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Development of AI-Based Interactive Accounting E-Modul Media Chatbot in Increasing Student Learning Interest

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Abstract: This research aims to develop interactive e-Modul media based on AI Chatbot for accounting subjects and evaluate its impact on students' learning interests. Qualitative methods are used through in-depth interviews with teachers and students as well as classroom observations using the E-Module. The results showed that this interactive e-Modul was well received by teachers and students, with a significant increase in student participation and enthusiasm. Students feel more motivated and helped in understanding accounting material, while teachers feel helped by Chatbots that provide quick and accurate answers. Although there are several technical obstacles, such as limited Chatbot knowledge and access problems, the results of this study indicate that the use of an AI-based interactive e-Modul Chatbot has great potential to increase student learning interest. Continuous development and support of adequate technology infrastructure are needed to optimize the implementation of this learning media in the future.
Keywords: Media E-Modul, Accounting, Interactive, AI Chatbot, Learning Interest.

Pengembangan Media E-Modul Interaktif Berbasis AI Chatbot Pada Mata Pelajaran Akuntansi Dalam Meningkatkan Minat Belajar Siswa

Abstrak: *Penelitian ini bertujuan untuk mengembangkan media e-Modul interaktif berbasis AI Chatbot untuk mata pelajaran akuntansi dan mengevaluasi dampaknya terhadap minat belajar siswa. Metode kualitatif digunakan melalui wawancara mendalam dengan guru dan siswa serta observasi kelas yang menggunakan e-Modul tersebut. Hasil penelitian menunjukkan bahwa e-Modul interaktif ini diterima dengan baik oleh guru dan siswa, dengan peningkatan signifikan dalam partisipasi dan antusiasme siswa. Siswa merasa lebih termotivasi dan terbantu dalam memahami materi akuntansi, sementara guru merasa terbantu dengan adanya Chatbot yang memberikan jawaban cepat dan akurat. Meskipun terdapat beberapa kendala teknis, seperti keterbatasan pengetahuan Chatbot dan masalah akses, hasil penelitian ini mengindikasikan bahwa penggunaan e-Modul interaktif berbasis AI Chatbot memiliki potensi besar untuk meningkatkan minat belajar siswa. Pengembangan berkelanjutan dan dukungan infrastruktur teknologi yang memadai diperlukan untuk mengoptimalkan implementasi media pembelajaran ini di masa depan.*
Kata kunci: *Media e-Modul, Akuntansi, Interaktif, AI Chatbot, Minat Belajar.*

1. Introduction

The rapid development of technology today affects all aspects of life, including education (Mulyani & Haliza, 2021). Digitalization of education can be used by teachers and students to be more creative and innovative so that learning is more fun and less monotonous. Teachers' skills in utilizing technology, information literacy, and communication skills are important components in learning this century (Nurhayati et al., 2020).

The use of digital tools has been a lot available for teachers to support learning activities as one of the efforts to digitize education (Herawati & Muhtadi, 2018). The role of teachers in this era is as a facilitator who helps students think creatively and develop and utilize innovative learning media (Mahfud et al., 2019).

The use of technology can be done in learning by developing interesting learning resources (Asari et al., 2023). One example of the role of teachers in digitalization of education is developing e-Modul as a learning resource. e-Modul is a digital learning module that contains material in text and images and is said to be suitable for use as a teaching material (T. T. Nguyen et al., 2020). The use of e-Modul is assisted by electronic devices such as computers,

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laptops, cellphones, or other gadgets that support the use of E-Modul. The characteristics of a good e-Modul are self-contained, self-instruction, stand-alone, user-friendly, and adaptive (Bukhori, 2024).

Knowing that currently students belong to Generation Z who can be said to be close to technology, many studies have developed technology-based learning methods (Antonietti et al., 2022). As previously conducted by (Murtado et al., 2023) with the results of the EPUB format e-Modul in mathematics subjects, it can be said that it is feasible to support learning and can increase learning outcomes with a classical completeness score of 84.85%. It is also in line with research by (Pardamean et al., 2017) which states that EPUB-based digital materials are considered effective in improving students' understanding.

The development of information and communication technology has experienced an extraordinary leap since Covid-19 hit the world in early 2020, and has affected all aspects of life. After the Covid-19 pandemic, there are many interesting things to see from various perspectives that have made drastic progress in the field of information technology (Wityastuti et al., 2022).

Educational technology is moving to catch up with the advancement of information and communication systems. This is the cause of the birth of a number of media that are increasingly sophisticated in supporting the implementation of various levels of education such as higher education. Chatbots are educational technology that can be used (Santoso, 2022).

Chatbots start working by identifying how the human brain works to learn specific topics such as decision-making and problem-solving (Pardamean et al., 2017). The working mechanism of Chatbots makes users seem to have familiarity with Chatbots socially (Fitria, 2023). The Al application uses the results of identification to help answer questions, provide system and procedure services, which in general can be relied upon in service to customers if applied to the business sector, customers are positioned as users (Putrie, 2021).

Chatbots are very important for education, especially the learning process in accounting subjects because they have a continuous and systematic work pattern. It is also part of an effort to make the education system more innovative. On the other hand, the implementation of Chatbots is in line with the Freedom of Learning policy, which gives students the freedom to choose what they learn and what media they use to achieve learning goals (Andika Isma et al., 2023).

The application of educational technology in Klaten City, Central Java Province at various levels of education has begun during the Covid-19 pandemic, the implementation of teaching and learning is carried out online with various types of online learning media. Therefore, the application of Chatbot will be a complementary medium for the development of more creative, innovative and effective learning models based on educational technology.

Chatbot is a crucial media as an alternative to educational technology for students because Klaten City, Central Java Province has already implemented online education, namely during Covid-19. On the other hand, there are still students who are less interested in learning outside the classroom because of non-academic busyness and media that tend to be boring for students. So the problem is achievement. Subject learning will fail due to poor learning media and low interest in learning.

In the long run, graduates will have difficulty competing in the job market and industry. Therefore, to facilitate students to learn independently outside the classroom, Chatbots have the advantage of being able to answer these problems. The advantages of Chatbot include: 1) being able to communicate privately, creating something interactive. 2) A website version is available so that you don't have to install the application. 3) its use in realtime; 4) how the system works is designed to provide answers to the obstacles faced by users (students) and 5) triggers users (students and teachers) to reuse it repeatedly (Ardiansyah, 2023).

The ability to work systematically is one of the advantages of Al technology. According to (Qotrunnida et al., 2023), Chatbot is an application designed to help humans communicate with machines and can interact with users using text and audio, either one of them or a collaboration of both. With the help of artificial intelligence-based Chatbots, the education industry has the ability to accelerate the development of learning methods that are effective, achieve learning goals, and efficiently in a relatively fast time, Chatbot-based AI provides a variety of accurate information and provides the widest possible learning experience.

Students can use the Chatbot by simply clicking on the link on their Android phone or laptop. Chatbots that have been designed with interactive capabilities will greet users and ask for their names. The chatbot will also display a number of features available for the user's

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learning material button/menu. It also allows users to ask directly about a topic in the chat column if they find something they don't understand. Furthermore, the robot will respond to student (user) questions. Therefore, this application is called Chatbot. The term Chatbot refers to the nature of the interaction between the user as the giver of commands (questions) and a robot that is specifically designed to answer questions asked by the user. For commands or questions that are not in the Chatbot database, the robot will suggest asking directly to the content creator/teacher on the related subject that designed the Chatbot work system so that educators (lecturers/teachers) can add standardized question and answer keywords to the Chatbot (Santoso, 2022).

According to (D. M. Nguyen et al., 2021) Chatbots, in helping to provide services, have been applied to various fields and fields of work such as Chatbots that serve the admission of prospective students serving online consultations so that they can cut down on procedures found in conventional methods. The AI-based chatbot allows students to instantly get daily curriculum updates, tuition information, assignment scores, and various other information.

According to (Sholihah et al., 2022), Chatbot as an artificial intelligence instrument changes the nature of online services by revolutionizing the interaction between service providers and consumers, including compatibility, convenience felt by users, and the expectation of maximum service performance as well as building social interaction between humans and robots.

Chatbots designed to have artificial intelligence are increasingly used today and in the future in various fields, both in the field of education and business. There are many opportunities for the use of artificial intelligence in accounting due to the complexity of its working mechanism and the amount of data that must be parsed in both the business and education sectors. Therefore, Artificial Intelligence is needed that can help students learn independently. However, in the learning process, there is an emotional intelligence factor that also has an influence on students when doing assignments given by teachers, including in terms of the completeness of learning outcomes (Brandtzaeg et al., 2021).

Information technology (IT) is a type of technology that consists of hardware and software collaboration to facilitate the activity of processing data and storing information, as well as disseminating for various human needs whose medium is computers. The role of IT in an organization is very important because it can help smooth service and business operations in an organization. The information system is software. databaseshardware and people who collect, modify, and disseminate information for an organization. Therefore, it can be said that an information system is a form of cooperation between computers and humans that processes data that is entered into a database and then becomes an information system. Information systems will generate information for humans as recipients (Antonietti et al., 2022).

Accounting is a group of economic sciences that are divided into various sectors such as accounting, education, management accounting, corporate accounting, auditing accounting, government accounting and various other accounting fields that continue to develop along with human needs, both for the needs of human resource development in the world of education and in the world of industry and the business world (DUDI) At the same time, the very rapid progress of the technology and information industry encourages almost all lines life and business are in contact with technology, including accounting (Ardiansyah & Sari, 2023).

The focus of this research was carried out at SMK Negeri 1 Pedan. Based on the results of interviews with Accounting subject teachers at SMK Negeri 1 Pedan, learning is only limited to printed book teaching materials so that there is a lack of references used. In fact, SMK Negeri 1 Pedan has provided facilities that support electronic-based learning. So far, students are also considered to be less enthusiastic in learning activities, especially when learning material. Many students are less interested and bored, so many use smartphones during class hours to play games or open social media. This will certainly affect the understanding of the material and the learning outcomes of students.

Through research conducted at SMK Negeri 1 Pedan, it is shown that students' interest in learning is very lacking by using the old model e-Modul which has not been adjusted to today's technological developments. This problem encourages researchers to develop e-Modul as interactive teaching materials and attract students' interest in learning. The teaching materials developed are in the form of AI-based e-Modul created using AI Chatbots. The development of the e-Modul with AI Chatbot is expected to have an impact on students' interest in learning at SMK Negeri 1 Pedan.

2. Research Methods

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This research uses a qualitative approach to develop interactive e-Modul media based on AI Chatbot in accounting subjects to increase students' interest in learning. This approach was chosen because it allows for an in-depth exploration of the perceptions, experiences, and needs of students and teachers in the context of accounting learning using AI technology. Qualitative methods provide flexibility to understand complex and dynamic phenomena from the participant's point of view, which is crucial in developing effective and relevant learning media.

This research was conducted at SMK Negeri 1 Pedan located in Klaten, Central Java. The selection of this school is based on the institution's willingness to adopt new technologies in learning as well as the availability of basic infrastructure that supports the implementation of AI-based interactive e-Modul. The research participants included accounting teachers and grade X students in the Department of Financial and Institutional Accounting (AKL).

Data were collected through in-depth interviews, participatory observations, and document analysis. In-depth interviews were conducted with accounting teachers and students to gather information regarding their needs, perceptions, and expectations for the use of AI Chatbot-based interactive e-Modul. Participatory observation is carried out during the learning process to see firsthand how the interaction between students and the e-Modul and its impact on learning interest. Document analysis involves reviewing existing curriculum, syllabus, and learning materials to ensure that the E-Modul developed are in accordance with applicable educational standards.

This study uses several data analysis approaches, including data reduction, data presentation, and conclusion drawn. Data Reduction in this study involves a thorough examination of all data obtained from interviews, observations, and documentation. The data is reduced with the aim of focusing on relevant information regarding the risks, barriers, and thoughtful application of artificial intelligence in the field of education.

Next, there is the data presentation stage, where the data that has been reduced is then presented in the form of a concise representation. The presentation of this data highlights important information about the use of AI Chatbot-based e-Modul media in education focused on accounting subjects at SMK Negeri 1 Pedan. After the data presentation stage, the next step is to the process of drawing conclusions where at this stage the data is taken based on the findings that emerge from the data analysis. These findings identify how the effectiveness of e-Modul, features and content that must be present in interactive e-Modul, student perceptions and responses, challenges and obstacles, e-Modul development strategies and the impact of the use of AI-Chatbot-based interactive e-Modul on student learning outcomes in accounting subjects.

With this qualitative approach, it is hoped that the research can provide an in-depth understanding of how AI-based interactive e-Modul can be developed and implemented effectively to increase students' interest in learning in accounting subjects. The results of this research will provide valuable insights for educational technology developers, educators, and policymakers in an effort to improve the quality of education through technological innovation.

3. Results and Discussion

This research aims to develop an interactive e-Module media based on AI Chatbot for accounting subjects and evaluate its impact on students' learning interests. Data was collected through in-depth interviews with teachers and students, as well as classroom observations related to the learning e-Module used in class X of SMK Negeri 1 Pedan. Where the results obtained in this study can provide a detailed picture related to the development of the use of AI technology.

The development of this AI-based interactive e-Modul is designed with the AI Chatbot feature that can answer student questions in real-time. The chatbot is programmed with a database that includes classroom accounting materials and can provide additional explanations, sample questions, and automated feedback.

Based on the interviews, teachers and students showed positive acceptance of the use of this e-Modul, where teachers felt helped by the existence of a Chatbot that can provide quick and accurate answers to students, while students found this feature interesting and helped them understand the material better.

Observations in the classroom also showed an increase in students' participation and enthusiasm in accounting learning. Where it can be seen that students are more active in asking questions and using Chatbots to clarify learning concepts that have not been understood. Some students stated that learning with AI Chatbot-based e-Modul makes them more motivated and interested in the accounting material taught by teachers.

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Although generally the responses shown by teachers and students are fairly positive, there are several obstacles faced, such as the limited knowledge of Chatbots in answering very specific and technical questions. Some students also experience technical difficulties in accessing the e-Modul on their devices. This is in line with research by (Khairunisa & Suyatmini, 2024) which revealed the use of AI Chatbots which has the potential to increase student engagement and expand the availability of diverse learning materials, while facilitating the development of problem-solving skills and analytical skills among students. However, barriers such as inadequate understanding, limited resources, and effective integration in the learning process are fundamental problems that schools need to overcome.

The results of this study show that the development of an interactive e-Modul based on AI Chatbot has a positive impact on students' interest in learning accounting subjects. This is in line with research (Sari & Suyatmini, 2024) which reveals that interactive technology-based learning can increase student engagement and learning motivation.

The Chatbot feature that is responsive and able to provide direct feedback has proven to be effective in increasing students' interest in learning. The speed and accuracy of the answers provided by the Chatbot help students understand the material faster, reduce confusion, and eliminate obstacles in learning.

The chatbot feature that is responsive and able to provide direct feedback has indeed proven its effectiveness in increasing students' interest in learning. With the ability to provide answers quickly and accurately, chatbots help students understand the material more efficiently.

The speed of responding is one of the main advantages of chatbots. Students do not have to wait long to get an explanation or help related to their questions. This not only saves time, but also maintains learning momentum, so students can stay focused on the material being studied.

In addition, the accuracy of the answers provided by the chatbot is also very important. Using ever-evolving technology, chatbots can be programmed to provide the right answers according to the context of the questions asked. This helps reduce student confusion and ensures they get the correct and relevant information.

The use of chatbots can also eliminate obstacles in learning. For example, if students feel embarrassed or hesitant to ask a teacher or classmate, they can easily use the chatbot to get help. This creates a more inclusive learning environment and allows each student to learn in the way that is most convenient for them.

Overall, the chatbot's responsive and accurate features have proven themselves to be a very beneficial tool in modern education. By helping students understand the material faster, reduce confusion, and overcome obstacles in learning, chatbots not only improve learning efficiency, but also promote higher learning interest and motivation among students.

Teachers play a crucial role in integrating these technologies into the curriculum. Support and guidance from teachers in using the e-Modul is very important to ensure that students can take advantage of all available features optimally. The role of teachers in integrating technology, such as e-Modul, into the curriculum cannot be underestimated. They are not only learning facilitators, but also important mentors in ensuring students can make the most of all of these technology features.

First of all, the support of teachers is very important in introducing e-Modul to students. Teachers can describe the benefits and potential of e-Modul to improve students' understanding and motivation to learn. Through this introduction, students will be more motivated to explore and use e-Modules in their learning.

Furthermore, teachers have a key role in guiding students in using the e-Modul effectively. They can provide direction on how best to navigate the platform, use interactive features, and optimize the learning experience individually. This includes helping students understand how to answer questions, exploring additional resources, and utilizing tools like chatbots to get hands-on help.

In addition, teachers also play a role in facilitating discussions and reflections related to the use of e-Modul. They can use the results of the technology to evaluate student progress, provide in-depth feedback, and design more personalized and relevant learning strategies. By doing this, teachers not only ensure that students make the most of technology, but also integrate a more cohesive and meaningful learning experience.

Finally, teacher support and guidance also provide examples for students on how to integrate technology into their daily lives in a positive way. It creates a learning environment where students feel supported to experiment, try new things, and continue to develop their digital skills.

Thus, the role of teachers in integrating e-Modul into the curriculum is not only important, but crucial for the success and effectiveness of

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this technology-based education. With their support, students can experience learning that is more effective and relevant to the demands of modern times.

The technical obstacles faced show the importance of adequate technological infrastructure in supporting the implementation of e-Modul. Schools need to ensure adequate access to devices and stable internet connections for all students. The technical constraints that often arise in the implementation of e-Modules highlight the importance of adequate technological infrastructure in the educational environment. One of the key aspects to consider is the availability of hardware access and a stable internet connection for all students.

First of all, the successful use of e-Modul is highly dependent on the availability of devices such as laptops, tablets, or smartphones. Schools need to ensure that every student has access to the necessary devices to access and use the e-Modul optimally. This may involve allocating or borrowing devices to students in need, especially for those who do not have their own devices at home.

In addition to hardware, a stable internet connection is also a crucial factor. E-Modul often rely on online access to download materials, conduct exercises, or interact with learning platforms. Unstable or slow connections can hinder students' access to learning materials, leading to frustration and reducing their learning effectiveness.

Schools need to evaluate and invest in technology infrastructure to ensure that their learning environment can support the effective use of e-Modul. This includes ensuring the availability of fast and reliable internet access throughout the school area, as well as considering alternative solutions such as hotspots or the provision of additional devices if needed.

Apart from the technical aspect, it is also important to provide training to teachers and school staff in the use of e-Modul so that they can support students in overcoming technical challenges that may arise. This includes knowledge of the initial setup of the device, troubleshooting network issues, and the use of related apps or platforms.

By prioritizing adequate technological infrastructure, schools can increase students' chances of succeeding in technology-based learning. This not only helps to overcome any technical obstacles that may arise, but also ensures that all students have a fair and equal opportunity to access modern education that is relevant to this digital age.

Continuous development To increase the effectiveness of this e-Module, it is necessary to develop Chatbot capabilities continuously, including expanding the database and improving machine learning algorithms to answer more complex questions. Continuous development of Chatbot capabilities is an important step to improve the effectiveness of e-Modules in modern learning. There are several aspects to consider in this development.

Effective chatbots require an extensive and constantly updated database. This includes the addition of more educational content, definitions, case examples, and answers to various questions that students may ask. By expanding the database, Chatbots can provide more accurate and relevant answers to a wide variety of questions.

The machine learning algorithms underlying the Chatbot must continue to be improved to improve natural language processing (NLP) capabilities. This includes improving understanding of the context and nuances of the language, distinguishing complex questions, and providing more timely answers.

Advances in the field of artificial intelligence (AI) can be used to improve the capabilities of Chatbots. For example, the use of deep learning techniques to improve natural language processing or integration with other systems such as data analysis to provide more detailed feedback.

The development of Chatbots must also take into account the needs and preferences of users, both students and teachers. This can include customizing the user interface to make it easier to navigate and interact, as well as integrating with other platforms used in the learning process.

It is important to continue training the Chatbot by entering new data and periodically evaluating its performance. This helps to ensure that the Chatbot remains relevant and effective in supporting student learning.

By making continuous improvements to Chatbot capabilities, e-Modul can improve students' learning experience by providing timely, accurate, and tailored assistance to their individual needs. This not only accelerates students' understanding of the subject matter, but also increases their motivation to learn independently and collaboratively using modern technology.

The use of AI-based interactive Chatbot e-Modul in accounting subjects has proven to be effective in increasing students' interest in learning. Despite some technical constraints, the positive reception from teachers and students

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shows the great potential of this technology in changing the conventional way of learning to be more interactive and engaging. Continuous development and adequate infrastructure support will be the key to the successful implementation of this e-Modul in the future.

4. Conclusions and Suggestions

This study shows that the development of interactive e-Modul media based on AI Chatbot in accounting subjects has a significant positive impact on students' learning interests. These e-Modul not only facilitate access to information and learning materials, but also provide instant feedback that helps students understand concepts better. The results of interviews and observations indicated that students felt more motivated and involved in the learning process, while teachers felt helped by the existence of virtual assistants who could answer students' questions in real-time.

Positive reception from teachers and students shows that this technology can be an effective tool in improving the quality of learning. The interactivity offered by the Chatbot allows students to learn in a more dynamic and personalized way, which in turn increases their interest and participation in accounting subjects. However, to achieve optimal results, support from teachers is needed in integrating this technology into the curriculum effectively.

However, this study also found several obstacles, especially related to technical and infrastructure limitations. Some students have technical difficulties accessing e-Modul, and Chatbots sometimes have trouble answering very specific questions. Therefore, continuous development of Chatbot capabilities and improvement of technological infrastructure in schools is needed. Thus, this AI-based interactive e-Modul can be optimized to support more effective and engaging learning in the future.

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