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Effectiveness Analysis of Digital Teaching Materials and Assessment for Gadget Based Application by Using Artificial Intelligence

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Abstract: This study aims to evaluate the viability and effectiveness of the use of digitalisation of teaching materials and learning assessment of marketing management courses with artificial intelligence based on gadget applications. This study used development research with DDD-E model (decide, design, develop, evaluate). These research subjects were students from the 4th semester of the Business Education Program of Universitas Negeri Medan, with 65 students. Before being put on trial, first the product was put to test to see its validity which will be judged by three experts to measure the eligibility by looking at the material, language, and media. A practicality test was performed to see the usage practicality by looking at the Source aspect, animation aspect, visual aspect, audio aspect, evaluation aspect, and accessibility aspect. Hypothesis test performed by using paired sample T-test with experimental design before-and-after to test the effectiveness of teaching materials and study assessments as to the outcome of before-and-after treatment using teaching materials on digital-based application. The research results showed that using the digitalization of teaching materials and learning assessment of the marketing management course with artificial intelligence before and after treatment results in different learning outcomes, according to the effectiveness test. From the data, it can be seen that there is a strong and significant influence of around 64.2% between before and after the use of teaching materials and digital learning assessments of the dBUSAR application on student learning outcomes. Overall, the role of Artificial Intelligence in student learning has great potential to change the educational paradigm.

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Introduction

One of the innovations of the Industrial Revolution was artificial intelligence (AI), which is a technology that can think like a human but is controlled by a robot rather than a human. In general, artificial intelligence (AI) uses a certain level of intelligence that can perform functions similar to humans such as perception, knowledge and creativity (Arly et al., 2023). As a result of the creation and application of new technologies and education, artificial intelligence is increasingly being used in the education sector (Rahardja et al., 2021). Artificial intelligence continues to develop, and new applications continue to emerge in education (Rahardja et al., 2019). All of these methods play a very important role in helping learning, including digital books, also known as *electronic books. Electronic books* are one of the types of literacy today that comes in digital format.

Artificial Intelligence-based teaching materials offer innovative solutions by leveraging computing power to personalize learning experiences, improve student engagement, and provide more accurate feedback (Ajani et al., 2024). This indicates that the

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development of instructional materials and the effectiveness and efficiency of the learning process itself might both be greatly enhanced by artificial intelligence. To guarantee learning achievement in every topic covered, it is anticipated that the application of artificial intelligence techniques in the creation of instructional materials and learning evaluations would result in easily accessible and anytime-useful teaching resources.

By creating appropriate learning resources, a teacher can create instructional materials that satisfy students' requirements and follow the curriculum, (Saragih et al., 2023). To ensure that teaching materials meet the needs of students and improve learning effectiveness, it is crucial to update their content regularly. Enhancing the substance and calibre of teaching materials requires innovative cooperation between lecturers and students in addition to lecturers updating information on the materials themselves, (Putnik & Alves, 2019). To inspire pupils to learn, instructional materials must be prepared with the following qualities in mind: novelty, usefulness/ease of use, accessibility, communicativeness, and curiosity. Artificial intelligence can be used to deliver instructional content, conduct assessments, and provide learning feedback. Here are a few instances of how artificial intelligence has been used to enhance learning, (Yasin, 2021): a) Intelligent Computer Aided Instruction, also referred to as the Intelligent Tutoring System (ITS), is a teaching tool that adapts to students' skill levels. b) AI-powered virtual mentors can offer feedback on students' learning exercises and practice problems, suggest resources that require relearning, and act as tutors. c) speech assistants rely more on speech functions as a hub for communication and engagement, d) Smart content features make it easier and faster to share and locate the content of virtually programmed materials and digital books. The advancement of technology that facilitates teaching and learning should be advantageous to schools in the present day (Tjahyanti et al., 2022).

Through suitable and responsible implementation, artificial intelligence has the potential to improve the quality and accessibility of education, allowing for more efficient and customised learning for students. Getting to know customisation, automatic evaluation, smart content, voice assistants, and virtual tutors (Putri et al., 2023), (Fauziyati, 2023). Teaching materials can be used to make it easier to understand the material and can make students learn independently (Yuangga & Sunarsi, 2020), and artificial intelligence provides a learning experience that is tailored to the needs of each student (Maufidhoh & Maghfirah, 2023). Artificial Intelligence is often used for automatic assessment and assessment of questions through online platforms, where educators and instructors no longer need to create questions and correct answers manually because Artificial Intelligence systems can work according to pre-programmed instructions and can learn from user habits (Mufid et al., 2022). With the use of artificial intelligence tools in learning assessments, it can be carried out fairly, transparently, and quickly. Students' learning results may improve as a result of this motivating them to learn. Two outside variables that affect students' learning outcomes are instructional materials and learning assessments.

Some of the artificial intelligence applications that are often used in the development of teaching materials include chat GPT, which is an application that can be used as a source of information from poorly understood material easily with various alternative answers. With the use of the program canva, educators may produce instructional materials such as books, posters, presentations, films, and more. Quizizz, is an application that can be used to conduct learning assessments easily and can provide automatic assessments. In addition to these applications, there are several other artificial intelligence applications such as Toonme, JegelApp, and Pictory AI. To combine all teaching materials that have been created in the

heyzine by inserting links from various artificial intelligence applications that have been created and producing one interactive electronic teaching material.

Drawing from research findings (Sari & Avianty, 2023) on the creation of educational materials based on artificial intelligence, it is known that artificial intelligence-based teaching media is feasible and effective to be used in Mathematics Learning evaluation courses, so it is recommended to apply the use of artificial intelligence in learning media in other courses. (Li et al., 2024) additionally, it was discovered that using visual-based instructional materials might boost students' willingness to study, which in turn affects how well they learn. According to (Faqiroh, 2020), teachers should be permitted to develop creative learning opportunities since students desire to use project-based learning and problem-based learning to increase their competency.

The problem raised in this study is whether the digitalization of teaching materials and learning assessments for marketing management courses using artificial intelligence based on gadget applications can improve student learning outcomes. The purpose of this study is to analyze the use of digitalization of teaching materials and learning assessments for marketing management courses with artificial intelligence based on gadget applications in improving student learning outcomes.

The novelty of this study is the development of digital-based teaching materials and learning assessments by applications using artificial intelligence technology in designing teaching materials and learning assessments. The applications developed utilise the use of artificial intelligence technology. This is because the use of technology must be carried out immediately in the development of learning resources and learning assessments to make it easier for students to understand the information taught. The use of AI technology is used to improve the quality of teaching materials and learning assessments and improve understanding of concepts, application of materials, and student learning outcomes. Understanding the concept and application of the material can have an impact on the birth of creative innovation ideas in the implementation of the marketing management course's output projects. Technology must be employed right away in the development of teaching resources and learning assessments to facilitate students' comprehension of the information being taught. Through the development of teaching materials for this course, it is also hoped that students with competence as educators have good abilities, skills, and attitudes in creating teaching materials and learning assessments in accordance with technological developments. This learning-quality improvement plan is an attempt to raise student standards, which in turn raises the standard of education in Indonesia.

Research Method

This study used development research with the DDD-E models which had 4 stages: decide, design, develop, evaluate (Albert, 2020).

1) Decide. First thing done at this stage is to determine the learning objectives, determine the learning materials and conduct initial research, namely identifying the initial capabilities and assessing the availability of resources.
2) Design. The original draft is the name given to the design's output, which includes the following stages of work: selection of artificial intelligence media used in designing teaching materials and learning assessments. a) Some of the artificial intelligence applications that will be used in this study are as follows: ChatGPT, video maker, canva, quizizz, and heyzine. b) Selection of teaching material formats and learning assessments. The format of teaching materials and learning assessments used is in the

form of an application where the application is made using the JagelApp Application. c) Design of the original instructional resources and evaluations.

3) Development, phase of turning the final product until it is finally useful, utilising the design developed during the design process. The steps involved in this process include turning the product into an actual, usable product.
4) Evaluate. The evaluation's ultimate objective is to gauge how well development objectives are being met.

This study was carried out at the Business Education Study Program Faculty Economic Universitas Negeri Medan between January and July 2024. Questionnaires and observations were used in the data collection process. By evaluating the viability of the application display, the presentation of the application, the language, and the content of the materials, the expert validation questionnaire was used to ascertain the degree of feasibility of the learning assessments and instructional materials created. There are two ways utilised to examine the data in this study: quantitative and qualitative methods. Quantitative analysis was used to view the findings of the preliminary investigation. In addition, quantitative analysis was also used to analyse the validation results of validator questionnaires. To determine the weight of each validator's response, use the following formula to calculate the average score (Nurdin & Hartati, 2019).

The effectiveness of the digitization of teaching materials and learning assessment of marketing management courses using artificial intelligence based on gadget applications was assessed using a paired sample t test in a limited small group trial with a before-after (one-to-one) experimental design. A small sample of 65 students who had completed three trials and learnt the subject was used to examine the efficacy of the learning media. This before-and-after experiment's design evaluated how well instructional materials affected learning outcomes both before and after the use of instructional materials. The hypothesis test was carried out using a paired sample t test, with the conditions of accepting Ho if the Sig value was larger than 0.05 and rejecting Ho if the Sig value was less than 0.05 (Ismail, 2019). The hypotheses in this research are:

Ho: There was no difference in learning outcomes before and after treatment using the digitalisation of teaching materials and learning assessment of marketing management courses with artificial intelligence based on gadget applications.

Ha: There are differences in learning outcomes before and after the treatment using the digitalisation of teaching materials and learning assessment of marketing management courses with artificial intelligence based on gadget applications.

Results and Discussion

Decide Stage

The curriculum carried out at Economic Faculty, Univeristas Negeri Medan is the Independent Learning Independent Campus (KKMB) curriculum and the Outcome Based Education (OBE) curriculum. Every course, including the marketing management course, is made to develop course output to enhance work, skills, and creativity, as required by the autonomous curriculum. This is accomplished through the implementation of six different work categories, including routine tasks, critical book reports (CBR), critical journal reviews (CJR), mini research (MR), team based projects (TBPj), and idea engineering. The initial stage in creating learning objectives is to examine the graduate profiles, concept maps, and competency maps of the Universitas Negeri Medan Business Education Study Program. To achieve the graduate profile, competency standards are set for graduates, which are outlined in the graduate learning outcomes by measuring the dimensions of attitudes and values,

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general skills, special skills, and knowledge. The course competency standards set are contained in the learning results of the marketing management course based on the competency standards of the graduates, namely: learning outcome 1: able to analyze marketing planning, learning outcome 2: able to analyze consumers, learning outcome 3: able to analyze marketing strategies, and learning outcome 4: able to project marketing in the electronic marketing era.

Design Stages

Based on the previously discussed learning outcome and sub-learning outcome of the marketing management course, the content in the instructional materials and learning evaluations has been produced. The goal of the marketing management course is to give students experience and expertise regarding the concepts, principles, approaches, and processes of marketing management in organizations/companies, as well as to be competent in understanding and using marketing management analysis in getting to know customers and strengthening brands. To make sure the theory is current and applicable, the marketing management course's main book and supplementary books, research findings from both the lecturer's team and other researchers, and service results from both the lecturer's team and other researchers are the sources of the references used to review the course material. Designing broadcast materials is done with the canva application, specifically in the form of digital material design and percentage materials. The following design was created in this development, which includes 12 broadcast materials and digital materials created using the canva.

The next stage is to create an educational video after the print and digital assets are ready. The instructional video is intended to last no more than five minutes. This is done to keep students from becoming disinterested in the instructional film. In designing learning videos, several artificial intelligence applications such as *powtoon* and *Pictory AI* are used. A variety of assignment models are used in the creation of learning evaluations. Each chapter's study topic is taken into account when modifying the assignment. Essays, multiple-choice questions, games, and project assignments are some of the formats of the assignments. A project time schedule is created at each meeting of the project review to make it easier to evaluate the completion of the course project output.

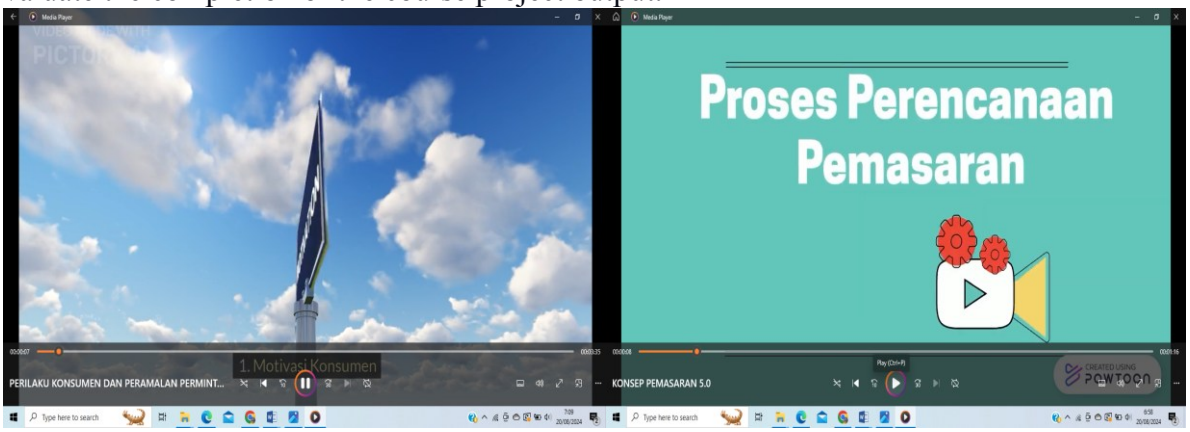

Figure 1. Display of Learning Video Design using Artificial Intelligence Applicatior

Develop Stage

For teaching materials, they are then changed into digital flipbooks by utilising the hayzine, while for learning assessments, they are changed and developed using the Quizizz as shown in the following image. The learning assessment design in the form of a printed file is then entered into the Quizizz to produce a digital learning assessment. The following is a look at the learning assessment questions on the Quizizz that has been developed.

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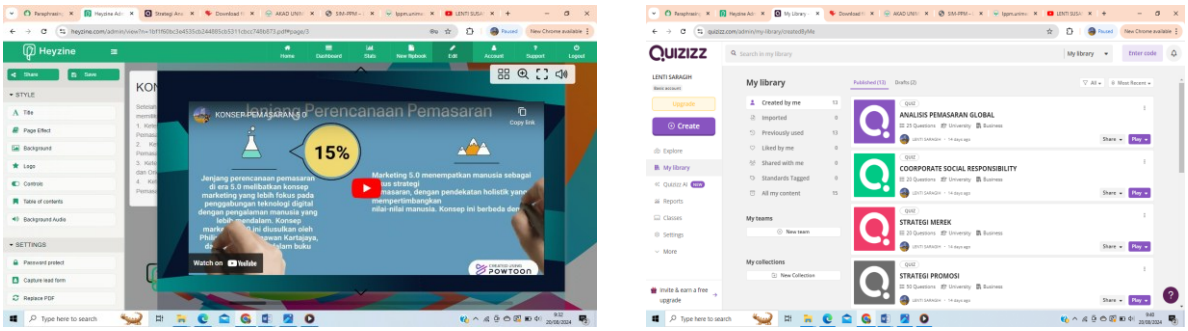

Figure 2. Layout of Learning Video in Heyzine Application

The creation of learning assessments and instructional materials based on device applications is the following phase. One artificial intelligence application that can help users construct a new application for teaching materials is called JegalApp, and it can be downloaded from the play store using a smartphone. After installing the JegalApp application, account registration is carried out first. Designing the application's name and logo is the first step in creating a new application. This ensures that all necessary documents are available during the in-out procedure. In the development of this teaching material, the name of the teaching material application developed is dBUSAR, which means *"digital Buku Pemasaran"*. After all the material has been entered into the application and has been changed into an application, the next step is to download the new application and then the application can be used by installing the dBUSAR application on the gadget device.

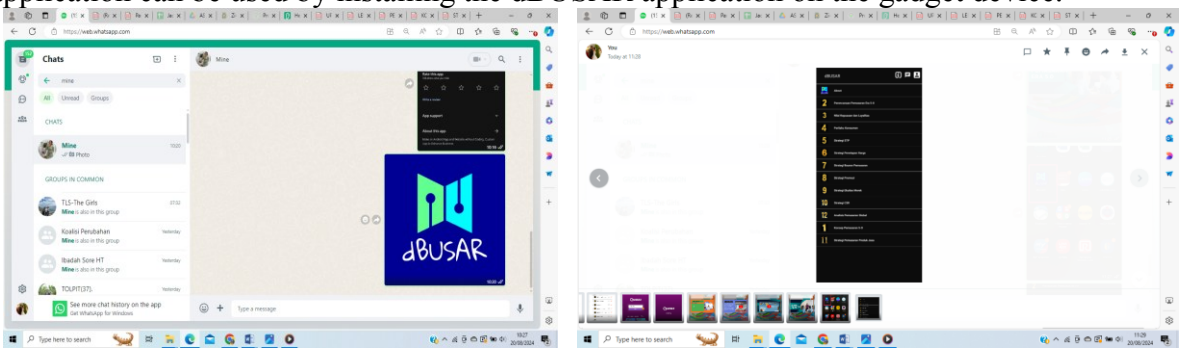

Figure 3. Display of dBUSAR Application

Evaluated Stage

Validity Test

The feasibility test on the development of teaching materials and learning assessments involved 3 expert validators consisting of material expert validators, linguist expert validators and media expert validators. There are four aspects assessed by the validator team in this teaching material, including the feasibility aspect of material content, the feasibility of application presentation, application display and the language feasibility aspect. The following is the assessment results from the validator.

Table 1. Validator Assessment Data

Nb	Validators	Feasibility Aspects					
		Material Content (%)	App. Presentation (%)	App Display (%)	Language (%)	Average (%)	Information
1	Media Expert	90,4	90	87,7	84,3	88,1	Highly Worthy
2	Material Expert	90,4	91,3	84,6	85,7	88	Highly Worthy
3	Language Expert	91,2	93,8	89,2	91,4	91,4	Highly Worthy
	Average	90,7	91,7	87,2	87,1	89,2	Highly Worthy

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The table shows that each validator's evaluation range falls between 84.1% -90.4%, indicating that the dBUSAR program is very practicable to use.

Test Normality

Three tests were conducted on 65 respondents to determine how effective the use of teaching material applications. According to the Shapiro-Wilk test, which is used in this study's normality test, there is no discernible difference between the initial and final variables. This paired sample test requires that the data be distributed properly. Therefore, doing a normality test is the first step.

Tabel 2. Test of Normality

	Kolmogrof- Smirnova			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistics	Df	Sig.
Pretest	.108	65	.56	.972	65	.145
Posttest	.115	65	.64	.975	65	.224

According to the information in the tests of normality table 3, the Shapiro-Wilk column's Sig pretest value is 0.145, and the Sig posttest value is 0.224, both of which are higher than the research alpha (0.05). Given that the pretest and posttest score data are normally distributed, it is feasible to draw the conclusion that the requirements for assuming normality in this study have been met. To find out how well the dBUSAR application's digital learning tests and instructional materials affect student learning results, a paired sample t-test will be used next.

Effectiveness Test

The final step in evaluating dBUSAR digital teaching resources is to examine how well the learning assessments and instructional materials are used. the Paired Sample Test was used to assess the efficacy of this medication. A significance value (2-Tiled) < 0.05 indicates significant differences between the initial and final variables, whereas a significance value (2-Tiled) > 0.05 indicates no significant differences between the initial and final variables.In this paired sample test, it is required that the data be distributed normality. In order to determine the efficiency of the dBUSAR application's digital learning assessment and utilization of instructional resources, the paired sample t test score was computed using SPSS 26. The outcomes of this study's efficacy test computation are:

Table 3. Paired Samples Statisctics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	82.97	65	3.316	.411
	Posttest	88.43	65	2.562	.318

The mean pretest value is 82.97, and the mean posttest value is 88.43, according to the data in the paired sample statistics table above. It is known from the data that the pretest and posttest scores differ from one another. Since the posttest score is higher than the pretest score, there is a descriptive difference between the average learning outcomes of the pretest and posttest. The following table of paired samples correlations shows the degree of significance of the value difference.

Table 4. Paired Samples Correlations

		N	Correlation	Sig
Pair	Pretest&Posttest	65	.642	.000

The correlation value is 0.642 with a significance level of 0.000 < 0.05, as can be observed from the data in the paired samples correlation table above. From the data, it can be seen that there is a strong and significant influence between before and after the use of teaching materials and digital learning assessments of the dBUSAR application on student learning outcomes.

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Table 5. Paired Sample Test

		95% Confidence Interval of the Difference							
		Mean	Std. Deviation	Std. Err. Mean	Lower	Upper	t	Df	Sig. (2-tailed)
Pair 1	Pretest-Posttest	-5.462	2.580	.320	-6101	-4.822	-17.064	64	.000

The table paired samples test was used to examine the relationship between the utilisation of instructional materials and the digital learning evaluation. Using digital teaching resources with the dBUSAR application, the pretest and posttest experiment's design evaluated the impact of instructional materials and learning assessments on learning outcomes both before and after treatment. A paired sample t test was used to evaluate the hypothesis. If the Sig value is greater than 0.05, Ho is accepted; if it is less than 0.05, Ho is rejected (Kadir, 2015).

Based on the research data, Ho is rejected while Ha is accepted when the Sig. (2-tiled) value is 0.000 < 0.05. As a result, there are differences in student learning outcomes before and after the treatment using digitalization of teaching materials and learning assessments for the marketing management course with artificial intelligence based on gadget applications. In the mean column, a value of -5, 462 was obtained. This figure illustrates how the average learning outcomes from the pretest and posttest differ, ranging from -6, 101 to -4, 822. The study's findings demonstrate that artificial intelligence may be applied to swiftly, equitably, and transparently evaluate learning assessments. Artificial intelligence learning systems can analyse data about an individual's learning progress and provide additional or repetitive material if needed. This indicates that artificial intelligence-based learning media and the use of interactive media in learning are feasible and effective in improving learning outcomes, (Ardana Yasa et al., 2021), (Rahardja et al., 2020; Sari & Avianty, 2023). This means that students with different levels of understanding in one class can learn more effectively because each of them gets the right level of support. Overall, the role of artificial intelligence in student learning has great potential to change the educational paradigm. Artificial intelligence and other digital access are important elements in modern educational practices, so it is necessary to actively use artificial intelligence to increase existing potential, for example by providing the freedom to choose media according to learning preferences to increase student motivation and confidence in learning (Lestariningrum et al., 2024).

An improvement in student learning outcomes may result from this, since it may boost students' drive to learn. This is consistent with the results of, (Maufidhoh &Maghfirah, 2023) that artificial intelligence provides a learning experience that is tailored to the needs of each student. (Li et al., 2024) claimed that using visual-based instructional materials might boost students' motivation to study, which in turn affects how well they learn. Teachers are required to be able to innovate their education since (Faqiroh, 2020) found that students really wish to use project-based learning and problem-based learning to develop their competency. As a result, each student can learn more efficiently if the curriculum and instructional materials are customized to meet their specific needs. According to several studies, they found students' comprehension of artificial intelligence has significantly increased, according to evaluations, and their trust in incorporating this technology into teaching mediums is the most important finding (Kaswar et al., 2023). Artificial intelligence is starting to take a role in learning activities in schools and universities (Molenaar, 2021). The world of education in the current era should take advantage of the birth of technologies that facilitate the work of educators or students, as stated by (Tjahyanti et al., 2022).

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The findings in this study have significant conceptual and practical implications that explain that artificial intelligence is starting to take a role in learning activities. Therefore, both lecturers and students must be biased to adapt to each artificial intelligence application that can provide convenience and practicality in learning. Conceptually, this study strengthens the opinion that the use of artificial intelligence in the development of digital teaching materials is feasible and effective. This is marked by an increase in student learning outcomes with the use of digital teaching materials, as a result of interactive, creative, and student-centered learning. Digital teaching materials make students more actively involved in learning because materials and assessments have been provided and equipped with a deadline for working on the assessment so that the use of learning time is more effective. The results of this study emphasize that technological changes in education require every educator to be ready to use technology to facilitate the work of educators in the teaching and learning process and the assessment process. Practically, this study suggests that the use of technology, especially artificial intelligence, in producing interactive digital learning media and learning assessments that are practically used must be carried out in each course. This is useful for maintaining accountability and transparency in learning and assessment assessments. Related to the benefits of using digital teaching materials and digital learning assessments, support from all parties is needed, such as improving supporting facilities and infrastructure, room comfort, and adequate internet facilities throughout the campus.

Conclusion

The product of this research is the application of teaching materials and learning assessments for the marketing management course with artificial intelligence applications developed with the DDD-E (decide, design, develop, and evaluate) model. The resulting application is named dBUSAR. The dBUSAR application was declared feasible to use after passing a validity test conducted by material experts, media experts, and language experts. Based on the practicality test, it is known that the dBUSAR application is practical to use. Hypothesis testing shows that Ha is accepted and Ho is rejected. This means that there is a difference in student learning outcomes before and after the treatment using digitalization of teaching materials and learning assessments for the marketing management course with artificial intelligence based on gadget applications. From the data, it can be seen that there is a strong and significant influence of around 64.2% between before and after the use of teaching materials and digital learning assessments of the dBUSAR application on student learning outcomes. Overall, the role of artificial intelligence in student learning has great potential to change the educational paradigm.

Recommendation

The results of the study indicate that there are differences on student learning outcomes in the marketing management course, namely an increase in learning outcomes before and after the use of digital teaching media and artificial intelligence-based assessment tools applications for learning evaluation. Therefore, the researcher recommends that digital teaching media and assessment tools be used in all learning activities related to the marketing management course, especially at the Faculty of Economics, Universitas Negeri Medan. The use of digital learning media and learning assessments dBUSAR requires internet access. Therefore to facilitate application-based learning. This study also suggests improving facilities and infrastructure, especially the internet network, so that the use of digital teaching media and assessment applications can run well.

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