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HYPERMEDIA-INTEGRATED PRINT TEXTBOOKS: BRIDGING THE TRADITIONAL AND DIGITAL LEARNING GAP

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ABSTRACT
Digital learning offers flexibility to its users, but its dependence on internet access is a barrier, especially in remote areas that still lack internet facilities. This research aims to identify student learning problems and their causes, as well as identify alternative solutions that can be used to overcome student learning problems. This research is a descriptive study using observation, interview and questionnaire methods. The main problems found were limited practicum facilities and limited textbooks. The analysis shows that there are studies on digital learning and textbooks, but few studies discuss the integration of hypermedia in printed textbooks as an alternative. This research offers an innovation in the form of a printed textbook model integrated with hypermedia that presents interactive elements such as videos, animations, simulations and digital links that can be accessed when students are within the reach of the internet. The printed textbook model integrated with hypermedia is expected to enrich students' learning experience. The conclusion of this research is that the incorporation of hypermedia in printed textbooks can be an effective alternative to bridge between traditional textbook-based learning and digital technology-based learning, and opens up new potential in the development of interactive learning materials in the future.

Keywords: *Printed textbooks, hypermedia, technology integration.*

INTRODUCTION
Along with the rapid development of information and communication technology (ICT), education has also undergone significant changes, with the increasing use of digital technology in the learning process. Technology-based learning, such as the use of e-learning and other online platforms, provides greater flexibility for students to access learning materials anytime and anywhere (Jarukasetwit, 2024). However, despite the many advantages of digital learning, there are also significant challenges, particularly related to the dependence on limited internet access in some areas (Mhlongo et al., 2023). In Indonesia, for example, while large cities have relatively good digital infrastructure, many remote areas still face difficulties in accessing internet facilities, hindering the effectiveness of digital-based learning (Febrianto et al., 2020; Indrawati et al., 2020). This has created a gap between traditional and digital learning that needs to be addressed promptly.

Printed textbooks, which have long been a primary tool in the educational process, are still widely used in various educational institutions in Indonesia. Although seemingly simple, printed textbooks play a crucial role in delivering learning materials in a structured and systematic manner (Červenková et al., 2023; Pan & Chen, 2020). Printed textbooks serve as the main reference for students, especially in areas where internet access or other digital technologies are difficult to obtain (Al Masuudi et al., 2024).

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Printed textbooks are considered an effective learning resource because they are easily accessible and do not depend on an internet connection. However, with the advancement of technology, printed textbooks are beginning to face significant challenges in terms of their ability to present more interactive and in-depth content (Alenezi et al., 2023). Unlike digital-based learning, which offers interactivity through videos, animations, and other multimedia elements, printed textbooks are still limited to presenting material in the form of text and static images.

Vocational High Schools/Sekolah Menengah Kejuruan (SMK), which aim to prepare students with practical skills in specific fields, increasingly require more dynamic and interactive learning media. SMKs require students not only to master theory but also to possess practical skills that can be applied in the workforce. Therefore, the instructional materials used in SMKs must support both of these aspects. Learning that integrates theory and practice provides students with the opportunity to develop more holistic and applicable skills.

Although printed textbooks are still widely used as a primary source in education, especially in SMKs, learning that relies on printed textbooks often faces limitations in terms of presenting interactive and in-depth content (Reinhold et al., 2020). Printed textbooks typically only present information in the form of text and images, which limits how students can truly understand and master the material effectively. Students, particularly in SMKs, need learning that combines theory with practice, where they can learn through direct experience and interaction with more dynamic teaching materials (Hulaikah et al., 2020).

Digital technology has great potential to enhance the learning experience (Wekerle et al., 2022), but the dependency on internet access remains a major constraint, especially in remote areas that are hard to reach by digital infrastructure (Haleem et al., 2022; Timotheou et al., 2023). Digital learning requires stable access to devices and internet connections, which are not always available in all regions. Therefore, solutions that combine the strengths of printed textbooks with the interactive elements of digital technology, without requiring continuous internet access, are highly relevant.

This research will identify students' learning problems and their causes, as well as examine alternative solutions that can be used to address these learning issues. The aim of this study is to contribute to the development of more inclusive learning media that align with the educational conditions in Indonesia, especially in areas still facing technological access limitations.

METHOD

This study uses a descriptive approach with the aim of exploring, analyzing, and providing an overview of the issues faced by students in the learning process, as well as offering innovative solutions as alternative ways to address students' learning problems. The descriptive approach was chosen because the purpose of this study is to gain a better understanding of existing issues without conducting experiments or manipulating variables. The methods used in this research are observation, interviews, and questionnaires, each of which plays a role in collecting the necessary data. This study was conducted at SMK Negeri 2 Gunungsitoli, specifically with 30 students from the 11th grade of the Motorcycle Engineering program in the subject of Motorcycle Electrical Maintenance/Pemeliharaan Kelistrikan Sepeda Motor (PKSM).

RESULTS AND DISCUSSION

A. Observation Result

The main finding from the observation was the limited number of practical tools available at the school. In the PKSM class, there are only two units of practical equipment for motorcycle electrical maintenance. This causes long queues among students during the practical sessions. As a result, many students do not have the opportunity to fully engage in practical work. Most students can only watch the teacher's demonstration or follow the provided steps without being directly involved in the hands-on practice that would deepen their understanding.

The observation also showed that the printed textbook used in the PKSM class is still limited to static text and images. This textbook presents basic information about motorcycle electrical systems but does not provide interactive elements that could help students understand more complex technical concepts. The teacher uses the textbook as the main reference for explanations, but students often struggle to connect theory with actual practice. This leads to students feeling less interested and less engaged in the learning process.

Furthermore, it was found that the learning media used at SMK Negeri 2 Gunungsitoli is very limited. The available resources only include printed textbooks and a few practical tools that are limited in number. The teacher also does not use technologies such as videos or animations to clarify concepts that are harder for students to understand. On some occasions, the teacher uses live demonstrations to explain how the motorcycle electrical system works, but these demonstrations are limited to the practice that can only be conducted with the available tools. Students do not have access to animations or videos that could visually and interactively depict the workings of the electrical system.

Based on the observation of student interactions during learning, it was found that the level of student engagement in the learning process is relatively low. Many students appeared less active in discussions or in asking the teacher questions about the material being taught. This is suspected to be related to the limitations of the media used in teaching, which is not engaging or interactive enough for the students. Most students seemed more interested in following the practical instructions than in truly understanding the underlying theory behind the procedures.

One striking issue is the low motivation among students to follow the lessons. Many students do not show high interest or enthusiasm in attending the lessons, whether in theory or practice sessions. In informal interviews with several students, they expressed that they had difficulty understanding the material provided only through printed textbooks. Some students revealed that they would prefer to watch simulations or videos that could clarify how the motorcycle electrical system works. However, due to the limitations of facilities and media, this cannot be implemented in everyday learning.

B. Interviews Result

The interviews conducted with teachers and students at SMK Negeri 2 Gunungsitoli aimed to explore further the challenges faced in the learning process and to identify potential solutions that could address these issues. Based on the interviews with

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both groups of informants, several key findings were obtained, providing deeper insights into the learning problems encountered by students and teachers.

1. Teacher Interview

Interviews with the PKSM subject teacher revealed that they face several challenges in delivering the material to students. One of the biggest obstacles is the limited number of practical tools available for student use. According to the teacher, there are only two sets of practical equipment for motorcycle electrical systems, which forces students to wait their turn to conduct practical work, thus reducing the effectiveness of learning. The teacher also mentioned that the textbook used in the PKSM class is still very limited, especially in terms of interactive content. The textbook only provides text and images, which are considered insufficient in helping students truly understand the complex motorcycle electrical system.

2. Student Interview

Interviews with students revealed several issues related to their learning motivation and engagement in the PKSM lessons. Many students expressed difficulty in understanding the material taught through the printed textbook, due to the absence of visual or interactive elements that could clarify the concepts they were learning. Students stated that they were more interested in learning methods that involved visualization, such as tutorial videos or animations, which could explain how the motorcycle electrical system works in a clearer and more in-depth manner.

Students also mentioned that they felt less engaged in the learning process due to the lack of variation in the media used by the teacher. They felt that lessons often became monotonous, with only the teacher's explanations being followed. This led to a lack of motivation to learn and frequent difficulty in grasping technical concepts. Students found it easier to understand the material when they could see more concrete and interactive examples, such as videos or direct simulations of the electrical system.

Some students also mentioned that limited internet access at the school was a major issue preventing them from accessing additional online resources. Although they wanted to explore more information through the internet, they were often unable to do so because of the limited internet facilities available at the school.

C. Questionnaire Result

The questionnaire distributed to students aimed to collect quantitative data regarding students' perceptions of the learning media used, particularly the printed textbooks and other learning materials. Based on the results of the questionnaire completed by 30 students, the following are the key findings::

Table 1. Table of Results from Student Perception Questionnaire on Learning Media

Aspects Tested	Indicator	Findings	Total (%)
Use of Printed Textbooks	Interactivity of printed textbooks.	Most students feel that printed textbooks are not interactive enough, presenting material only in the form of text and images.	70%

	Depth of explanation of technical concepts.	Many students want multimedia elements in printed textbooks to better understand technical concepts.	63%
	Desire for multimedia elements (videos, animations, simulations).	Most students want multimedia elements in textbooks to aid in understanding the material.	63%
	Difficulty understanding motorcycle electrical concepts with printed textbooks.	Many students find it difficult to understand motorcycle electrical concepts using only printed textbooks.	57%
	Interest in interactive visualizations or demonstrations.	Most students are more interested in learning when the material is accompanied by visualizations or interactive demonstrations.	70%
Learning Motivation	Lack of motivation to learn with printed textbooks.	Students feel less motivated in learning with printed textbooks, especially due to the lack of variety in methods.	60%
	The influence of interactive media on learning motivation.	The use of interactive media such as videos and simulations significantly impacts the improvement of students' learning motivation.	77%
Limited Internet Access	Limited internet access for finding additional information.	Some students face limitations in accessing the internet to search for information related to learning materials.	43%
	Internet access at home and ability to use the internet.	Although there is internet access at home, most students feel unable to utilize it without guidance from teachers.	57%

Based on the results of observations, interviews, and questionnaires conducted at SMK Negeri 2 Gunungsitoli, there are several issues affecting the quality of learning in the subject of Motorcycle Electrical Maintenance/Pemeliharaan Kelistrikan Sepeda Motor (PKSM). The majority of students desire multimedia elements such as videos, animations, and simulations to facilitate their understanding of the material. In addition, limited internet access poses an additional challenge for students to access supplementary learning materials online. Based on these findings, this study proposes the development of a print textbook model integrated with hypermedia as an innovative solution to address these issues.

Hypermedia Integration in Printed Textbooks

Considering the existing limitations, both in terms of practical tools, learning media, student motivation, and internet access, this study offers an innovative solution in the form of developing printed textbooks integrated with hypermedia. Based on findings from observations, interviews, and questionnaires, the integration of hypermedia in printed textbooks can be an effective alternative to overcome the learning problems faced by students.

Textbooks are books used as standard sources of information for formal study of a subject and as instruments for teaching and learning. Textbooks are considered one of many resources that teachers can use in designing effective lessons. Textbooks, which are generally published in print form, may seem less relevant given the rapid advances in information and communication technology (ICT) in recent years. Nevertheless, the

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reality is that textbooks, despite their physical and printed form, remain a simple and effective tool that can be used in various contexts, at specific times, and in ways that have not yet been fully replaced by digital alternatives (Elias et al., 2012; Wang & Bai, 2016). Roberts et al., (2021) found that there is no difference in academic performance between using printed textbooks or e-books.

The use of high-quality textbooks is essential for effective pedagogy, as textbooks provide a clear framework, structure, and content, which are crucial for teaching basic concepts and maintaining educational consistency (Japelj Pavešić & Cankar, 2022; Khachaturyan & Ghalachyan, 2023). Oates & Mp, (2014) state that adopting a more systematic approach to textbook use, as observed in high-performing countries, has the potential to substantially improve educational outcomes in the UK. The problem-based learning model is an instructional learning model specifically designed to help students learn new information more effectively, with the aim of stimulating students' problem-solving abilities, increasing their motivation to learn, and deepening their understanding (Gijselaers, 1995). Textbooks have a significant influence on the teaching and learning process, but often fail to support deeper problem-solving Jäder et al., (2020). Various countries include problem-solving as part of their curriculum, but the majority of tasks provided can be completed by imitating examples or templates available in textbooks. In other words, textbooks emphasise procedural and rote learning rather than encouraging students to develop their own solutions.

Textbooks play a vital role in preparing a skilled and competent workforce. Textbooks, especially in vocational schools, must continue to evolve to meet the demands of the times and the needs of industry. Liu, (2024) highlights the importance of textbook reform in vocational education, such as the development of more flexible and practice-based textbooks, as well as the use of learning methods that are more adaptive to student needs. He also suggests that textbooks in vocational schools should not only focus on theory but also emphasise the practical application of knowledge to enhance the quality of training and students' job readiness. Research conducted by (Vaganova et al., 2020) shows that the use of multimedia in vocational education helps increase students' motivation to learn the material, improve their understanding, and enhance the effectiveness of learning. Multimedia enables teaching to be more dynamic and adaptable to individual students' needs, thereby increasing their engagement in the learning process.

Research by Ran & Jinglu, (2020) emphasizes that integrating multimedia features into digital textbooks can improve students' understanding and engagement. Several studies have integrated textbooks developed with various teaching media in the form of multimedia, such as the study by Nasrulloh et al. (2021), which developed an e-book in the epub 3.0 format that provides learning materials consisting of text, images, and videos accessible on various devices, but did not integrate interactivity to enhance engagement and learning effectiveness, thus limiting the potential optimization of the teaching and learning process in technology-based science education. Awaludin et al., (2020), developed a hypermedia-based e-book for integral calculus, and the findings of their research showed an improvement in learning outcomes for integral calculus, offering a more interactive learning experience, and facilitating the understanding of abstract concepts through multimedia visualization. Hypermedia is a technology that integrates hypertext and multimedia, allowing the presentation of learning materials in various ways and supporting non-linear navigation. Various studies have shown the positive impact of using hypermedia in the teaching and learning process, including

improved student understanding, problem-solving ability, scientific processing skills, and overall academic performance (Koliasa et al., 2021).

CONCLUSION

Based on the research conducted through observations, interviews, and questionnaires, it can be concluded that the limitations of practical facilities, limited learning media, and low student motivation and engagement are the main challenges in learning Motorcycle Electrical Maintenance/Pemeliharaan Kelistrikan Sepeda Motor (PKSM) at SMK Negeri 2 Gunungsitoli. The primary issue found is the reliance on printed textbooks that only present material in the form of text and images, without interactive elements that could facilitate students' understanding of technical concepts. Additionally, the limited practical tools and internet access problems also hinder the effectiveness of learning, making it difficult for students to master the practical skills needed in vocational fields.

As a solution, this study proposes the development of a print textbook integrated with hypermedia as a more interactive and flexible learning media. The hypermedia integrated into the print textbook can serve as a bridge between conventional and digital learning by utilizing technologies such as quick response (QR) codes, augmented reality (AR) markers, or short URLs that direct users to additional digital content. For example, a QR code embedded in the textbook page can be scanned using a smartphone to access explanatory videos, interactive simulations, or web-based exercises that enrich students' understanding of the written material. This approach allows students to continue benefiting from the advantages of printed textbooks—such as ease of use without relying on an internet connection—while also gaining access to dynamic multimedia content that is typically only available in digital formats.

The integration of multimedia elements, such as videos, animations, and simulations, is expected to increase student engagement, enrich the learning experience, and facilitate understanding of materials that are difficult to grasp using printed textbooks alone. This hypermedia-integrated textbook also allows students to access additional materials without fully relying on a stable internet connection. Therefore, this textbook model is expected to bridge the gap between traditional textbook-based learning and digital learning, as well as open new potential in developing more relevant and effective learning materials to improve the quality of education at vocational schools.

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