

## Development of PBL-based teaching materials assisted by Multimedia Presentation on the topic of Static Fluid

Dibi Nasiah<sup>1</sup>, Yeni Megalina<sup>2</sup>

<sup>1,2</sup> Department of Physics, Medan State University, Indonesia  
[dibinasiah15@gmail.com](mailto:dibinasiah15@gmail.com)

### ABSTRACT

*This study aims to develop a problem-based learning multimedia presentation assisted by Canva on static fluid material that is feasible and effective for use in learning. The type of research used in this research is Research and Development (R&D) with the 4D (four-D) development model. There are three instruments used, namely, learning media feasibility instruments reviewed from media experts, material feasibility instruments reviewed from material experts and student response instruments to the effectiveness of learning media. The subjects in this study were 30 students of class XI MIA at SMA Negeri 16 Medan. The results showed in the trial that 30 students obtained an average score of 91.4 categorized as very feasible. The results of the acquisition of 30 students in class XI MIA-3 obtained an average pretest of 25.5 and posttest of 85 if calculated by normalized gain showed a gain value of 0.78 in the high category. The increase shows that the multimedia presentation based on the problem-based learning model assisted by Canva on static fluid material is effectively used in SMA Negeri 16 Medan.*

**Keywords:** Multimedia Presentation, PBL, Static Fluid

### INTRODUCTION

The 21st century can be characterized as a century of knowledge marked by a massive transformation from an agrarian society to an industrial society and then to a knowledge society (Soh et al., 2010). This transformation process is also marked by the emergence of globalization and the swift flow of information that causes many social and cultural changes in society (Afandi et al., 2016).

In the midst of the transformation that occurs, it spurs the emergence of challenges that everyone must face, therefore a paradigm shift is needed in the education system that provides a set of 21st century skills needed by learners to face every aspect of global life (Soh et al., 2010). The change in question does not concern changes in curriculum content, but changes in pedagogy, namely changes in action from simple action towards comprehensive action and shifting the dominance of traditional teaching towards technology-based teaching (Afandi et al., 2016).

Currently, the world of education in Indonesia has entered the Era of disruption which forces the world of education to make changes. Education is required to innovate by utilizing technology. Because everyone involved in education, especially teachers and educators, must innovate, every problem that arises requires a new way, so that various problems can be solved. In addition, around 50 million Indonesian students spread across various parts of the country with geographical and demographic conditions that are difficult to reach is not an easy job to realize equitable education, both in terms of quality and quantity.

Therefore, the role of technology can help bridge the gap in the quality and quantity of education in Indonesia today (Mudarya, 2020).

Industrial Revolution 4.0 or another word for the era of disruption, which is happening today cannot be separated from the existence of innovative products, especially in the field of education. There are several challenges that educators must face. Educators in the 4.0 era are required to master technology. Not only technology, an educator must also be selective in determining the media that suits the character of students, so that students are better able to absorb learning quickly without the onset of boredom. Errors in choosing technological media and ease of accessing data will be a polemic for students and will ultimately lead to failure in achieving learning objectives (Priatna, 2019).

With this learning system, teacher creativity is needed in designing learning both in terms of material, models, or media used, including at SMA Negeri 16 Medan. Currently, the learning system at SMA Negeri 16 Medan implements Limited Face-to-Face Learning (PTMT). This is done due to the Covid-19 outbreak. PTMT is a step to prevent the spread of the Covid-19 virus. The observation results show that one of the obstacles of PTMT is the limited learning media. Of the 35 students, 62.9% stated that the learning model that is often used is a conventional learning model. As many as 88.6% of students stated that learning using media is more fun. At this time, learning media is needed in carrying out the teaching and learning process. The learning media needed is learning media that is interesting and effective in order to increase interest in learning and improve understanding of concepts.

Computer technology-based media and motivating in independent learning. Media has an important role in transferring knowledge (Nurrita, 2018). To improve understanding and competence of learning media is needed. Learning media that can make students more active and interact directly with lessons is interactive multimedia. Multimedia functions to make learning more directed (Daulay et al., 2020).

Interactive learning multimedia must contain learning materials by covering the breadth and depth in accordance with the objectives to be achieved. Therefore, the objectives must be conveyed clearly, as well as the material conveyed must be presented through a combination of multimedia and there are efforts to determine the level of achievement of learning outcomes. Interactive learning multimedia must have features that allow users to be actively involved in interacting with the program (Surjono, 2017).

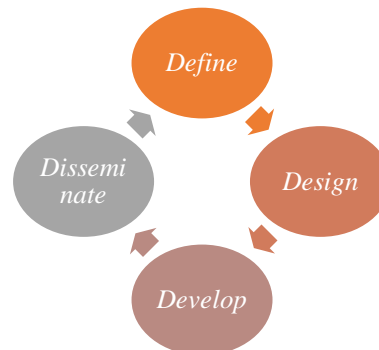
The formulation of the problem in this study is how physics learning outcomes in students using multimedia presentations based on problem-based learning models assisted by Canva on static fluid material at SMA Negeri 16 Medan?

The purpose of this study was to improve physics learning outcomes by using multimedia presentations based on the problem-based learning model assisted by Canva on static fluid material at SMA Negeri 16 Medan.

## **METHODS**

The type of research is Research and Development (R&D) research. The

research design used is 4D (Define, Design, Develop, and Disseminate).



**Figure 1.** 4D Model Development Stage

This research was conducted at SMA Negeri 16 Medan which is located at Jl. Kapten Rahmad Buddin, Terjun, Kec. Medan Marelan, Medan City, Medan Province. North Sumatra. The subjects and objects in this study were students of class IX-MIA 3 at SMA Negeri 16 Medan as many as 30 students and Presentation Multimedia Based on Problem Based Learning Model Assisted by Canva on Static Fluid Material.

The data collection methods used are observation, questionnaires and tests while to analyze the data using the gain test (to find how much improvement from the pretest and posttest data) and the effectiveness test (to determine the effectiveness of the treatment).

The observation method in this study was to look for student learning activities during learning by using multimedia presentations.

The questionnaire method (questionnaire) in this study is intended for media experts, namely lecturers of the Physics Department of Medan State University as a means of knowing whether or not multimedia presentations are feasible, material experts, namely lecturers of the Physics Department of Medan State University as a means of knowing the suitability of the content of static fluid material with the syllabus used in SMA Negeri 16 Medan and for students as a means of knowing the level of student understanding of multimedia presentations.

The test method used in this research is a formative test in the form of multiple choice as an assessment of cognitive aspects (pretest and posttest).

The instruments used in this research are questionnaires and tests. The questionnaire used in this study uses answers on a Likert scale. Sugiyono (2012: 134) Likert scale is used to measure attitudes, opinions, and perceptions of a person or group about social phenomena. The test used in this study is a multiple choice formative test. The test question consists of 20 items. The instrument is used as an evaluation tool to collect data on the test method, which in this case is the pretest and posttest. To calculate the gain value using the formula below.

$$N-Gain = \frac{skorposttest - pretest}{skormaksimum - skorpretest}$$

## RESULT & DISCUSSION

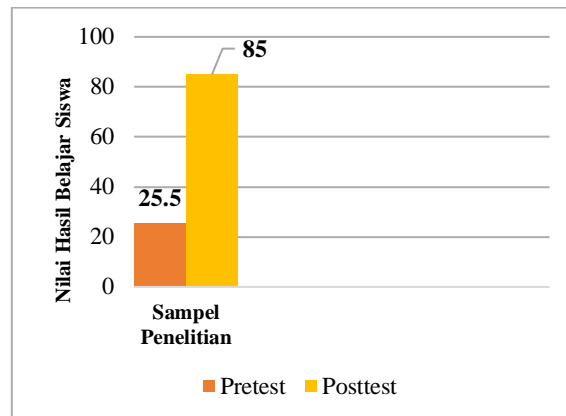
The results of the analysis test state that the multimedia presentation validation test after expert testing has been carried out by 2 experts, namely Medan State University lecturers consisting of 3 aspects of language, content and presentation, the results show that the multimedia presentation is very good/valid to use with static fluid material.

The results of qualitative data analysis by testing student response questionnaires as many as 30 students to the multimedia presentation developed with the criteria of software engineering, visual communication and learning aspects are in the very good/worthy category for use at SMAN 16 Medan. Based on the results of quantitative research shows that multimedia presentations are very effective in improving student learning outcomes in learning conducted in class. Based on student learning tests through pretests and posttests given to students consisting of 20 multiple choice questions, it was found that the increase in learning completeness scores had a considerable impact on student response scores. This can be seen from the comparison of the pretest and posttest results of the research sample which is illustrated in the table below.

<b>Component</b>	<i>Pretest</i>	<i>Posttest</i>
Highest Score	65	95
Lowest Score	5	70
Average	35	82,5

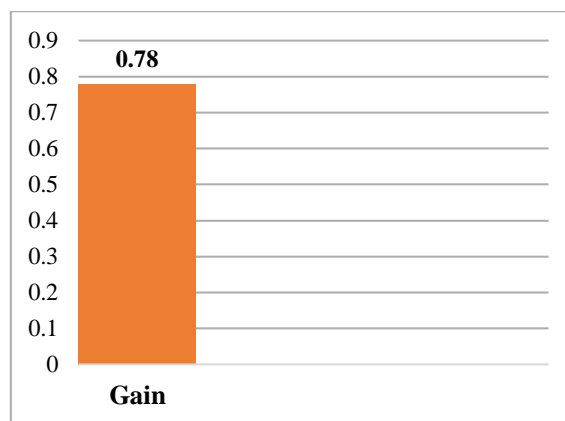
**Table 1.** Pretest and Posttest Data of Research Samples Source: Research Data 2022

Posttest scores after being given treatment using multimedia presentations in learning are higher than pretest scores before multimedia presentations, this is because the multimedia presentations given are more interesting and in accordance with learning objectives so that students are interested in understanding static fluid material. In this case the teacher does not just provide knowledge to students but facilitates students to build their own knowledge in thinking independently so that students can understand the material well. The increase in learning outcomes using multimedia presentations occurs because students get new experiences in receiving material. The average increase from pretest and posttest results shows that students experienced an increase of 59.5 with an average pretest of 25.5 to 85 on the average posttest, this can be seen in the graph below.



**Figure 2.** Graph of Learning Outcomes  
Source: Research Data 2022

Meanwhile, based on the gain test, the value is 0.58, this can be seen in the graph below:



**Figure 3.** Graph of Gain Value  
Source: Research Data 2022

Based on the gain value graph above, it shows that there are results of an increase in student test results in terms of the average pretest and posttest. From the results of tests conducted on students through pretests and posttests, it was found that 30 students tested passed the KKM. The increase in the average research sample is included in the high criteria. This high criteria category is because students have the ability to capture very broad learning material, so that when learning using multimedia presentations students get quite high scores.

Multimedia presentations with the provision of material, images, animated videos, and quizzes in it are said to be very effective in the learning process at SMAN 16 Medan on static fluid material. Furthermore, the results of research that are in line with research conducted by Audio-visual based learning media with the canva application state that the media to be used is the most important part of the learning design process. Through this media, the message given by the teacher to students will be conveyed effectively. Its use is also very effective both offline and online. This proves that there is a match with the results of the research conducted

by the author, that multimedia presentations are effective and can indeed improve student learning outcomes.

## CONCLUSION

The results showed that the average value of the pretest was 25.5 and the average value of the posttest was 85, this means that student learning outcomes have increased by 59.5, and the average size of the gain test is included in the medium criteria of 0.78 or 78%. Based on the above explanation, the use of multimedia presentations can improve student learning outcomes in static fluid material at SMA Negeri 16 Medan..

## BIBLIOGRAPHY

- Afandi., Junanto, T. & Afriani, R. (2016). Implementasi Digital-Age Literacy Dalam Pendidikan Abad 21 Di Indonesia. *InProsiding SNPS (Seminar Nasional Pendidikan Sains)* (Vol. 3, pp 113-120).
- Daulay, M. I., Musyid, R. & Baharuddin. (2020). Development of Computer-Based Instruction Based Learning Models in Electricity Transmission Engineering Lessons SMK Negeri 1 Percut Sei Tuan. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 3(4) : 2084-2096.
- Mudarya, I,N. 2019. Kuantitas Dan Kualitas: Era Baru Pendidikan Indonesia. *Jurnal Pendidikan*, 6(3) : 1-11.
- Nurrita, T. (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. *Misykat: Jurnal Ilmu-ilmu Al-qur'an Hadis, Syariah dan Tarbiyah*, 3(1) : 171-187.
- Priatna, T. (2019). *Disrupsi Pengembangan Sumber Daya Manusia Dunia Pendidikan di Era Revolusi Industri 4.0*. Bandung : UIN Sunan Gunung Djati.
- Rahmatullah.,& Inanna, dan Ampa, A,T. 2020. Media Pembelajaran Audio Visual Berbasis Aplikasi Canva. *Jurnal Pendidikan Ekonomi Undiksha*, 12 (2), 317-327.
- Soh, T.M.T., Arsad, N, M. & Osman, K. (2010). The Relationship of 21st Century Skills on Students' Attitude and Perception towards Physics. *Procedia Social and Behavioral Sciences*, 7(C) : 546–554.
- Surjono, H.D. (2017). *Multimedia Pembelajaran Interaktif*. Yogyakarta : UNYPress