The problem-based video motion graphic with the theme of global warming developed in the category is very suitable to be used for research data collection and has the characteristics of video motion graphics, namely (1) a two-dimensional animation media (2) the video motion graphic developed is compiled based on the characteristics of problem-based learning , (3) contains exercise questions combined with motion graphics that can train students' higher order thinking skills, (4) there are discussion activities that can train collaboration skills, (5) can be used anytime and anywhere.

The problem-based motion graphic video media used can train students' high-order thinking skills with a percentage of 68% in the good category. Problem-based motion graphic video media is used to train collaboration skills to get a percentage above 62.50% in the very good and good categories.

Suggestions from researchers to follow up on this research are the problem-based motion graphics video developed should use the best quality images so that students do not have misconceptions. The developed problem-based motion graphics video should use a dubber with good quality so that the volume of the dubber is higher than the music instrument.nIt is necessary to make very clear orders regarding the final assignment so as not to cause confusion to students.

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