

## Enhancing Physics Learning in Sekolah Indonesia Kuala Lumpur (SIKL) by Utilizing Artificial Intelligence

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### Abstract

*The surge in digital learning technology, particularly Artificial Intelligence (AI), has reshaped education. This community service initiative at Sekolah Indonesia Kuala Lumpur in Malaysia targets AI training to innovate physics education. The multifaceted approach encompasses preparation, implementation, and evaluation stages, employing methods like Focus Group Discussions, training sessions, and mentoring. AI plays a pivotal role in assisting students with assignments, analyzing physics problems, and creating presentation media for school tasks, utilizing applications such as Canva+ChatGPT and Google Slides+ChatGPT. Training outcomes at Sekolah Indonesia Kuala Lumpur showcase participants' proficiency in AI-driven presentation media, achieving an impressive average score of 84.67. Among 27 participants, only one fell short of the 75-point passing criteria. To maximize AI's role in physics learning, ongoing implementation and support are crucial in subsequent activities.*

**Keywords:** *artificial intelligence; canva; chat GPT; physics problems; physics learning; presentation media*

### Introduction

The Indonesian School Kuala Lumpur (SIKL) is an official educational establishment catering to elementary (SD), junior high (SMP), and high school (SMA) levels. It operates under the supervision of the Embassy of the Republic of Indonesia (KBRI) in Malaysia.

Sekolah Indonesia Kuala Lumpur (SIKL) has embraced the "Kurikulum Merdeka", making learning project-oriented and frequently culminating in presentations. Thanks to technological advancements, particularly in AI, students now enjoy greater freedom and opportunities to delve into their educational experiences. Nevertheless, it's crucial to recognize that students may not have complete mastery of AI technologies, particularly in the realm of physics education.

The use of AI (Artificial Intelligence) is important because AI can provide various benefits that support student performance in learning physics. Physics learning at SIKL focuses on understanding concepts and the ability to solve physics problems. Various efforts can be implemented to improve the quality of physics learning, especially by using developments in digital technology such as simulating the use of PhET simulation (Istikomah et al., 2023). The development of AI as it is currently widely used, namely ChatGPT, has an impact on physics learning at SIKL. However, students do not yet have the skills to analyze and validate the answers given by AI. According to a survey conducted among 59 students in grades X and XI at SIKL, the findings reveal that a significant majority, 94.9%, are already acquainted with AI, indicating a familiarity with the concept. Moreover, 74.6% of students have integrated AI into their daily lives. ChatGPT emerges as the predominant AI platform, being used by 86.4% of respondents, while fewer than 15% utilize other platforms such as Google Cloud AI Platform, Phision, Wolfram Alpha, DALL-E, etc.

The incorporation of AI in education is not yet at an optimal level, as only 10.2% of students always employ AI in their learning activities, 23.7% use it frequently, 37.3% rarely use it, and 28.8% never incorporate AI in their learning. In the context of physics education, only 3.4% of students always use AI, 15.3% use it frequently, 39% use it rarely, and 42.4% never integrate AI into their physics learning.

The use of AI technology in physics learning has been carried out at SMKN 1 Rajadesa Ciamis, West Java for Newton's Law material using Google Assistant (Nurahman & Pribadi, 2022). A study carried out by

Galindo-Domínguez et al (2024) involving 445 educators spanning primary, secondary, and higher education levels indicates that merely 25% of these teachers incorporate AI in their teaching. The performance of ChatGPT in answering physics problems was researched and the results showed that the performance of ChatGPT 3.5 could match the performance of a student who had taken one semester of physics at a university, while the performance of ChatGPT4 approached the point that it could not be differentiated from the performance of an expert physicist in introductory mechanics topics (West, 2023). Thus it can be concluded that using ChatGPT can help in learning physics.

Similar research was also conducted to test the performance of ChatGPT 4 in solving Force Concept Inventory (FCI) questions accurately (Kieser et al., 2023). Considering the potential use of AI in education, especially physics learning, it is necessary to provide training on the use of AI for school students. With this training, the role of AI can be optimized in physics learning as an innovation in physics learning.

## **Method**

This community service uses a service-learning method which aims to improve the quality of physics learning through optimizing the use of AI. The stages of the community service include preparation, implementation, and evaluation. The preparation stage begins with conducting a needs analysis, coordinating with relevant stakeholders, activity planning, and training material development. Needs analysis was carried out using a survey method of 59 grade 10 and grade 11 high school students, literature review, and focus group discussions with assisted subjects. Coordination with stakeholders involves the Head of the Faculty of Science and Technology at UIN Walisongo Semarang, lecturer in physics and physics education, and collaborator from the Sekolah Indonesia Kuala Lumpur. The implementation of community service activities consists of two stages: training and mentoring.

Training is provided to 11th-grade students at the Sekolah Indonesia Kuala Lumpur. The training is followed by mentoring to ensure that the final product of the training is presentation materials with AI technology. The evaluation is carried out based on the analysis of the products created by the training participants, namely, presentation materials with AI technology.

The data collection techniques employed in this community service project include assignments and questionnaires. Data collection instruments encompass student understanding questionnaires related to AI technology, AI presentation media analysis sheets, and activity documentation.

The AI presentation media analysis sheet is utilized to assess the outcomes of the media created by the participants through the assigned tasks. The analysis of presentation media comprises three aspects: appearance, conceptual accuracy, and AI usage. The evaluation criteria can be found in Table 1.

**Tabel 1.**

*Evaluation Aspects of AI Presentation Media*

No	Aspect	Assessment Indicators
1	Appearance	Visually appealing
		Utilizing various representations (images, mathematical, and verbal)
		Layout appropriateness
		Font type and size suitability
2	conceptual accuracy	Conceptual accuracy
		Content presented is easy to understand
		Images and illustrations serve to explain the content
		Content presented is contextual
3	AI Usage	Using the trained media (Google Slides + Chat GPT and Canva + Chat GPT)
		Taking notes
		solving physics problems

The assessment is done using a scale of 1-100 in accordance with the scoring guidelines. The defined passing criterion is 75. Participants

who pass are then categorized into four assessment categories: very good, good, fair, and very poor. The categorization is based on the normal distribution theory as shown in Table 2.

**Tabel 2.**

*Criteria for Assessing the Ability to Create Presentation Media with AI*

No	Aspect	Assessment Indicators
1	$93,75 \leq x \leq 100$	Very Good
2	$87,50 \leq x < 93,75$	Good
3	$81,25 \leq x < 87,50$	Satisfactory
4	$75 \leq x < 81,25$	Poor

The student response questionnaire regarding their understanding of AI is designed using a Likert scale from 1-4. The available responses are shown in Table 3.

**Tabel 3.**

*Criteria for Student Response Statements*

No	Criteria	Score
1	Strongly Agree	4
2	Agree	3
3	Disagree	2
4	Strongly Disagree	1

Student responses were obtained by distributing a questionnaire related to the use of AI in physics learning and the ability to create presentation media after the training. The statement items can be found in Table 4.

*Tabel 4. Criteria for Student Response Statements*

No	Evaluation Aspect	Statement Items
1	AI Role	AI helps in completing school assignments
		AI assists in analyzing solutions to physics problems
		AI aids in creating presentation media
2	Presentation Media	Proficiency in creating presentation media

Ability to create appealing presentation media
Capability to add animations to presentation media

Student responses using positive statements are then processed to determine the overall average. The average responses of students regarding the Use of AI in Physics Learning and the Ability to Create Presentation Media after the training are then categorized based on the normal distribution theory, as shown in Table 5.

**Tabel 5.**

*Criteria for Student Responses*

No	Range	Category
1	$x \geq 3,25$	Very Good
2	$2,50 \leq x < 3,25$	Good
3	$1,75 \leq x < 2,50$	Poor
4	$x < 1,75$	Very Poor

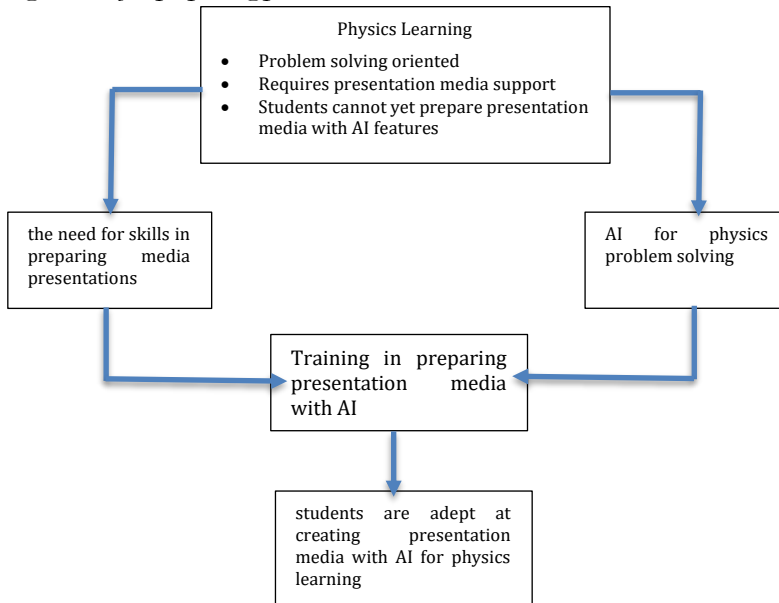
## Result

94.9% of students at SIKL are familiar with AI. ChatGPT is the majority of types of AI used in everyday life by students. Almost all subjects, including physics, require students to solve problems and present them in presentations. So the ability to prepare presentation media is very important for students to train. This community service activity seeks to provide students with skills in compiling presentation media by optimizing AI features for solving physics problems. Figure 1 shows the condition of students at SIKL before and after training.

The activity began by carrying out an FGD with related stakeholders. The FGD involved the Faculty of Science and Technology and the Kuala Lumpur Indonesian School. FGDs were held over two meetings to develop a training program. The training was held for one day on 15 August 2023. After the training continued with assistance in preparing media presentations with AI and solving physics problems with AI on 16-21 August 2023. This mentoring process was carried out intensively through WA groups and meet/zoom meetings.

**Figure 1.**

*training scheme for preparing presentation media with AI*



AI training was carried out at the Kuala Lumpur Indonesian School, which was attended by 21 class XI high school students. This training focuses on using AI to help students complete school assignments. The training material provided is with themes “Introduction to creating presentation materials with AI for school assignments” and “The use of AI in high school-level physics education”. The training is carried out in one day followed by assistance in preparing presentation media. Figure 1 is documentation of training activities for preparing presentation media with AI at SIKL.

**Figure 2.**

*Documentation of activities*



The international collaborative community service project has produced a product in the form of presentation materials created with the assistance of AI. The average score for the ability to compose presentation media with AI is 84.67, categorized as satisfactory. Meanwhile, the one who did not pass received a score of 74.72. Table 6 provides a visual representation of the category attainment based on the categorization criteria after achieving the minimum requirements.

**Tabel 6.**

*Criteria for Students' Ability to Create Presentation Media with AI*

No	Description	Quantity
1	Very Good	0
2	Good	7
3	Satisfactory	11
4	Poor	2
5	Not Complete	1
Total Number		21

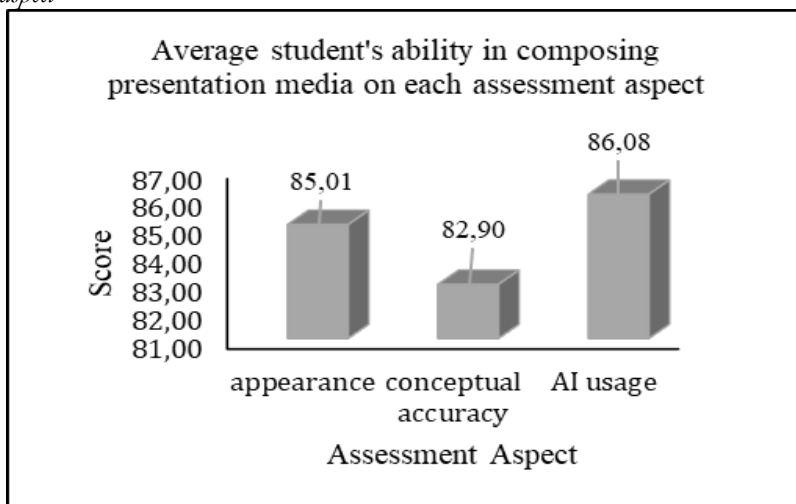
Based on Table 6, it can be observed that the achievement of students who fall into the "good" category is seven, "satisfactory" category is eleven, while two students are in the "poor" category. The



results of students' abilities for each assessment aspect, namely appearance, conceptual accuracy, and AI usage, can be seen in Figure 2.

**Figure 3.**

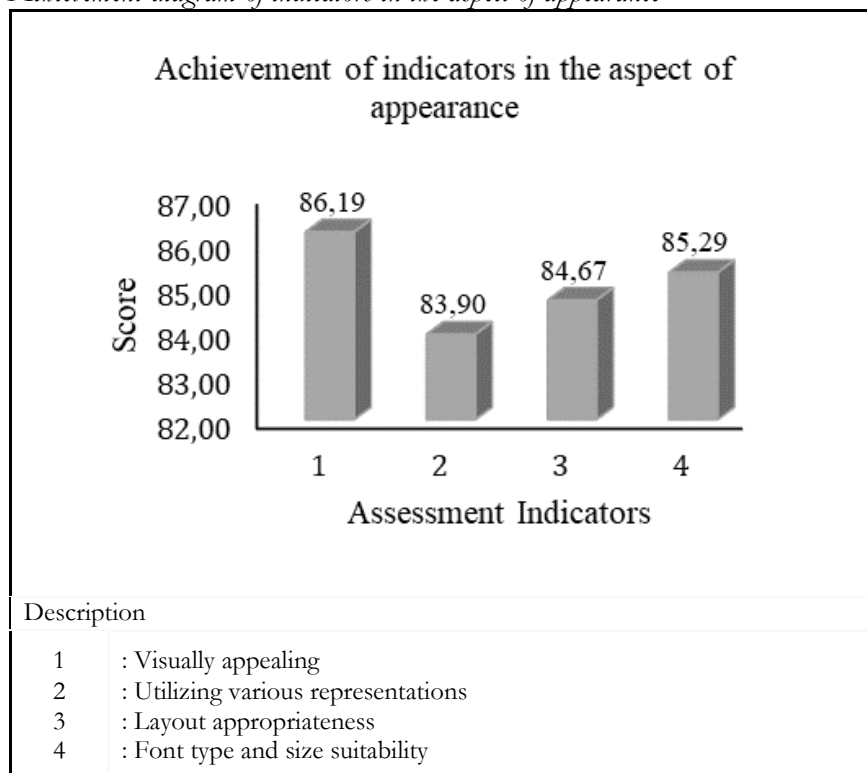
*Diagram of average student's ability in composing presentation media on each assessment aspect*



Based on the diagram in Figure 2, it is known that the lowest average ability to compose AI-assisted presentation media is in the conceptual accuracy aspect with a score of 82.90, followed by the appearance aspect with a score of 85.01, and AI usage with a score of 86.08. According to the assessment criteria, these three aspects are categorized as "satisfactory." The analysis of each aspect can be seen in Figures 3-5.

**Figure 4.**

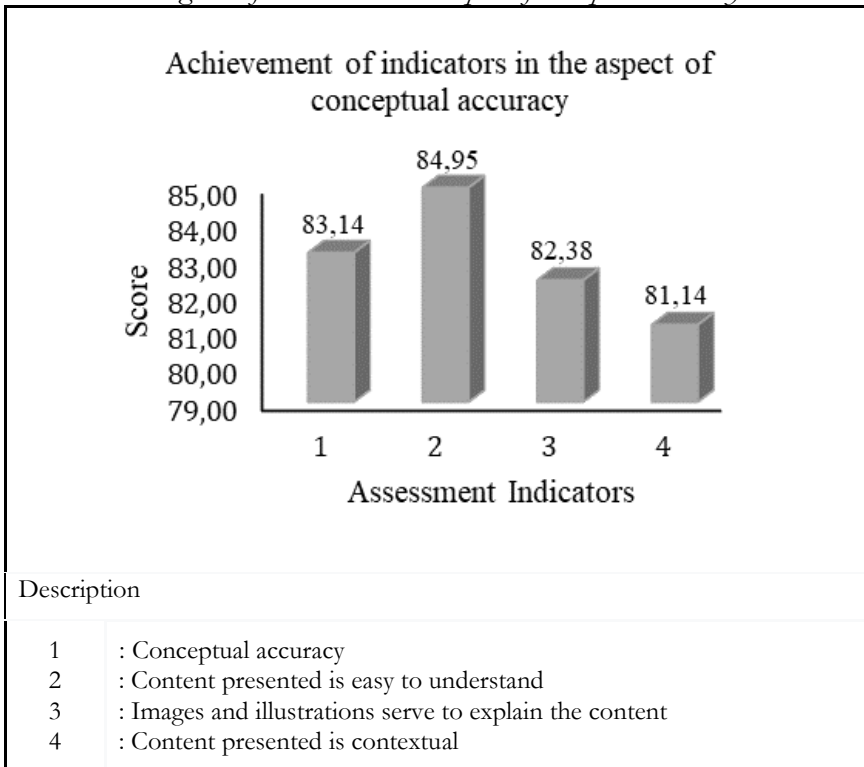
*Achievement diagram of indicators in the aspect of appearance*



Based on Figure 3, the highest achievement in the ability to create presentation media is in the aspect of appearance, with the indicator "visually appealing" scoring 86.19, followed by "font type and size suitability" with a score of 85.29, "layout appropriateness" with a score of 84.67, and the lowest score is for "utilizing various representations" with a score of 83.90. The lowest score for utilizing various representations is due to four participants who did not maximize the use of representations in their created presentation media. Most of them only used image and verbal representations without incorporating mathematical representations.

**Figure 5.**

*Achievement diagram of indicators in the aspect of conceptual accuracy*



Based on Figure 4, students' ability to create presentation media in terms of conceptual accuracy is highest for the indicator "content presented is easy to understand" with a score of 84.95, followed by "conceptual accuracy" with a score of 83.24. It is followed by the indicator "images and illustrations serve to explain the content" with a score of 82.38, and the lowest is for "content presented is contextual" with a score of 81.14. The lowest ability is in presenting contextual content, as some participants are not yet able to present the material in a contextual manner in alignment with everyday life. However, there are four students who excel in presenting material in a contextual manner. Meanwhile, the "image and illustration serve to explain the content" indicator is also low, as some of the images and illustrations provided

by students are not well-suited to the material. Some images serve as mere decorations but do not reinforce the content.

**Figure 6.**

*Achievement diagram of indicators in the aspect of AI usage*

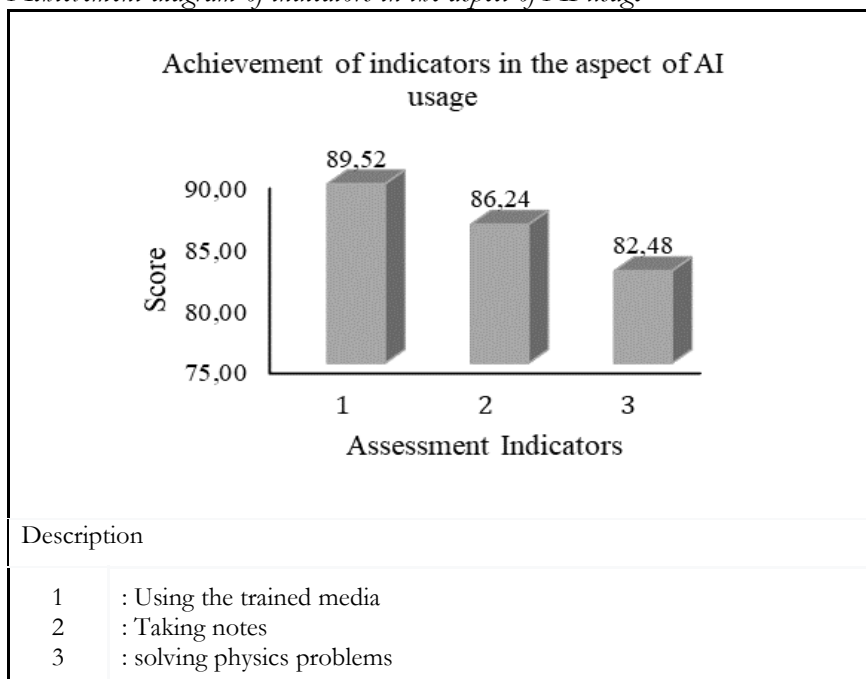


Figure 5 illustrates students' abilities in using AI. Students' ability to compose presentation media using AI in terms of AI usage showed that the highest score was achieved in the "using the trained media" indicator. All participants were able to create presentation media using the trained media. Additionally, participants were also able to write notes with the assistance of AI. The lowest ability was observed in "solving physics problems." The score was low in this indicator because two students did not provide any examples of solving physics problems in their presentation media.

After the AI training in physics education, which was realized by creating presentation media with the help of AI, students provided responses regarding the role of AI and presentation media. Overall, students' responses to the role of AI and presentation media obtained

an average score of 2.78, categorized as good. Students' responses to the role of AI in physics education received an average score of 2.92, also categorized as good. Meanwhile, the response to the ability to create presentation media received an average score of 2.63, categorized as good. Figure 6 shows the results of students' responses to the role of AI and the ability to create presentation media.

**Figure 7.**

*Student Responses to AI Training in Physics Education*

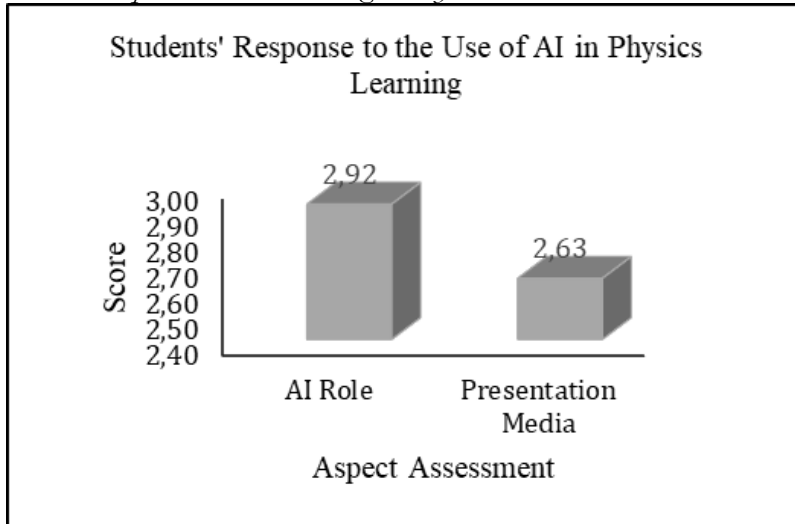
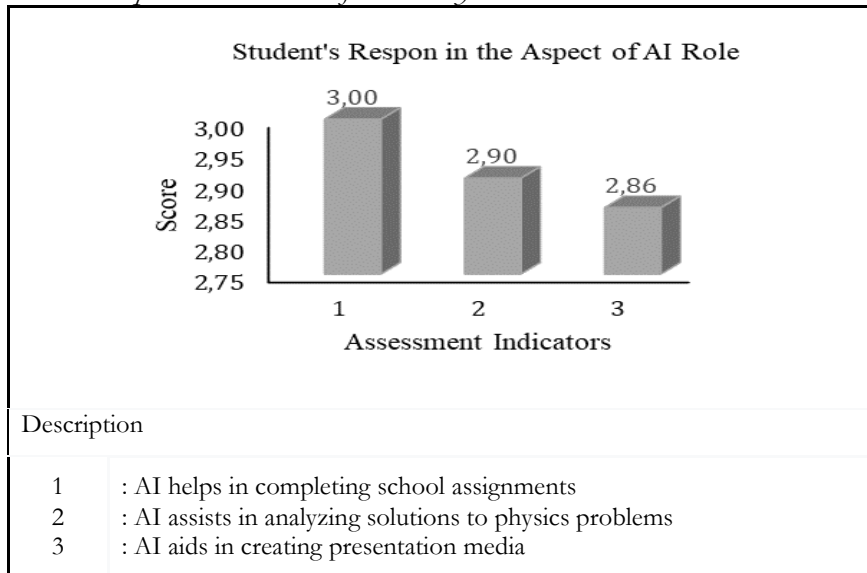


Figure 7 shows the student's response in the aspect of AI role. The role of AI in assisting students in completing school assignments received a response score of 3.00, categorized as good. AI also provides guidance for analyzing physics problems with a response score of 2.90, categorized as good. However, the role of AI in assisting with presentation media received a good response with a score of 2.86. Therefore, the lowest score is related to the role of AI in assisting with presentation media. This is because AI usage is still limited to creating notes in the free Canva account. AI cannot yet be used to create images in the Canva application. AI can be used to create images and text in Google Slides. Thus, the primary role of AI in physics education is to assist in completing school assignments and aiding in the analysis and problem-solving of physics questions.

**Figure 8.**

*Student Responses to the Role of AI in Physics Education*



**Figure 9.**

*Student Responses to the Ability to Create Presentation Media*

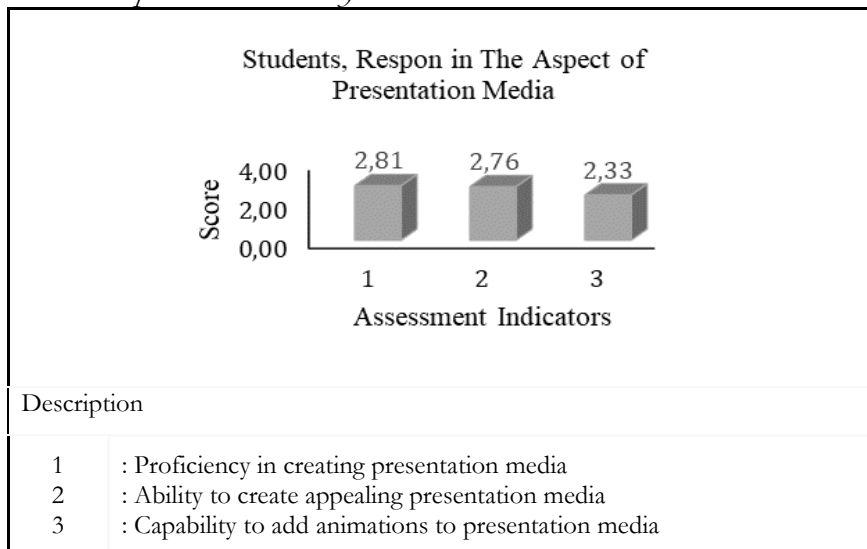


Figure 8 shows student response to the ability to create presentation media. Student responses to the ability to create presentation media

after the training were generally positive, with a score of 2.81 for the skill of creating media, 2.76 for the ability to create attractive presentation media, and 2.33, which is categorized as less satisfactory, for the ability to include animations/images in presentation media. The two platforms used in the training could not fully utilize AI for image creation (create image). The training also did not focus on creating animations or images. Consequently, student responses regarding the ability to include images and animations were less satisfactory. This can serve as a basis for future community service projects to optimize the ability to create engaging media animations.

### **Discussion**

AI plays a very important role in the world of education and learning. The use of AI makes it easier for teachers to prepare lessons and carry out physics lessons (Ukoh & Nicholas, 2022). One form of AI that is currently widely used is ChatGPT. GPT chat can be applied to physics learning as a physics learning innovation. The results of the AI training that has been carried out have had a positive impact on the use of ChatGPT in physics learning, especially in helping students prepare presentation media. The application of AI to physics learning has also been used in Vietnam high schools as an effort to improve student-centered physics learning (Bruneau et al., 2023).

AI plays a very important role in the world of education and learning. The use of AI makes it easier for teachers to prepare lessons and carry out physics lessons (Ukoh & Nicholas, 2022). Meanwhile, for students, AI acts as a learning resource. AI provides a wealth of information and extensive open materials for students. Skills in validating concepts and analyzing problems that occur in using AI.

One form of AI that is currently widely used is ChatGPT. GPT chat can be applied to physics learning as a physics learning innovation. The results of the AI training that has been carried out have had a positive impact on the use of ChatGPT in physics learning, especially in helping students prepare presentation media. The application of AI to

physics learning has also been used in Vietnam high schools as an effort to improve student-centered physics learning (Bruneau et al., 2023).

Student-centered learning requires students to have science process skills starting from observing, formulating hypotheses, collecting and analyzing data, testing hypotheses, representing data in graphic form, and communicating. So that students' activities in learning are mostly preparing the results of discoveries and recording investigations in the form of presentations. Preparing a presentation requires quite a lot of time. One of AI's roles in learning is to help prepare presentation media. AI technology can be applied to several presentation media. Some presentation media that can be built with AI technology include NB2slides (Zheng et al., 2022).

Presentation media commonly used today are Power Point, Canva, and Google Slides. AI can also be applied to presentation media, for example Canva+ChatGPT and Google Slides+ChatGPT. This training provides students with skills in preparing presentation media. This skill helps students prepare their school assignments and makes presentations more interesting. The quality of learning becomes better with scientific investigation and communication activities. The presentation of AI-assisted presentation media has an impact on improving lecturers' skills in presenting presentations and improving the quality of the learning process in class (Olatunde-Aiyedun & Hamma, 2023).

In this way, AI plays a role in physics learning through completing school assignment presentation material. Through this training activity, it is hoped that students will have the skills to use ChatGPT wisely and optimally in fulfilling school assignments. Further use of AI can be explored more widely, especially in fulfilling school assignments.

### **Conclusion and Suggestion**

Community service initiatives are implemented effectively, in the form of AI training as an innovative approach to improving the quality of physics learning at the Kuala Lumpur Indonesian School. The



specific focus is providing training in creating AI-assisted presentation media. The role of AI in physics education includes helping students complete school assignments, helping analyze physics problems, and facilitating the creation of presentation media for academic assignments. Applications used for presentation media include Canva + Chat GPT and Google Slides + Chat GPT. Training participants at the Kuala Lumpur Indonesian School have the ability to produce presentation media using AI with an average score of 84.67. Among the 21 participants, only one participant failed to meet the minimum passing criteria set at 75. All students showed increased ability to use AI for physics learning. Students were able to create presentation media using Canva+ChatGPT and Google Slides+ChatGPT, from those who had never previously known this combination at all. This training has the potential to be expanded further to increase the use of AI in physics education, especially by exploring alternative types of AI besides Chat GPT.

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