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Analysis of Student Needs for Digital-Based Learning Media on Thermodynamic Material for High School Students at Sangkhom Islam Wittaya School Thailand

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ABSTRACT

This study aims to analyse students' needs for digital-based learning media on thermodynamics in Mathayom 5/4 (Grade 11) class at Sangkhom Islam Wittaya School, Thailand. This research uses a qualitative descriptive method, with a sample of 25 students. Data were collected through interviews, observations, and questionnaires. The results of the questionnaire data were then processed and made into percentages in the form of tables and graphs. Based on the results of the questionnaire, 84% of students support the development of digital learning media, because they believe that this media will facilitate the understanding of thermodynamic concepts. Most students agree that digital learning media is needed to make learning more interesting and interactive. They also expect it to include educational games and sophisticated visualisations to improve their engagement and understanding of difficult material. Overall, this research shows that there is an urgent need to increase the use of digital learning media in physics learning, especially in thermodynamics, to create a more dynamic and effective learning environment.

KEYWORDS: Learning Media, Digital, Thermodynamics, Mathayom (high school)

1 INTRODUCTION

In today's digital era, the development of information technology has had a significant impact in various fields, including education, both in Indonesia and Thailand. Both countries are working to utilise digital technology in an effort to improve the quality of education in schools. In Indonesia, the government has encouraged the use of technology through the "Merdeka Belajar" programme which aims to integrate technology in the learning process (Fadilah et al., 2024). Meanwhile, Thailand is also investing in education digital infrastructure. Digital technology offers various innovations in learning methods that can be utilised to improve the quality of learning in the classroom (Ambarwati et al., 2021) . Digital learning media, such as interactive videos, simulations, and web-based learning applications, are one form of innovation that can help improve students' understanding of learning materials, especially in challenging subjects such as physics (Puspitasari, 2019).

At Mathayom Sangkhom Islam Wittaya School, the use of technology in physics learning is still not optimal. Teachers often dominate the class with the lecture method, without involving digital learning media that can increase student engagement. This results in students' lack of active participation in the learning process, which in turn makes it difficult for them to internalise complex physics concepts such as thermodynamics. Another challenge faced is the limited access to well-equipped physics laboratories as well as the lack of digital facilities such as computers and stable internet access. In fact, digital media has the potential to change classroom dynamics to be more interactive and support deeper understanding through simulations, virtual experiments, and relevant educational games. With technologies such as PhET Interactive Simulations, Labster, or OpenSource Physics, students can explore physics concepts in a more visual and applicable way. In addition, the use of digital whiteboards, projectors, and smartphones as learning aids can increase student engagement in understanding abstract concepts such as thermodynamics. Collaborative learning can also be applied by utilising Google Classroom, Kahoot, or Quizizz to increase student participation through interactive quizzes and technology-based group discussions. With more optimal integration of digital media, it is expected that physics learning can be more interesting, interactive, and help students understand the material better. Here is a picture of the classroom atmosphere during the learning process.

Figure 1. Learning process atmosphere based on observation at Sangkhom Islam wittaya school

From the figure above, learning is still dominated by the lecture method, with students sitting in a structured formation. This shows that the interaction between teachers and students is still limited to the direct delivery of material, without much involvement of digital learning media that can increase students' active participation. According to (Musfiqon, 2012), the right learning media is not only able to arouse student motivation, but also significantly improve concept understanding. With the presence of digital-based learning media, teachers can present physics content that is more dynamic and interesting. For example, through interactive learning videos, simulations of thermodynamic processes, or online quizzes that can help strengthen students' understanding more deeply. These technologies allow learning to happen not only inside the classroom, but also outside the classroom, providing flexibility for students to learn according to their own pace and learning style. This is especially important in subjects like physics, where many abstract concepts require time and deeper understanding.

Based on observations at Mathayom Sangkhom Islam Wittaya School, the teaching methods applied are still focused on lectures. Teachers tend to dominate the class by giving assignments without utilising supporting learning media. This can reduce students' learning motivation and cause them to have difficulty understanding the material (Suot et al., 2024).

Based on this background, this study aims to describe students' needs for digital-based learning media on thermodynamic material for high school students at sangkhom islam wittaya school thailand. This needs analysis is very important to find out the extent of students' readiness and their needs in using more interactive and digital learning media. As stated by (Yunus, 2019), understanding the needs of students will help in designing learning media that are not only relevant to the material, but also interesting and effective in achieving learning objectives. By knowing the needs of students and teachers, it is expected that appropriate and effective learning media can be developed to improve students' understanding and motivation to learn in physics subjects.

2 METHOD

This research is a descriptive qualitative approach (Noor, 2011) with the aim of describing the needs of students for digital-based learning media on thermodynamic material in class XI SMA Sangkhom Islam Wittaya School, Thailand. The subjects of this study were 25 students of Mathayom 5/4 class (equivalent to class XI SMA) in the odd semester of the 2024 academic year. The sample selection was carried out purposively, namely selecting students who participated in the English Programme to facilitate communication in the data collection process.

The data collection techniques were carried out by observation, interviews and distributing questionnaires to Mathayom (SMA) students through Google Form media. This student needs analysis questionnaire will be developed by focusing on student needs for learning media, especially digital-based learning media. The results of the questionnaire were then analysed using the percentage formula from (Sugiyono, 2013).

The main instrument used in this research is a questionnaire questionnaire consisting of 10 closed questions. These questions were designed to measure several indicators, namely: students' understanding of physics materials, students' learning motivation, the use of digital media in learning, the availability of supporting facilities and infrastructure, and the role of teachers in facilitating the use of digital media. Questionnaires were distributed to students through Google Form to facilitate the filling and data collection process. After the data was collected, the analysis was carried out using the percentage technique for each answer given by the respondents. The results of this percentage are then interpreted and presented in the form of tables and graphs to provide a clear picture of student needs for digital-based learning media on thermodynamic material.

This research was conducted in July 2024 in Tambon Sadao, Songkhla Province, Thailand. All data collected is qualitative data, in the form of words described in accordance with the phenomena observed, thus providing a comprehensive picture of the conditions and needs of students in physics learning.

3 RESULT AND DISCUSSION

This research was conducted by distributing online needs analysis questionnaires in the form of Google Forms to grade XI students at Sangkhom Islam Wittaya School, Thailand. The research subjects consisted of 25 students of Mathayom 5/4 class (equivalent to grade XI SMA) who were purposively selected, namely students who attended the English Programme to facilitate communication in data collection. The questionnaire includes 10 points questions that describe students' needs for digital learning media, as well as the learning activities they have done. The results of the questionnaire regarding students' needs for Digital Learning Media can be seen in Table 1.

Table 1. Percentage results of research instruments

No	Question	Option Answer	Percentage
1	Is physics a difficult subject?	Yes	92%
2	Is learning physics at school fun?	No	8%
3	Do you use your smartphone to study?	Yes	72%
4	Have you ever learnt thermodynamics using a smartphone/tablet?	No	28%
5	Do you like learning using a smartphone?	Yes	80%
6	Does your school have internet/Wi-Fi?	No	20%
7	Has the media you use helped to understand the Thermodynamics material?	Yes	68%
8	Do teachers at school use smartphones/tablets/computers in the learning process?	No	32%
9	Do teachers need to use digital learning media in the learning process?	Yes	92%
10	Do you agree if digital-based learning media is designed on thermodynamic	No	8%

material?

Based on the results of the questionnaire measuring students' needs for digital-based learning media on thermodynamic material, it can be concluded that 84% of students agree on the importance of developing digital learning media. This is because students feel that the media will help them understand the concepts of thermodynamics more easily. In addition, students are used to using smartphones in learning, and school facilities such as Wi-Fi or internet support the use of this technology.

However, from the results of the questionnaire relating to teaching methods, it appears that students have not been able to understand thermodynamic material in depth only through teacher explanation. This shows that the teacher is still at the centre of the learning process, where the lecture method is dominant. The learning media used is also considered less interesting by students, so they find it difficult to be fully involved in the learning process. In this case, teachers are expected to be more sensitive to the development of digital technology and are required to be more creative in creating learning media that are varied and able to attract student interest, especially in complex materials such as thermodynamics.

According to (Kartilawati & Warohmah, 2014), in carrying out their duties, teachers need to have various skills in accordance with the demands of their profession and must be able to adapt to technological advances and educational developments. Therefore, it is expected that teachers continue to innovate in developing their digital skills and updating teaching methods, especially in thermodynamic materials, to make learning more effective and interesting for students. The following is a graph showing the percentage of the results of questionnaires that have been filled in by students related to learning media.

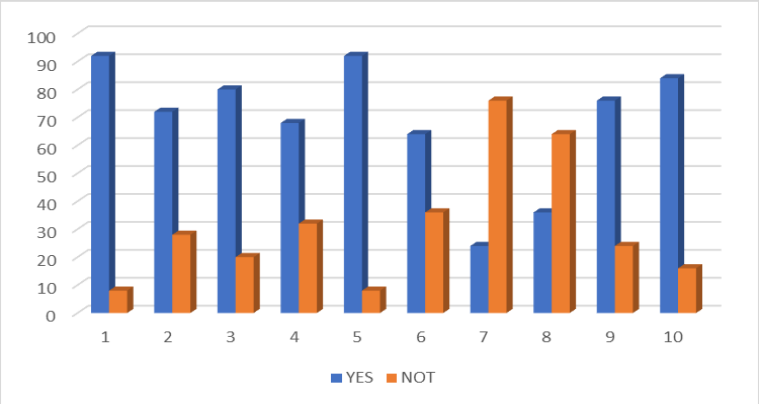

Figure 2. Graph of Questionnaire Percentage Results

In the percentage chart of the questionnaire above, the comparison between "yes" and "no" answers can be seen more clearly based on the data collected from the students. The percentage of "yes" answers is displayed using a blue bar graph, while the percentage of "no" answers is displayed with an orange bar graph. Based on the results of the questionnaire measuring students' needs for digital learning media in thermodynamics, many students consider physics to be a difficult subject. As many as 92% of students admitted to having difficulty in understanding physics material. However, 72% of students still consider learning physics at school fun, which indicates a positive aspect in the teaching methods used by teachers.

Based on points 9 and 10 in table 1, the percentage of students who need digital-based learning media is very significant, with a blue bar graph that is higher than the orange bar graph. This indicates that the majority of students feel the importance of using digital-based learning media in the learning process. The percentages reaching 76% and 84% reinforce the conclusion that digital-based learning media is needed to support students' learning process.

Digital-based learning media is expected to be a very effective tool in supporting the learning process in the era of ever-evolving technology, especially now that we have entered the 5.0 era. In this era, technology is not just a tool, but also an integrated part of human daily life, including in the education sector. The current generation of students, often referred to as "digital natives," are already very familiar with technology and can utilize it optimally in various aspects, including in learning. This further

emphasizes the importance of transforming learning media from conventional to digital media that is more interactive, innovative and flexible.

One of the main needs of students not only in Indonesia but countries like Thailand also need digital-based learning media is the desire to get a learning experience that is not monotonous and boring. Students tend to be more interested in interactive and entertaining media, such as educational games that insert arcade or puzzle elements in quizzes. This educational game not only serves as an entertainment tool, but also as a means to strengthen the understanding of the concepts being learnt. In addition, digital media is also expected to present a summary of material that is easily accessible, complete, and structured, so that students can learn independently without having to always depend on the teacher's explanation.

To make the material more engaging, digital learning media in the 5.0 era needs to be equipped with sophisticated visualizations, such as interactive animations, 3D graphic illustrations, and virtual simulations that allow students to learn concepts more deeply. These rich visualizations not only make students more interested and engaged in learning, but also help them understand abstract or complex concepts more easily. In terms of technology use, 80% of students admitted to using smartphones as learning aids. However, only 68% stated that they had used a smartphone or tablet to study thermodynamics. Although the level of smartphone usage is quite high, there is still room to expand the utilization of this technology in learning, especially more complex materials such as thermodynamics. Furthermore, 92% of students liked learning using smartphones, indicating that digital technology can increase students' interest and enthusiasm for learning.

However, access to technology infrastructure in schools is still limited, with only 64% of students reporting that their school has internet or Wi-Fi access. This suggests that technological facilities in schools need to be improved to support the wider use of digital learning media. In addition, the results of the questionnaire also show that the learning media used for thermodynamics material is not enough to help students understand the material. Only 24% of students felt that the existing media was helpful, while the other 76% felt that the media was less effective. This is compounded by the fact that 64% of students reported that their teachers rarely use smartphones, tablets or computers in the learning process, suggesting that teachers' utilization of technology is still very limited.

Most students, 76%, agreed that teachers need to use digital learning media in the learning process. In addition, 84% of students agreed that digital learning media for thermodynamics should be designed, indicating that many students feel digital media can be an effective solution in understanding this complex material. Overall, this data shows that although students have an interest and habit in using technology for learning, there is still an urgent need to improve the quality of learning media and technology infrastructure in schools to make learning thermodynamics more effective and engaging.

In addition to describing students' preferences for learning media, the questionnaire results also provide an overview of the availability and quality of facilities and infrastructure that support physics learning at school. One of the important indicators measured is access to digital devices such as computers, tablets, or smartphones, as well as the availability of an adequate internet network. Based on the findings in the field, the availability of electronic devices at Sangkhom Islam Wittaya School, such as LCD projectors, computers, and other digital learning media, is not evenly distributed in all classes. Only a small number of classes are equipped with these facilities, while most others still rely on conventional teaching methods without the support of interactive media. This inequality hinders the comprehensive use of technology in the learning process, especially for subjects that require visualization of complex concepts such as physics.

Thus, although students show high interest in the use of digital-based learning media, the absence of adequate facilities and infrastructure, such as stable internet access and electronic devices available in all classrooms, is a major obstacle in the implementation of interactive and technology-based learning media. These limitations not only reduce the effectiveness of learning, but also restrict teachers in optimizing modern learning approaches that are more dynamic and in line with the needs of students in the digital era. Therefore, improving technology facilities in schools, both in the form of hardware such as LCDs and

computers as well as supporting infrastructure such as internet networks, is crucial to creating a more inclusive and interactive learning environment.

4 CONCLUSION

Based on observations, interviews, and questionnaires conducted at Mathayom Sangkhom Islam Wittaya School, Thailand, it can be concluded that students really need digital learning media in learning thermodynamic materials. This is reinforced by the survey results which show that 84% of students believe that the development of digital learning media will help them understand the concepts of thermodynamics better. Students are used to using smartphones in learning, and school facilities such as the internet support the use of digital media. Most students also expressed their interest in interactive learning media, such as educational games and interesting visualisations, to make learning more fun and effective. They expect the media to help them learn independently with a complete summary of the material, practice questions with discussion, and evaluation to measure their understanding. This shows that the use of digital learning media can create a more dynamic and interesting learning environment.

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