JPPIPA 10(11) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Electronic Teaching Materials to Improve Student Learning Effectiveness Automotive Vocational High School

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Received: February 29, 2024
Revised: August 24, 2024
Accepted: November 25, 2024
Published: November 30, 2024

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DOI: 10.29303/jppipa.v10i11.7338

Abstract: Electronic teaching materials are learning media that are made interactively with various materials, media such as audio, video and images. In secondary automotive vocational schools, the use of electronic teaching materials creates new chances to improve learning efficiency and equip students with marketable skills. This study aims to examine the effectiveness of electronic teaching materials in vocational high schools, compared to printed teaching materials. This research was studied using descriptive qualitative research, using literature study and field study methodologies. The questionnaire in this study consisted of ten questions to assess the feasibility of electronic teaching materials for use by students in vocational high schools. 60% of students stated that the use of electronic teaching materials in the process of learning activities at school is very feasible to use because it is easy to access.

Keywords: Electronic teaching materials; Improve; Learning

Introduction

The rapid advancement of communication and information Every element of life is often impacted by technology. People are being urged to be more productive and efficient in their everyday lives by the advancements in technology, education, and media that are made possible by smartphones, computers, and the internet (Setiyani et al., 2020). However, the question that arises is whether the transformation will bring better changes in the teaching and learning process carried out by teachers? (Rahman et al., 2020). In order for students to learn independently, it is necessary to provide facilities to help learn. These facilities can be in the form of teaching materials. Teaching materials are items, or things organized in a methodical way, that are utilized by educators and learners during the educational process. Teaching materials can be printed and non-printed (electronic) (Wijaya & Vidianti, 2019).

Electronic teaching materials are teaching materials that can be arranged interactively with various social media, such as pictures, diagrams, and simulations. It helps students to more easily understand abstract concepts. Electronic teaching materials are a collection of resources or lesson content bundled in interactive multimedia that is organized logically and methodically and shows the full picture of the competencies that students will master in learning activities (Wendo et al., 2022). Electronically published instructional materials are those that can be seen on computers or other digital devices and include text and graphics (Yulaika et al., 2020). The majority of the content of electronic teaching materials provides practical simulation and practical experience without the need for expensive physical resources. The latest developments in technology or curriculum changes with electronic bajar can be updated easily so that learning remains relevant. The use of various multimedia elements can increase the absorption of information and make learning materials more interesting for learning with varied learning styles.

The presence of electronic teaching materials is expected to make it easier for teachers and students to carry out learning activities. The packaging of this teaching material can function as a tool to facilitate the

How to Cite:
Firdaus, H., Syafrizal, & Nulhakim, L. (2024). Electronic Teaching Materials to Improve Student Learning Effectiveness Automotive Vocational High School. *Jurnal Penelitian Pendidikan IPA*, *10*(11), 9791–9798. https://doi.org/10.29303/jppipa.v10i11.7338

delivery of material that will be given by the teacher (Mansur et al., 2021). Along with the advancement of technology, the development of learning media is also so fast. Learning media can be in the form of multimedia, electronic and in the form of print media. Media that is often used for now is electronic media, this is due to its very practical use (Rahmadhani & Efronia, 2021). However, electronic teaching materials can reduce the social interaction between teachers and students in learning, the inability to discuss directly with instructors or classmates can reduce the collaborative aspect of learning. The use of electronic teaching materials requires good access to technology, including internet connections, hardware and software. Not all students have equal access, which can create gaps in accessibility.

Learning using electronic teaching materials cannot completely replace practical experience, which can limit the in-depth understanding of some concepts. In the absence of direct supervision in learning using electronic teaching materials, some students tend to be less motivated. Learning using electronic teaching materials requires independence and high self-discipline, students need to manage their own time without direct supervision from the teacher. The use of electronic teaching materials facilitates students in understanding learning materials with or without the presence of educators (Pratiwi & Listiadi, 2021). 80% of learning resources go to internet use and students need electronic teaching materials by 45%. The results of previous research show that it is necessary to develop teaching materials to be more futuristic or in accordance with current technological developments that are easily accessible and interesting (Lufthansa et al., 2022). Teachers who teach vocational topics have voiced a want to make electronic modules available as a learning tool. Electronic modules are beneficial for students who require learning resources other than textbooks to transfer content to vocational high school students because they enhance comprehension and learning efficiency at home and in the classroom (Holisoh et al., 2023).

New schools were soon established, and every region with regional autonomy authority had an open opportunity to establish vocational high schools (Suharno et al., 2020). Vocational High School (SMK) is one of the secondary education levels that prepares graduates to be ready for work (Insya & Sukaswanto, 2021). Vocational students have an edge in practical skills relevant to the world of work. Currently, Vocational High School education consists of several areas of expertise competencies, namely technology, business management, tourism, agriculture, shipping, hospitality, and so on (Firdaus & Anriani, 2022). One of the competency options in Vocational High Schools (SMK) is automotive light vehicle engineering competence, with the main objective being to equip students with knowledge, attitudes, behaviors and skills (Firdaus & Atikah, 2021). With internship experience and industry-focused learning approach, SMK students have a clearer perspective on the demands and expectations of the world of work. In light of this and the growing need for knowledge workers, there is a significant increase in the need for qualified recent graduates and other key human resources (Pang et al., 2019). Vocational students are not only trained in technical skills, but also empowered with soft skills such as teamwork, effective communication, and problem solving. These skills increase their adaptability in a variety of work environments. SMK often focuses on fields related to technology and industry. Therefore, SMK students have an advantage in adapting to technological changes as they are familiar with the latest developments in their field. This capability is especially important in an era where technology continues to evolve rapidly. Since vocational students are trained in areas such as information technology, manufacturing, and service, they have more career opportunities after graduation. This diversity of competencies allows them to choose a career path according to their individual interests and talents. However, some vocational students may face challenges in integrating theoretical understanding with practical skills. Sometimes, the curriculum may be too focused on practical training, so that understanding of related theories can be neglected. This can affect students' ability to deal with the demands of work that require an in-depth understanding of theoretical and applicative aspects. Learning aims to enable learners' ability to apply learned behaviors or skills to real-life situations or in the workplace (Okunlola, 2023).

Automotive majors in vocational education have received significant technical training in car maintenance and repair. Similar groundwork is used by those who are interested in global competence, who emphasize how "our learning environments, work, and societies are becoming increasingly global, interconnected, and interdependent," and who contend that "educators should develop global competencies in themselves and their students, and students should leave school armed with the attitudes, knowledge, and skills to work and live in a global society" (Auld & Morris, 2019). The purpose of automotive light vehicle engineering expertise competency is to prepare students to become mechanics who are able to manage businesses, especially in the field of automotive light vehicle workshops, and become mechanics who are proficient in maintenance and repair of motors, chassis, and power transfer systems (Firdaus et al., 2023). Their expertise involves an in-depth understanding of automotive systems, from engines to electrical and

mechanical systems. They can systematically analyze problems, identify causes, and design effective solutions. This capability is invaluable in the automotive industry which often requires a quick response to vehicle problems. The quality of SMK graduates is not only determined by the individual factors of the students themselves, but also greatly determined by external factors, one of which is educational competence that can prepare graduates in accordance with the demands of the world of work (Sugiarto et al., 2019). Various equipment including screens installed in laptop and desktop systems are used for the display process. It also aims to generate quantitative feedback, skill growth, competencies, and consistent ways to access expertise (Sattar et al., 2019). The efficient and fair use of information technology, both in terms of hardware and administration, is one of the key elements that is crucial to enhancing the efficacy of learning in this era of digitization. Learning activities, thus, can positively influence students' behavior, knowledge, and abilities (Sova et al., 2022).

In this study, researchers measured the extent to which electronic teaching materials have been effectively integrated in the automotive curriculum. How well the curriculum accommodates automotive students' needs in understanding the latest electronic and technological concepts. The extent to which the use of electronic teaching materials can increase the understanding of automotive students towards theoretical and practical aspects, so that automotive students and teachers are easy to access electronic teaching materials, as well as certain obstacles or obstacles that affect the availability of these teaching materials in various vocational high schools. Educators must be able to develop digital-based teaching materials anytime and anywhere in accordance with the growing Industrial Revolution era (Ceria et al., 2022). Learning to use laptops and mobile phones or gadgets is important in the post-pandemic period like now. This shift in the learning process requires the ability of teachers to present learning resources that are in accordance with technological devices. Some students find it difficult to carry printed books, especially if one day is more than two lessons. Unlike electronic teaching materials that can be opened with mobile phones, objects that are made light and easy to carry everywhere (Sriwahyuni et al., 2019). The key to the problem of learning using digital media is an understanding of the natural abilities (individuals) whose data are operated by computer programs (Shulga, 2023). One of the things that can be done is to present a teaching material in the form of an e-module (Istyadji, 2021). The main problem is the limited teaching materials as evidenced by the low student learning outcomes. Teachers only use student books as learning resources so that students' interest in learning is reduced (Nugrahaeni, 2022). In line with this statement, innovation is needed in electronic teaching materials, namely the absence of electronic teaching materials that can balance students' attitudes, knowledge and skills in the 4.0 era is an important foundation for the development of electronic teaching materials (Anita et al., 2022). Educated personnel who can master and adapt to the development of science and technology are absolutely necessary to reflect the lack of knowledge development of technological education content, including the use of electronic teaching materials (Amin et al., 2021).

Method

Qualitative descriptive research, which explains in fully the methodological approaches of literature reviews and field investigations to acquire research data, was used to analyze the challenges in this study. 50 grade 12 students studying automobile production at vocational high schools (SMK) are the participants in this study, which focuses on the requirement to develop a product—specifically, electronic teaching materials. An online survey via Google Form was given to SMKN 4 Serang City in January 2024 in order to get information about the use of electronic teaching resources created by researchers. The questionnaire consists of 10 questions to assess the feasibility of electronic teaching materials for use by students in vocational high schools, there are ten questions given to students as respondents: Is the material contained in learning electronic teaching materials easy to understand?; Is the material contained in the electronic teaching materials appropriate for students?; How do images look in electronic teaching materials?; Can teaching materials improve competence?; Are electronic teaching materials easy to use?; Can electronic teaching materials be used anytime and anywhere?; Is this electronic teaching material easy to use?; Are the images and displays in electronic teaching materials attractive and appropriate to the material?; How is the size, type, and color of letters in electronic teaching materials easy to read?; Is the layout of electronic teaching materials attractive?.

Research on how well students learn when using electronic teaching materials employs qualitative approaches based on post-positivist philosophy, which is a method used to study the natural state of objects rather than using experiments. In this method, researchers are used as primary instruments for gathering data, and data collection techniques are triangulated (combined), The process of analyzing data is more qualitative and inductive, and the findings of qualitative research prioritize significance above sweeping conclusions.

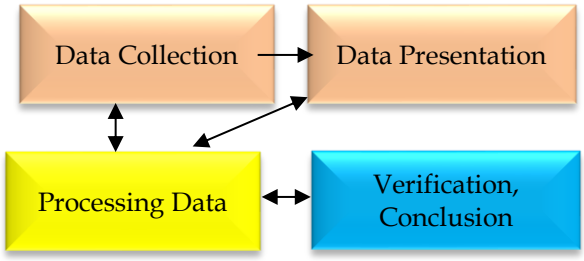

Figure 1. Research flow

Result and Discussion

Result

The students' responses to electronic teaching materials to improve the competence of automotive vocational high school students in chassis learning were collected through questionnaires using the Google Forms application, there were 10 statements with answer choice categories: Very inappropriate, Not Feasible, Decent Enough, Feasible, and Very Decent related to the use of electronic teaching materials to improve the competence of vocational students. The use of electronic teaching materials based on the results of a questionnaire conducted by 50 students revealed that the majority thought that electronic teaching materials were needed that were interesting and could improve student competence.

The results in the statement are related to whether the material in electronic teaching materials is easy to understand?. The response of this question is shown in Figure 2.

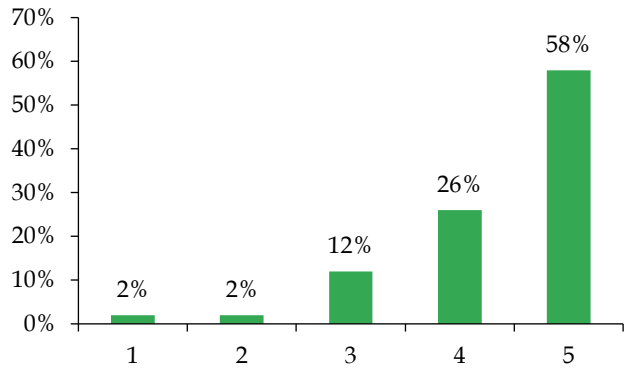

Figure 2. Response of the material contained in the electronic learning materials is easy to understand

This indicates that 58% of students said that it is simpler for them to grasp what they are studying because of the content in electronic teaching tools. Pupils who utilize electronic books learn at a higher emotional and psychomotor level. Electronic teaching resources can facilitate the incorporation of dynamic visuals and sound components, which helps pupils learn more easily (Riwu et al., 2019). Since usability is coupled with cognitive dimensions and a positive user experience linked to emotive factors, technology also implies strong user involvement (Quezada et al., 2021).

The results on the research statement given to 50 students related to the material contained in electronic teaching materials, suitable for students?. The response of this question is shown in Figure 3.

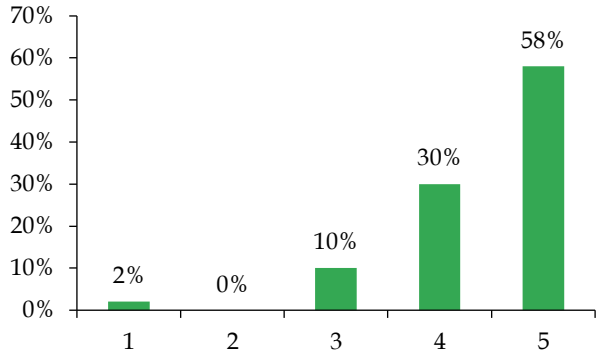

Figure 3. Response The material contained in electronic teaching materials, suitable for students

This means that, 30% of students state that electronic teaching materials contain descriptions of feasible theoretical and practical materials with core competencies and basic competencies that are in accordance with the vocational curriculum. Similarly, the development of information technology with the availability of material in appropriate teaching materials can also be felt by students, they will be easier to get information on a wide scale from various accurate sources (Afifulloh & Cahyanto, 2021).

The results in the statement related to electronic teaching materials are easy to use?. The response of this question is shown in Figure 4.

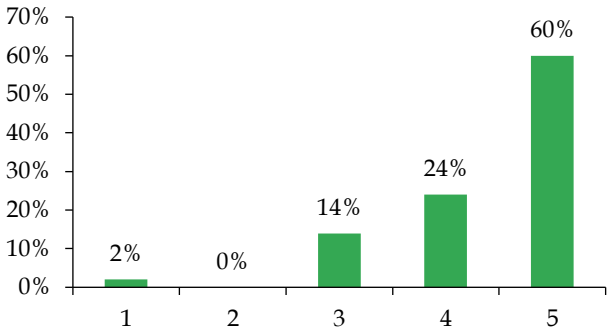

Figure 4. The response of this electronic teaching material is easy to use

This means that 60% of students state that the use of electronic teaching materials in the process of learning activities at school is very feasible because it is easy to

access and use. Electronic teaching materials make it easier for students to use by utilizing technology, so the cost is relatively cheap and can be used anywhere (Pratiwi & Listiadi, 2021).

The results of the statement related to whether electronic teaching materials can be used as a medium to improve student competence?. The response of this question is shown in Figure 5.

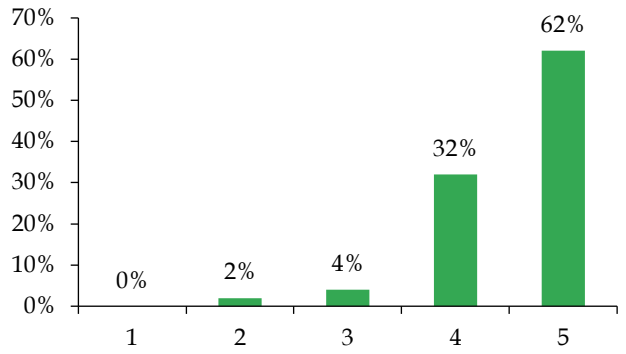

Figure 5. The response of electronic teaching materials can be used as a medium to improve student competence

This means that it shows that 62% of students stated that using electronic teaching materials in learning activities at SMK automotive expertise programs can improve student competence. By using electronic teaching materials students can learn actively, think critically, solve problems creatively and students can work in groups or teams (Zainuddin & Perera, 2019). Students in the 21st century, must have global competence so that students have broad knowledge that can be developed with reference to the framework developed by Pearson (Auld & Morris, 2019). This bolsters the notion that hiring competent personnel is essential. Against this backdrop, the need for competent recent graduates as critical human resources has increased significantly due to the growing requirement for knowledge workers (Pang et al., 2019).

Discussion

Students must graduate from SMK with strong hard and soft skills in order to become productive human resources capable of starting their own businesses and thriving in the industrial sector (Ardhian & Nuryanto, 2019). One of the most recent trends in engineering education is the speed at which different technologies are developing. These modifications affect teaching strategies and alter student skills (Lee & Shvetsova, 2019). The challenge lies in how the government manages vocational schools and shows concern to its graduates. This is a crucial question. Currently, the government is faced with a number of challenges, including the low quality and relevance of graduates. Many industry parties complain about the unpreparedness of SMK graduates for the world of work. This indicates that their competence is still inadequate (Suharno et al., 2020).

Media that target teens and the broader public typically have more comprehensive message content and are presented in the form of books or printed pamphlets. It's well recognized that using electronic books has significant benefits, and users are typically quite satisfied with this kind of media. Numerous research have also demonstrated that the availability and accessibility of electronic books is what contributes to their favorable evaluation (Ghozali et al., 2019).

The best curriculum-based online materials and teachers are combined in current instructional activities; e-learning allows for faster and more extensive information access for education (Denić & Nešić, 2022). This study investigates the barriers to new goods and services and their impact on consumer adoption, with a particular focus on e-books. E-book firms must overcome user opposition to replace paper books in order to reach the majority of consumers (Kim et al., 2021).

From the results of the study, it was found that the use of electronic teaching materials in SMK is effective in improving student learning at school, because students easily obtain material from teachers so that students can learn anywhere and anytime without limited space and time. However, in the future there needs to be more in-depth research related to the effectiveness of the use of electronic teaching materials in SMK, because this research is limited to vocational students majoring in automotive.

Conclusion

The competencies obtained by students when learning theory can be applied as well as possible in the workshop during practice. Teachers and students have several challenges while conducting effective practical learning in workshops, one of which is the dearth of readily available, user-friendly instructional resources. Studies show that sixty percent of students prefer easily navigable instructional resources, fifty-eight percent prefer easily comprehended instructional materials, and fifty-eight percent prefer materials that align with fundamental and core abilities. This certainly requires media that can make it easier for students to learn actively, creatively, independently, and interestingly, so electronic teaching materials are one of the media that can be used by teachers and students to learn anywhere and anytime to achieve the competencies needed by the world of work. Electronic teaching materials in education in automotive vocational secondary schools,

this opens up new opportunities to increase learning effectiveness and prepare students with relevant skills for the future job market. So that with the existence of electronic teaching materials, it was found that 60% of students can improve student competence through learning at school or anytime and anywhere. And it can help students gain a better understanding of automotive concepts, improve their practical skills, and prepare them to face technological challenges in the developing automotive industry.

Acknowledgments
The authors would like to thank the supervisors, teachers and students of automotive vocational schools in the Serang and Cilegon areas, who have helped to obtain research data.

Author Contributions
H.F.: writing-original draft preparation, result, discussion, methodology, conclusion; S. and L.N.: analysis, proofreading, review, and editing.

Funding
This research is funded independently and the campus research program.

Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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