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Title: PBL Model, Discussion Method, Discussion Approach, Varied Lectures, Video Learning Media & PPT to Increase Student Engagement.

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Abstract

This research aims to develop and examine evectiveness audio visual which intergrede with Problem based learning model in improving cognitivenes student learning on the topic of uniform circular motion. This research use Research and Development (R&D) method with improving 4D model which conssist to the define, design, develop, dan disseminate. The study was conducted at SMPN 3 Kuala Kapuas with nineth grade students as a research subct. The data was collected through expert validation pretest and posttest, also lesarning outcomes. The validation result shows that the develop audio visual media obtained average 4,66 categorized is very good, , indicating that the media is feasible for use in learning. The effectiveness of the media was tested using gain score analysis and a t-test. The results showed that the use of PBL-assisted audio-visual media was able to improve students' cognitive learning outcomes with a normalized gain value of 0.53, which falls into the medium category. In addition, the learning outcomes of the experimental class were higher than those of the control class, although the difference was not statistically significant. Therefore, the developed audio-visual media is effective as a support for

problem-based learning and can help improve students' conceptual understanding in physics learning.

Keywords: PBL, audio visual, learning outcomes

INTRODUCTION

The implementation of learning is one of the main factors in achieving learning objectives. In the learning process, many factors influence the attainment of these objectives. Teachers play an important role as organizers of classroom learning activities. The 2013 Curriculum requires learning that emphasizes student activeness. However, in reality, learning in schools is still teacher-centered, meaning that the 2013 Curriculum has not been fully implemented. This problem was found at SMPN 3 Kuala Kapuas, where learning activities are still focused on teachers. This condition contradicts one of the goals of the 2013 Curriculum, namely student-centered learning.

Education is one of the most important investments for developing countries to ensure future progress. Indonesia's relatively low education quality, based on the Global School Ranking, places Indonesia among the ten countries with low educational quality (Godwin, 2017). Therefore, improving the quality of education in Indonesia is necessary to keep pace with rapid global development. All aspects within the education system must be well connected and integrated. Improving educational quality refers to various factors, including the development of students' and teachers' potential in the learning process. This is in line with Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, which emphasizes education as a planned effort to create active learners in developing their potential.

One appropriate learning model is Problem Based Learning (PBL). This learning model uses real-world problems as a context for students to learn critical thinking and problem-solving skills, as well as to acquire essential subject

knowledge. The success of the PBL model can be supported by presenting problems that are easily understood by students and related to real situations. However, in practice, teachers often present problems in static visual forms, causing students to feel less engaged and reducing their understanding of the material.

One important step is presenting learning materials and problems accompanied by attractive visuals to capture attention and reduce students' boredom. This is supported by Sagala (2009), who states that lectures can be effective when teachers explain material using images and other visual aids. However, in reality, these steps are not widely implemented. Teachers have not optimally utilized learning media that can present interesting visuals, resulting in monotonous learning experiences.

Based on observations, learning at SMPN 3 Kuala Kapuas mainly uses printed media and PowerPoint presentations. The visual messages presented in printed media and PowerPoint are considered insufficient and monotonous because they only display limited images and static visuals. Physics material, which is closely related to natural phenomena, cannot be clearly illustrated through these media.

Learning media are tools used to deliver learning (Sanaky, 2013). One of the main function of tools is helping students in learning subject matter. Due to complain student regarding the monotoun and bored in learning prosess, various media lerarning is needed to attract and give new vibes.

Audio-visual media can convey material through both visual and audio messages, including animations, demonstration videos, and phenomena or experiments that cannot be conducted in the classroom, such as how airplanes fly. Such media strongly support physics learning, which requires concrete visualization of events, natural phenomena, or experimental demonstrations. According to Gunawan et al. (2017), physics concepts presented through audio-visual media can be visualized, making it easier for students to understand,

increasing enthusiasm, and motivating learning. The presence of moving images, animations, demonstration videos, and natural phenomena related to physics is expected to attract students' attention, increase learning interest, reduce boredom, and improve learning outcomes.

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The use of video based audio visual can expected to overcome difficulties in learning pyscis, particularry uniform circular motion, which requires deeper understanding through direct observation of phenomena that cannot be presented in the classroom. Therefore, this study focuses on developing audio-visual learning media on uniform circular motion to improve students' cognitive learning outcomes.

RESEARCH METHOD

This research is a combination of two research models, namely Research and Development (R&D) and the Four-D (4D) model. According to Sugiyono (2009:407), Research and Development is a research method used to identify problems and produce new products as well as to examine the effectiveness of those products..

he 4D development model consists of four main stages, namely:(1) Define,

which aims to determine and define learning requirements; (2) Design, which aims to design the format of physics learning videos as complementary learning media for students. At this stage, several draft aspects were prepared as references for feasibility and quality of the learning videos, including content, images, graphic design/layout, and material organization. The result of this stage was the initial prototype of the physics learning video; (3) Develop, which aims to produce audio-visual media in the form of physics learning videos that have been reviewed and revised based on comments, suggestions, and assessments from expert lecturers and practitioners. At this stage, limited field trials and operational field trials were also conducted; (4) Disseminate, which aims to implement the developed physics learning videos on a broader scale. This stage was conducted after the learning videos had been tested several times. At this stage, dissemination was carried out by distributing the learning videos in DVD format to physics teachers at SMA Negeri 7 Purworejo, which served as the research site.

This research was conduct from November to December 2022. This research location SMPN 3 Kuala kapuas, and the research subject were ninth grade students at SMPN 3 Kuala kapuas. The limited trial was 36 students and the trial and The research subjects in the field trial were 36 students from grade IX.

RESULTS & DISCUSSION

The development of audio visual learning media for psychs on the topic of uniform circular motion used Desearch and Development method (R&D) which adapted from 4d model by Thiagarajan dan Semmel (1974:5). The main development model in 4D is (1) Define; (2) Design; (3) Develop; (4) Disseminate. The following is the development flow of the Audio-Visual Learning Media that has been conducted:

1. Define Stage

This research began with analysis aimed determining and defining the requirement for development. In this need analysis, the researcher conducted observation at SMPN 3 Kuala Kapuas and obtained the first diagnosis that ninth grade students learning still used the convetional method and focusing on teacher lectures, it is necessary to conduct learning with the help of audio visual media in the form of videos.

The school is also have several facility such as LCD and speaker in each classroom, so this research began with doing the needed analysis aims to establish to define the term of development.

Based on the observation with the subject teachers, it was found that the abilities of grade IX in understanding material is equivalent. Most student also had laptop or computers at home, so audio-visual media in the form of videos could be used as independent learning materials.

Next an abalysis competency and basic competencies, then describes learning indicator. From the result of observation know that SMPN 3 Kuala Kapuas implemented the 2013 Curiculum. The tasks analysis can help t etermine the form and format of the media to be developed.

After conducting task and concept analysis, the researcher formulated learning objectives that were incorporated into the audio-visual media in the form of videos. At this stage, learning objectives were formulated based on basic competencies and indicators that had been developed.

2. Design Stage

In this stage, researcher prepared video content scenario, recorded experimental video eich support uniform sircular motion, collected videos from other sources that supported the topic, designed the video format, and conducted the dubbing process. The audio-visual physics learning media were created using Corel Video Studio X10 software.

The audio visual media in the form of videos were divided into three parts: introduction, content, and closing.

The introduction section contained the learning material title, analogies relating the material to motion, concept maps, basic competencies, and learning indicators. The content section consisted of videos explaining learning materials according to the lesson plan. The video also included sample problems and their solutions. The closing section contained problem-based videos that functioned as assignments used as problem references to support the problem-based learning model, adjusted to learning indicators and objectives.

3. Develop Stage

In this section, researcher analys the feasibility of the initial draft MAV in the form of physics learning videos on uniform circular motion that had been prepared during the design stage. This analysis involved one expert validator and one practitioner validator. At this stage, the researcher also analyzed the feasibility of lesson plans (RPP), syllabi, and the validation of pretest–posttest questions.

This part is aims to initial design of the audio visual media in the form of video. Validation conducted two validationer, the first one is expert validation and the second one is practici validator. Lecturer validation was conducted from 10 November 2017 to 13 December 2022 at Universitas Negeri Yogyakarta. Validation by the psycis as a practisi validator was conducted from 10 November 2022 to 13 Desember 2022 at SMPN 3 Kuala kapuas. The result of the validator assessment uses to determent feasibility audio visual media and lesson plant.

Based on the result, audio visual media such as video have scor 4,66 with categories very good quality.

Furthermore, the results of the analysis of the validity of pretest-posttest questions conducted, from two validators showed that the Aiken's V coefficient values of the pretest-posttest items ranged from 0.56 to 0.67, so that all question

items totaling 40 questions were declared valid. Therefore, the pretest and posttest question items, each consisting of 40 questions, were declared feasible to be used as measurement instruments.

After going through the validation stage by expert and practitioner validators, the validators concluded that the audio-visual media in the form of videos are feasible to be used in physics learning with comments and suggestions that serve as the basis for revision.

4. Desimminate Stage

Furthermore in desiminnate stage, the final product of the audio visual was given to supervising teacher for learning media on the development of economic centers of excellence for community welfare in other classes and also to be developed in other materials.

In making video visual several must be considered such as: (1) Characteristic aspec; (2) function of audio visual media; (3) learning material in visual media aspect. Based from the result of analysis for all aspec have a total average score 4,66. According to the criteria of the five point scale assessment, the average expert assessment has a very good category because it has a score greater than 4.26, so it can be concluded that the audio visual media in the form of videos are feasible to be used in learning. The high feasibility of material feasibility and media feasibility in the developed audio visual media is because the material contained in the media is in accordance with the concepts and objectives to be achieved and fulfills aspects of function, benefits, and attractiveness to be used in physics learning. This is in accordance with the statement of Sumiati (2007) that the use of learning media must be adjusted to the content or learning material and the objectives to be achieved.

The result from the both validator also support that video media is suitable for use in problem based learning. This is supported by the availability of problem

sources and learning materials as independent learning materials for students in solving the problems contained in the video. The results of the assessments from lecturers and teachers also stated that the Audio-Visual Media meets the characteristics of problem based learning and can be used as feasible media in problem based learning. This is supported by the provision of problems that meet the criteria of the characteristics of problem based learning in accordance with the material of uniform circular motion, this video also contains material that is related to the problems provided so that it can be used as a new source for students in solving problems and achieving educational objectives. The video also contains practice questions along with their solutions which help facilitate students in solving questions related to the material of uniform circular motion. This is also explained by Cynthia Sparks (2000) that in using media, especially video, teachers need to pay attention to ideas, namely selecting videos that are appropriate to learning objectives, paying attention to video quality so that it is able to motivate students and improve concepts and broaden knowledge, videos have attractiveness so that students have reasons to focus on watching, can encourage attention and activeness of students, and videos must contain a large amount of information so that students more easily achieve learning objectives.

Furthermore the discus is focusing by activenees of audio visual media this research was conducted SMPN 3 Kuala kapuas from November to December 2017. The research subjects were grade IX students. The purpose of this development research is to produce Audio Media products that are feasible to be used in problem based learning in the classroom, to determine the improvement of students' cognitive learning outcomes after the implementation of audio-visual media in problem based learning in the classroom, and to determine differences in students' cognitive learning outcomes between classes that use audio-visual media and conventional classes. In this development research, at the field trial stage, to determine the effectiveness of audio-visual media, an experiment was

conducted by finding differences in the improvement of cognitive learning outcomes between one experimental class, namely the class that in learning uses audio-visual media, and one control class, namely the class that in learning uses conventional learning media without additional media.

From the results of the feasibility analysis, the Audio-Visual Media is feasible to be used as learning media for problem based learning in the classroom. This feasibility test uses two expert validators, namely supervising lecturers and physics teachers of SMA Negeri 7. The results of the analysis of the assessment of audio-visual media for all aspects have a total average score of 4.66. According to the criteria of the five-point scale assessment, the average expert assessment has a very good category because it has a score greater than 4.26, so it can be concluded that the audio visual media in the form of videos are feasible to be used in learning. The results of the feasibility analysis of Audio-Visual Media can be seen in the appendix. This research applies the same learning model and learning method, namely the problem based learning model and the discussion lecture method for each class, both the control class and the experimental class. The dependent variable in this research is cognitive learning outcomes with the material of uniform circular motion. To determine the effectiveness of audio-visual media in terms of improving cognitive learning outcomes, tests in the form of pretest and posttest were used. In this research, learning outcomes are limited to the cognitive aspect of the C1 to C4 domain. Before being given treatment, each class was given a pretest to determine the level of students' understanding of the material of uniform circular motion. After being given treatment, each class was then given a posttest to determine the level of students' understanding of the material of uniform circular motion that had been taught.

The research data obtained was then analyzed using several analytical methods, and the results of the analysis were used to answer the research questions and prove the hypotheses. The following is a discussion of the analysis

of the effectiveness of audio-visual media in terms of the difference in cognitive learning outcomes between ninth grade students and students in classes without media.

To determine whether there was an increase in cognitive learning outcomes in classes that were given audio-visual media, a gain analysis was conducted. This is because audio visual media in the form of videos contain visual and audio elements. Audio visual media in the form of videos are a combination of visual media and audio. Messages in the form of learning materials on regular circular motion are conveyed through visuals and audio to reinforce the visual message. The visual messages displayed in the video consist of static visuals in the form of still images, text containing material and interactive explanations accompanied by audio in the form of dubbing of the existing text. In addition to static visuals, the video is also equipped with moving visuals in the form of animations and demonstrations related to regular circular motion material, which are useful for providing a different learning experience and for presenting objects or events that are difficult to present in class. The video also has the ability to reduce the limitations of providing demonstration tools. It is the difference in the characteristics and capabilities of visual media and audio-visual media that leads to an increase in learning interest and learning outcomes. As stated by Yudi Munadi (2013:46), media plays a role in developing the cognitive abilities of students. The more students are exposed to objects, the more thoughts and ideas they will have, and the richer and broader their cognitive minds will be, including perception, memory, and thinking.

From the t-test analysis, it is known that there is a difference in cognitive learning improvement between grade IX and classes without media, with a significance level of 5%. It can be concluded that the average value of cognitive learning improvement in classes without media is lower than the average value of

cognitive learning improvement in grade IX. The difference in improvement is not very significant.

Audio visual media can also show the real problem and improviding new material sources so that this can contribute to the success of achieving educational goals with the problem-based learning model. According to the theory developed by Barrow and Min Liu (published in 2005) in the Scientific Journal of Didactics Vol. XIV, No. 1, August 2013, page 205, the characteristics of PBL are explained as follows: 1) Student-centered learning, 2) Authentic problems as the main focus of learning, 3) New information is obtained through independent learning, 4) Learning takes place in small groups, with the teacher acting as a facilitator.

In addition, the characteristics learning based problem can be detailed as follow: problem be a starting point in learning process, The issues raised are real-world problems that are unstructured, require multiple perspectives, challenge students' knowledge, attitudes, and competencies, and then require the identification of learning needs and new areas of learning. Self-directed learning becomes paramount, as does the utilization of diverse knowledge sources, their use, and evaluation of information sources are essential processes in PBL. Learning is collaborative, communicative, and cooperative. The development of inquiry and problem-solving skills is as important as mastery of knowledge content in order to find solutions to problems. Openness in the PBL process includes synthesis and integrationc of the learning process. PBL involves evaluation and review of student experiences and the learning process.

Difference of improvement learning outcomes between 2 classes was due to the difference treatment between the experimental class and the control class. In the experimental class, participants were given IX to present more realistics problems, and the IX that had been created also contained material that was easier to understand because it is was supprtted by dubbing explanations and questions with disscussions. The audio visual media that had been created was also designs

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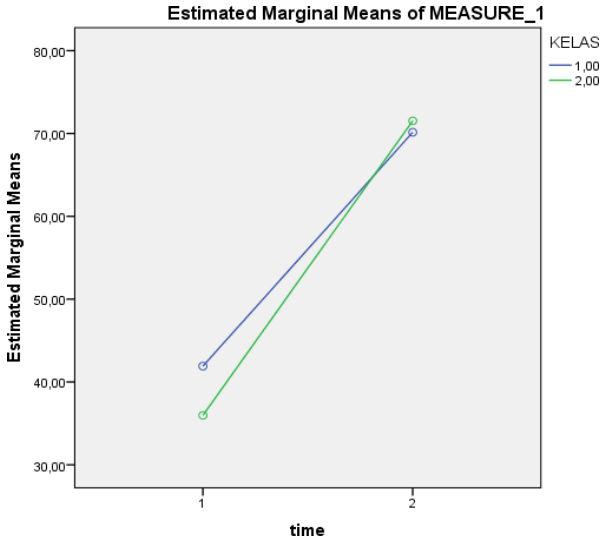
to be as attractive as possible according to the needs of the students. Meanwhile, in the control class, students were not given additional media and were only limited to the learning resources they had, such as worksheets and other book sources. The provision of problems to support problem-based learning was also limited to verbal explanations rather than real examples, so that students were unable to fully understand the problems that would later be solved together in problem-based learning in class.

Audio visual has designs as interesting as possible as needed students. Meanwhile, in the control class, students were not given additional media and only relied on the learning resources they had, such as worksheets and other books. The presentation of problems to support problem-based learning is limited to verbal explanations rather than concrete examples, so that students are unable to fully understand the problems that will later be solved together in problem-based learning in the classroom.



Picture 1. 1 Difference in learning outcome development

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The graphic analysis show describe about improvement learning outcome between experiment class and class control. It can be seen that the green graph labelled class, and the blue graph labelled class 001 is the control class. From the graph, it can be seen that the experimental class has a lower average pretest score than the control class. Thus, it can be seen that the increase in the experimental class was higher than increase in learning outcomes in the control class. The difference in learning outcomes between the two classes was also not very significant, because the graph shows that the slopes of the graphs are almost the same.This is due to several factors, one of which is practicality. Conventional media that has been implemented in schools in the form of worksheets is considered better because it can be understood anytime and anywhere without the need for supporting tools. This is in contrast to audio media, which requires electronic devices to access it.

CONCLUSION

Based on the result of data analysis and discission can be conclude that audio visual media in the form videos have been produced that is suitable for use in problem based learning in physics on the subjecy of uniform circular motion based on a review of the audio visual medium un four aspects (CD cover, appeatance, video display characteristics, video functions and benefits, material) with a total average scor of 4.66 in the excellent category, so in can be conclude that this auvio visual medium in the form of a video is suitable for use in learning

The developed physics audio-visual media can improve student learning outcomes. This is based on an average standard gain value of 0.53 for cognitive learning outcomes. The standard gain value for the improvement in student learning outcomes falls into the moderate category.

There is a difference in the improvement of cognitive learning outcomes of ninth-grade students at SMPN 3 Kuala Kapuas between students who use audio-visual media in the form of videos and students who do not use media, based on

the gain score data in the t-test, which shows that there is a difference in improvement that is not very significant. The improvement in learning outcomes in the experimental class is greater than the improvement in cognitive learning outcomes in the control class.

AI Declaration

The author uses artificial intelligence technology (Chat GPT) only to assist with language improvement, sentence structure, and the neatness of the article's writing. The use of AI does not include the creation of research data, data analysis, or drawing conclusions. The entire content and scientific responsibility of this article lies solely with the author.

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JOURNAL OF PRAGMATICS RESEARCH uses ***APA 7th referencing style***. The references should be in alphabetical order; use Cambria (12), 1,5 spaced. **The minimum requirement of the number of references is between 30-60 references and 40-80 % taken from reputable international journals.** It is preferable to have academic journals as the references published in the last 5-10 years except for main references of particular theories. It is suggested to apply reference software like ***Mendeley, Zotero*** or ***Endnote.***

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