PILLAR OF PHYSICS EDUCATION
Vol. 6 (3), 2023, page.213-217
ISSN (Print) : 2337-9618
ISSN (Online) : 2684-8880

Presentation and Readability Techniques of PjBL-Based Physics Worksheets In Circular Motion Material To Improve Student Collaboration

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ABSTRACT

The presentation of a teaching material, one of which is the Student Worksheet, can have an impact on students. Student Worksheet presentation affects students' communication skills, where this communication ability becomes the basis for students to understand a learning material. The purpose of this study was to find out how the Project Base Learning (PjBL)-based Physics Student Worksheet presentation technique improves students' communication skills on circular motion material. This type of research is Research and Development (R&D). The instrument used in the research is the Student Worksheet validation sheet. The data collection technique is in the form of Student Worksheet validation results in the form of presentation and communicative techniques. Based on the results of the study, it was found that the results of validation on the presentation technique according to the first validator got a very good score, while according to the second validator, they scored well on typing accuracy and very well on the presentation sequence. According to the first validator, the communicative component was validated, thatis, clarity of language scored well and readability of messages and information scored very well. While the second validator, clarity of language with a good score and readability of messages and information with a very good score. The results of the study can be concluded that the quality of this Student Worksheet is in the good and very good category in terms of presentation and communicative techniques, so that this Student Worksheet can be declared feasible to be applied to students with circular motion material.

Keywords : Student Worksheet, presentation technique, legibility, circular motion.

I. INTRODUCTION

In addition to aiming at expecting students to have knowledge, national education also expects students to acquire skills, develop attitudes, and experience learning so that they are able to think logically, critically and creatively so that they can apply them to everyday life. Therefore, media is really needed that is able to facilitate students to improve students' critical thinking skills, one of which is the Student Worksheet [1]. Readability is a measure seen from the level of difficulty or ease of text for students to understand. Readability itself is a form of evaluation book. Readability relates to the ease of reading text. A text can be said to have high readability if the text is easy to understand. Meanwhile, text is said to have low readability if the text is difficult to understand [2]. Utilization of appropriate learning media is one way for learning to achieve the planned learning objectives. Usage Learning media as a learning tool aims to make the message conveyed by a teacher understandable by students effectively and efficiently. Student Worksheet is one of the tools used to help and facilitate activity learn to teach. Student Worksheet participants are more active in finding themselves, with the hope that this can increase student learning activities which in the end can also increase student interest, achievement, and learning outcomes [3]. Learning tools are things that must be owned by every teacher as a guide or reference in teaching. Learning devices are learning support facilities that contain learning plans that describe in detail the competencies to be achieved by students, learning designs that follow certain learning model syntax, activity guidelines for students and tools to measure student competency achievement [4]. Teachers as educators need to design and develop learning tools that can train and improve students' communication skills. There are many models, approaches and methods that can be used to improve students' communication skills in the learning process, one of the models recommended in the 2013 curriculum is Project Based Learning (PjBL). PjBL is a form of learning that is based on constructivist findings that students gain a deeper understanding of material when they actively construct their understanding by working with ideas [5]. Student Worksheet are sheets that contain modules, summaries and assignments that must be done by students. Student Worksheet contains a summary of activities aimed at activating the role of students as learners. Student Worksheet has the goal that students can independently explore a concept by dismantling the scientific issues contained in it, and can increase their understanding of the material being studied through assessment questions [6]. Through Student Worksheet, students can become more active in learning activities. For teachers, Student Worksheet can make it easier for teachers to guide students in various activities throughout the learning process [7]. Readability relates to all the elements in the text or reading material. There are five ways to determine the readability of a text, namely the subjective assessment of experts, the question and answer method, readability formulas, charts, and the cloze test. In connection with this study, what is studied to determine the readability of the text is the readability formula. The readability formulas in question are formulas that produce numbers as readability indexes [8]. The presentation component is the presentation of modules that are tried out in a coherent and systematic way, modules are easy for students to understand and foster motivation. The initial aspect of the material is that the material in the integrated science supplement book on the theme of hearing is arranged from basic concepts to more complex concepts in accordance with the KTSP syllabus, namely starting from the notion of vibration and waves, the process of hearing, influencing factors, and abnormalities in the human sensory organs. The pattern of presentation of a teaching material will be considered good if the material is presented in a consistent, systematic and coherent manner so that it can help students understand the contents of the teaching material [9]. Circular Motion is one of the materials in Physics lesson. Included in circular motion is the motion of an object in the form of a circular trajectory. Students will understand better by seeing direct objects concretely. With the form of an active, creative, effective, and fun learning approach (PAKEM) in practice the learning focuses more on student activity, the teacher as a facilitator only [9]. Based on this, Student Worksheet is needed that can overcome the above problems, one of which is Project Based Learning (PjBL) based Student Worksheet which is able to improve student communication to can work in groups, collaborate, think creatively, critical and give participant opportunities educate looking for information in designing a project. Based on the description above, a study will be carried out entitled "Presentation of PjBL- Based Physics Worksheets to Improve Students' Communication Skills on Circular Motion Material"

II. METHOD

The instrument used in the research is the Student Worksheet validation sheet. In the validation sheet there is a presentation and communicative systematic assessment component which is useful for obtaining responses, criticisms, and suggestions from experts. Student Worksheet specially developed for circular motion material. The Student Worksheet profile is described through the results of validation by experts and practitioners (validation sheet), the results of limited testing of the device (see implementation data). Implementation data was obtained from the results of the analysis of the observation sheets carried out by two observers. Based on the results of revisions/suggestions from experts and practitioners. This type of research is research and development (Research & Development/

R&D). This research focuses on discussing the PjBL Student Worksheet validation that was developed. Validation is carried out by two validators as experts. The data collection instrument used was a validation sheet using a scale of 1-4. The validity of the learning tools developed are at least in the valid category so that they are suitable for use in the learning process.The Student Worksheet used is based on PjBL or*project based learning* , where PjBL is a learning model that forms a class in a project. PjBL is one of the learning strategies that students must have to build their own expert knowledge and show new understanding through various forms of representation. From several definitions of PjBL, we can conclude that PjBL is a student-centered learning model that develops and applies project concepts that are generated independently by exploring and solving real-world problems.

III. RESULTS AND DISCUSSION

Project-based learning (PjBL) with collaboration can be an effective approach to apply circular motion material to students while improving their communication skills. Here are the steps you can follow.Identify collaborative projects: Select projects that involve collaboration between groups of students. For example, you could ask students to design and launch a rocket vehicle that follows a circular path of motion. explanation of the concept of circular motion to students, such as angular velocity, radius, period, frequency, and centripetal acceleration. also discusses practical examples of circular motion in everyday life. divide students into groups consisting of members with different expertise. Ensure that each group has students who are experts in mathematics, students who have construction skills, students who are good at designing, and students with good communication skills. Planning a project by helping students plan their project by identifying the steps needed to design and launch a circular motion rocket vehicle. Encourage them to discuss and collaborate in developing ideas, designing blueprints, and organizing tasks in groups.

Implementing projects in which students work independently or in their groups to carry out projects. During this process, encourage them to communicate effectively with the rest of the group. This includes sharing ideas, explaining concepts, expressing opinions, and solving problems together. Evaluating the project. After the project is finished, ask students to evaluate their own and other group projects. Ask them to provide constructive feedback based on aspects of the communication skills demonstrated during the collaboration. Presenting and reflection: Invite each group to present their project to the whole class. Ask them to explain the concept of circular motion applied in the design and launch of rockets. Additionally, provide opportunities for students to reflect on their collaborative experiences and the importance of communication skills in achieving project goals.

By using the PjBL approach with collaboration, students will not only learn about the concept of circular motion, but will also develop their communication skills through collaboration in groups. This will help students improve their skills in speaking, listening, debating Research and development produces products in the form of physics-based worksheets*Project Based Learning* (PjBL) on circular motion material. Published Student Worksheets generally contain questions that only require cognitive ability to answer. In this Student Worksheet model, successive generations have helped students but still not optimally. As far as the author's observation, generally STUDENT Worksheets are made in the form of manuals or practicum guides which some people and the authors view are still very ineffective. For this reason, it is necessary to present Student Worksheet that has a model or involves all aspects of the knowledge, skills, communicative and attitudes of students.

This Student Worksheet is carried out by investigation or observation, with this observation quantitative data will be generated which will be analyzed to obtain the basic concepts in the field of science, namely physics. In this case, to test and apply the PjBL concept in the Student Worksheet, questions were given to apply the concept in the form of cognitive questions. Those filled with module presentation components are tried in a coherent and systemic manner, modules are easy for students to understand and foster motivation and communicativeness which will build on students more closely during investigative activities or scientific activities that will be carried out.

Before analyzing the results of the feasibility assessment of Student Worksheet Physics and the results of the responses of the two experts, instruments that have been declared valid and reliable must be used to retrieve feasibility assessment data and student responses, but due to time and cost constraints, researchers analyze the results with respondent data when testing the validity and reliability of the instrument. The combined average of the 2 components shows that the quality of the Student Worksheet is in the criteria of "Very Good" and "Good". From the data criteria above, it is known that this Student Worksheet can be declared feasible and qualified so that it can be used as one of the physics teaching materials in circular motion material in high school. This research is supported by other research on the development of Student Worksheet which is applied to physics learning which is categorized as valid and feasible to be applied [13].

The process of validating Student Worksheet and the guidelines for its use begins by giving the manuscripts to each of the two experts. The results of the expert's assessment of the resulting device are in the very valid category. Even so, the authors received several suggestions for improvement from the validator, including the need for time allocation in Student Worksheet, and the form of pictures. Thus, the resulting device has been developed based on supporting theories, so it is feasible to be tested. The revised results of this validation are hereinafter referred to as the initial draft of the Student Worksheet (before being tested directly on research subjects).

Expert validation aims to obtain input on the presentation technique component regarding the sequence of presentation and the accuracy of typing and contains a communicative component regarding the clarity of language use and the readability of messages or information on Physics Student Worksheet. The input obtained is then analyzed and used to improve the presentation technique and readability of information on Student Worksheet so that it canimprove the quality of Student Worksheet as learning media to be used in research.

Table. 1 validation table

Component	Indicator	Score			
		1	2	3	4
Serving technique	Presentation Sequence				√
	Typing Accuracy			√	
Communicative	Clarity Of Language Use				√
	Readability Of Messages Or Information			√	

Table. 2 information

1	Very Less
2	Less
3	Good
4	Very Good

In the expert validation table, there are material items that have a presentation systematics with components, namely presentation and communicative techniques, where the table contains material for the presentation sequence and typing accuracy, while in the language material items, namely clarity of language use and readability of messages or information. Research and development produces a product, namely Student Worksheet physics based on Project Based Learning (PjBL) on circular motion material so that there is an explanation of the presentation of this validation with information that in the presentation technique component there is a material content stating the presentation sequence in this Student Worksheet with very good values, while for the content of the material with typing accuracy with good values in it. While the communicative component has material content for clarity of the use of language used in Student Worksheet with very good values, besides that the readability of messages or information in Student Worksheet has been assessed well. Based on the results of material expert validation data, it was obtained that the average combination of 2 components regarding presentation techniques and information readability was known that the quality of Student Worksheet was in the criteria of "Very Good" and "Good". From the data criteria above, it is known that this Student Worksheet can be declared feasible and qualified so that it can be used as one of the physics teaching materials in circular motion materials in high school. This research is supported by research on Student Worksheet learning tools using a project-based learning model (PJBL) which is categorized as valid and feasible to be applied in physics learning [12].

IV. CONCLUSION

` Based on the results of the research conducted, it is known that the results of the validation of the presentation technique with indicators of typing accuracy and the order of presentation according to the first validator, the communicative component is validated, namely language clarity is considered good and the

readability of messages and information is considered very good. While the second validator, clarity of language with a good score and readability of messages and information with a very good score. This shows that the quality of the Student Worksheet is in the good and very good category in terms of presentation techniques and communicative indicators, so that this Student Worksheet can be used as learning material to improve students' communication skills and is declared feasible to be applied to students with circular motion materials. It is necessary to do more research related to other components in this Student Worksheet in order to obtain quality Student Worksheet that is able to increase knowledge and other skills so that it is not only further communicative skills.

ACKNOWLEDGMENT

Acknowledgments to Mr. Drs, Subiki, M. Kes., and Prof. I Ketut Mahardika, M. Si., as lecturers of the course and as supervisors who have directed in making this article. To friends who have done research and made articles wholeheartedly. As well as to all parties who have participated in making this article.

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