Interactive E-Business Learning Media Based on Artificial Intelligence

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Abstract. Artificial intelligence is a technology that can design computers to do things that humans normally do. Then when viewed from an educational perspective, artificial intelligence has been disclosed in several studies which are known to have a significant effect on the student learning process. The application of intelligent tutors has also been carried out in several educational activities. The purpose of this research is to design one learning applications using artificial intelligence with personalized learning to improve students' learning experience. In this study, the method used is MDLC (Multimedia Development Life Cycle). This method can be used in making animations, learning videos, and AI-based multimedia applications. In the results of the questionnaire and validation, the data obtained have satisfactory results both from the validator and from the respondents, so it can be concluded that this chatbot-based learning media is feasible to be used as a supporting tool in E-Business learning.

Keywords: Learning Media, Artificial Intelligence, Chatbot, E-Business.

1 Introduction

Towards the industrial revolution 5.0 learning at the university level demands a more active and student-focused learning process. Active learning is learning which focuses on the role of students in implementing the knowledge gained through the learning process to case studies based on industrial life, active learning is also inseparable from the independent learning process. In the independent learning process, students are expected to be able to carry out the learning process at their own will so that meaningful learning can be created and in accordance with the needs of the students themselves [1]. Active learning in the 21st century is also known to have a very close relationship with the use of artificial intelligence technology. With artificial intelligence, learning can be carried out using many sources, not only from books and teachers who have been owned by students. This is a huge potential that must be seen by teachers in implementing learning. The application of technology in the learning process has a very good impact on students.

One technology that has been proven to have a good effect on the educational process is artificial intelligence technology. Artificial intelligence is a technology that can design computers to do things that humans normally do. Then when viewed from an educational perspective, artificial

ICIESC 2022, October 11, Medan, Indonesia

DOI 10.4108/eai.11-10-2022.2325404

intelligence has been disclosed in several studies which are known to have a significant effect on the student learning process [2]. The application of intelligent tutors has also been carried out in several educational activities such as the implementation of IBM Watson. So it can be concluded that research on the design of learning applications using artificial intelligence should be carried out in the face of the times. Learning in this AI system is personalized learning so as to improve the student learning experience. AI learning in this individual system shows that it can improve student focus. The reason is, AI has the ability to teach students individually and recognize the areas needed to find the right way of teaching students through artificial intelligence. For example, if this technology knows you are interested in racing cars, then that will be used as an analogy or example to understand the subject matter.

2 Literature Review

2.1 Artificial Intelligence

Artificial intelligence (AI) is a scientific field concerned with the use of technology to solve complicated issues in a more humane manner [3]. This is typically accomplished by mimicking the traits and mental parallels of human intellect and applying them as computer-recognized algorithms. Depending on the situation, a more or less flexible and efficient strategy might be used, which influences how the behavior of artificial intelligence manifests. AI is commonly connected with computer science, but it is also closely related to mathematics, psychology, observation, biology, philosophy, and other subjects. The capacity to synthesize information from all of these domains will eventually aid advances in the development of artificial intelligence.

AI is a computer system that can do activities that would normally require human power or intelligence. AI is a technology that, like people, requires data to be used as knowledge. AI need experience and data to improve its intelligence. Learning, reasoning, and self-correction are critical stages in the AI process. AI must learn in order to expand its understanding. The AI learning process is not necessarily triggered by people, but AI will learn on its own when employed by humans. AI is capable of self-correction. AI is programmed to continue learning and correcting itself from mistakes it has made.

2.2 Chatbot

Artificial Intelligence (AI) is a branch of science that deals with the use of machines to solve Chatbots are computer programs (scripts) that imitate human language [4]. They use an online chat system to connect with other people, chatbots are designed to simulate intellectual conversations with one or more humans both audio and text. The more they talk, the more information they get, and the smaller the boundaries of their conversation. Virtual assistants can do more than just talk, chatbots are used for data collection. Chatbots can be an intermediary that connects teachers and students, where chatbots are arranged in such a way that they are able to correctly answer common questions asked by students [5]. Indirectly, chatbots can be said to be able to take over some common functions from teachers.

In simple terms, the chatbot serves the user to send a request then the bot will send a response back specifically based on the query sent by the user. It will automatically adjust which answers

match the keywords of the questions asked. Chatbots are also known as digital assistants that can understand and process user requests, and provide relevant answers quickly. Chatbots are often described as one of the most advanced and promising expressions of interaction between humans and machines. Behind the scenes, how a chatbot works is divided into two tasks in the first core of analyzing user requests and providing responses, chatbots return responses based on input from users [6]. So, every time the Chatbot gets a question from a user, it will automatically adjust which answer matches the keyword of the question asked. There are 4 kinds of operational system methods adopted by Chatbot, namely:

a. Pattern matcher. When grouping text in this technique, the bot employs a pattern matching strategy. Chatbots that are rule-based, programmed, and structured are typically classified as pattern matchers. These chatbots make use of a knowledge base that contains papers, each of which contains certain patterns and templates. When the bot receives an input that matches the pattern, it responds with a message from the template. Patterns can include sentences such as "What is your name?" or the regular expression "My name", "where" Patterns and templates are typically entered by hand. As a result, whenever the Chatbot receives a query, it will respond with any response that meets the pattern. However, if the request falls outside the scope of the pattern, he will be unable to deliver an appropriate response.

b. Suitable Algorithms. Algorithm-based Chatbots do more than just match patterns with responses; they select a pattern-matching algorithm and compare input sentences to responses in the data corpus. Algorithms are important here because they assist chatbots in evaluating enormous data volumes. This decreases the amount of pattern matching labor.

c. Decision Tree-Based. The way this chatbot works is arguably less user-friendly. Because the user must follow the order of answers that have been programmed by the bot engine. This method can be complex or simple depending on how the concept is designed.

2.3 Interactive Learning Media

Learning is a complex process that takes place throughout a person's life. The learning process occurs as a result of a person's contact with his surroundings. Learning, according to the review [7], is the process of modifying behavior through interaction between the individual and the environment. Learning is defined as a change in behavior or appearance, as well as a series of actions such as reading, observing, listening, mimicking, and so on [8]. Based on the explanation above, it is possible to deduce that learning is the consequence of experiences that a student has had. Learning is also a process of influencing student behavior as a result of interactions between students and their surroundings.

Learning media in general serves to facilitate the delivery of learning material from an educator to students so that it can help teachers and facilitate students' understanding in the learning process, which is consistent with the views [9] and [10] that good learning media can improve learning outcomes. The student learning process is expected to improve student learning outcomes throughout the learning process. Learning will significantly improve the effectiveness of the learning process and information transmission (messages and lesson content) at that time. The use of media in learning can also serve to improve student comprehension, make

data/information more appealing and reliable, aid in data interpretation, and condense knowledge. So, in this scenario, the media is said to serve as a tool in the learning process.

Interactive is related to two-way communication. A thing is mutual action and reaction, mutually active and interconnected, and has reciprocity between one another. While in computer terms, the word interactive means a dialogue between a computer and a computer or between a computer and other devices [4], [11], and [12]. Interactive learning media according to [5] and [13] is a form of learning media that in its use can create a link between the user and the learning media by influencing each other and providing mutual action and reaction between one another in helping deliver learning material. In other words, it can be said that interactive learning media is an intermediary tool for delivering learning material by teachers to students where in its use it causes interaction between students and the media in a way that is interrelated and provides mutual action and reactions between one another. Based on the understanding of interactive learning media, it can be seen that this interactive learning media is one of the learning media that can help explain abstract learning materials or in other words concretize abstract things to students due to the influence of mutual action and reaction between those who one with the other.

3 Research Methods

The MDLC approach was used in this investigation (Multimedia Development Life Cycle). This technology can be used to create animations, instructional films, and AI-powered multimedia applications. The stages of multimedia development are concept, design, material collecting, assembly, testing, and distribution [14].

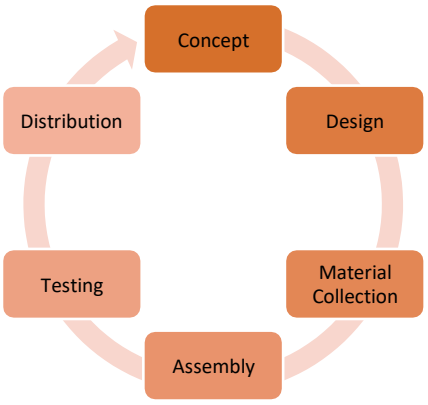

Fig. 1. Multimedia Development Life Cycle.

Concept stages are determined based on user requirement data collected through interviews that have been conducted as a necessity in making interactive learning multimedia based on Artificial Intelligence. In addition to interviews, researchers also used field notes to support data collection on the main features needed and in making storyboards. At the design stage, the researcher makes software programs, interfaces, and performs coding procedures. In the Collecting Materials stage, researchers collect materials to be used in the form of audio,

animation, and also text. In the assembly stage, researchers begin to combine and create AI-based interactive learning media using A.L.I.C.E, commonly known as Alicebot or simply Alice, is a natural language processing chatbot, which is a program that engages in a conversation with a human by applying some heuristic pattern matching rules to the human's input and using Artificial Intelligence Markup Language (AIML). The manufacturing process includes the creation of appropriate logic, flowcharts, AI training, creating text for descriptions, and recording audio descriptions, storing all data in the database, and developing applications using Flutter. This AI-based interactive multimedia will pass the testing phase to find out whether the application that has been made is running well. If an error occurs, revisions and improvements will be made so that the application can run better. The test uses black box testing to find out errors that occur in the application, such as functions that run incorrectly or are missing, interface design errors, performance errors such as initiation or termination errors. In addition to using the black box, researchers used a questionnaire to test the feasibility of this multimedia, in the questionnaire, it will be assessed whether the application that has been made can produce quality learning applications according to the user. In the distribution stage, the application was tested several times and passed the testing stage, the creation of the master file will be carried out and will be disseminated to users, namely 63 students and 1 lecturer in E-Business at Universitas Negeri Medan.

3.1 Data Collection Techniques

Researchers collect data using interview techniques, observation, literature study, and questionnaires. Interviews were conducted with lecturers who support E-Business courses and also students with the aim of knowing the needs in developing learning media. The interview method that researchers use is unstructured interviews so that researchers get accurate information about what prospective multimedia users need in developing learning media. In observation, the researcher observed directly the learning media used in teaching and learning activities for E-Business courses. A literature study was conducted before the research, where the authors searched, collected, and studied journals related to this research. Researchers used two different types of questionnaires, namely closed questionnaires to be filled out by students and teachers and open and closed questionnaires for three validation experts. The three validation experts include media experts or design experts in charge of validating the display design of learning media, material experts with the aim that the material in learning media is in accordance with current learning developments, and linguists so that the learning multimedia created has a vocabulary. , grammar, and delivery of good and correct descriptions.

Qualitative data used in this study is data obtained from interviews with lecturers and students, as well as suggestions and input for the needs of important functions that will be made in this multimedia learning. Quantitative data were obtained from the results of questionnaires given to teachers and students at the time of testing the use of this AI-based learning multimedia.

3.2 Black Box Testing and Expert Validation

The black box testing method is a method used to test software without having to pay attention to software details. This test only checks the output value based on the input value in each process. There is no attempt to find out what program code the output uses [19]. Black Box testing is carried out to ensure that there are errors (bugs) in the application interface and functional errors in the application because it is only done to test application functionality. In

addition, in this study, material and language validation was carried out by involving linguistic experts which aimed to check the feasibility of material and language in this AI-based learning media application.

4 Result and Discussion

4.1 Concept Stage

At this stage, the researcher conducted interviews and observations of the lecturers who were in charge of the courses and got information that learning still uses conventional methods so that students feel bored in the learning process. Researchers also interviewed students to get feedback and obstacles during learning. Based on this, an AI Chatbot-based learning media is conceptualized which will be used as an alternative learning media solution. This learning media facilitates learning with 14 meetings containing teaching materials in the form of text, animations, videos, and practice questions based on case studies in students' daily lives.

4.2 Design Stage

At this stage the researcher designed the interface of this AI-based learning media using storyboards. Researchers also collect all teaching materials that will be used in this learning media. In addition to designing the application, the researcher also carries out the material collecting stage considering that this application takes a long time. In the design stage, work begins with designing the UI appearance of the application. In this learning media, when the user gets a lower evaluation result than expected, a chatbot assistant will appear to help provide solutions to the problems faced by students, which can be seen in Figure 1 below.

Fig. 2. Chatbot interaction with students.

4.3 Material Collecting Stage

At this stage, all learning materials and assignments in the E-Business course will be used to conduct data training using the Teachable Machine. Other materials in the form of main theory, explanatory videos, and animations will be entered into the database. In addition, the researchers

also carried out the assembly stage together with collecting materials to speed up application development time. In this stage, application development is also carried out using Flutter, and check the description of the writing on the description page of the application, and sound is also done to minimize errors obtained. In making this multimedia, there are 3 aspects that will be tested with a questionnaire so that this application becomes valid including aspects of the material, media, and language.

4.4 Assembly Stage

In this stage, the preparation of existing features begins and also checks again to ensure that all the assistance materials displayed are in accordance with the scope of learning. In this stage the researchers make use case diagrams for users which can be seen in Figure 3 below.

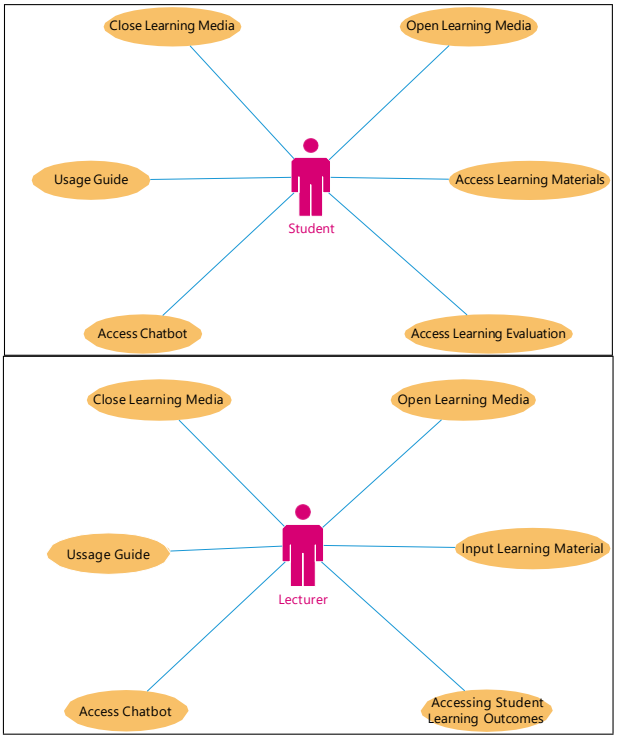

Fig. 3. Learning media use case diagram.

Based on Figure 3 above, it can be seen that users who are students can access the learning material menu which contains explanations in the form of text and animated videos, then students can access the learning evaluation menu in the form of case-based questions, then students can access the Chatbot menu as an assistant. virtual academics that can help conclude student learning outcomes and provide recommendations for the obstacles faced by students, students can also directly see the summary of their learning outcomes at each meeting on the learning outcome menu. Researchers also provide Activity Diagrams for the Chatbot feature which can be seen in Figure 4 below, in the Activity Diagram we can see when students communicate, first, the Chatbot will identify the Natural Language used by students, then access

all student academic data during learning and give appreciation to students with good learning achievements and offer assistance for learning materials for the next meeting, and if the Chatbot identifies that the student got low scores in the previous meeting, the Chatbot offers additional assistance with learning materials related to the previous material.

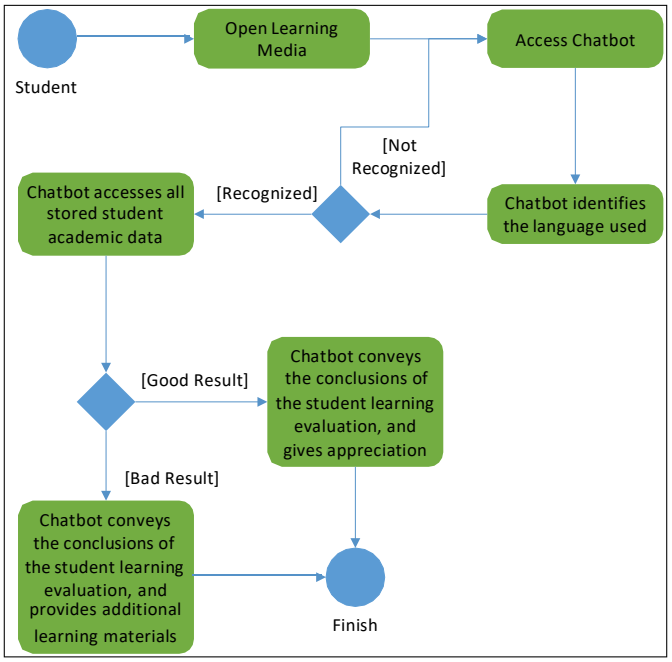

Fig. 4. Chatbot activity diagram for student.

4.5 Testing Stage

Researchers use the Black Box testing method in this stage, where researchers want to see whether the application has worked in accordance with the user requirements that have been determined previously. The points of testing that have been carried out by researchers are presented in the Table 1 below.

Table 1. Black Box testing.

No	Scenario	Expected Result	Result
1	User login with username and password	Dashboard page appears	Valid
2	User press the Learning Materials menubutton	Menu for selecting meetings 1-14 displayed	Valid
3	User presses meeting button 1-14	Learning materials at each meeting displayed	Valid
4	User press back button	Back to previous page	Valid
5	User press forward button	Go to next page	Valid
6	User press play button for learning video	Video displayed	Valid
7	User press the Learning Evaluation menu button	Case-based question and scores displayed	Valid

8	User press the Chatbot menu button	Chatbot page appears	Valid
9	User inputs text and communicates withchatbot	Chatbot understands the user's language and responds according to the text that has been inputted	Valid
10	Users notify the obstacles encounteredduring the lecture to the Chatbot	Chatbot responds and provides alternative learning solutions	Valid
11	User press usage guide button	Usage guide page appears	Valid
12	User press Profile button on Dashboard page	The profile and password update page appears	Valid
13	User press save button on edit profile page	User data updated in database	Valid
14	User press close button	Application closed	Valid

4.5 Distribution Stage

Researchers distribute learning media through the link provided to download the APK file which will then be installed on the cellphones of each student and teacher. In this study, application development is still limited to the use of Android and it is hoped that in the future there will be those who continue this research to develop it on a different operating system. The results of the questionnaire that the researchers got involved 62 respondents consisting of 60 students and 2-course lecturers who filled out the questionnaire form and got a very positive response, which can be seen in Table 2 below.

Table 2. User questionnaire results.

No	Criteria	Neutral (%)	Agree (%)	Strongly Agree (%)
1	Learning media provides benefits in in-depth explanations of concepts and case studies ofE-Business courses	6 (9.7%)	24 (38.7%)	32 (51.6%)
2	This learning media is effective for descriptive material and case study learning	0	26 (42%)	36 (58%)
3	This learning media makes it easier forstudents to understand E-Business courses	2 (3.2%)	20 (32.3%)	40 (64.5%)
4	Learning media interface looks attractive	5 (8%)	21 (33.9%)	36 (58.1%)
5	User experience in using this learning media is very good	0	13 (21%)	49 (79%)
6	This learning media is suitable with the needs of students	3 (4.8%)	10 (16.2%)	49 (79%)
7	Chatbot is very communicative and able to provide the information needed	0	5 (8%)	57 (92%)
8	This learning media is very easy to use	2 (3.2%)	12 (19.4%)	48 (77.4%)

Based on the results of the questionnaire above, the researchers concluded that this Chatbot-based learning media was in accordance with the research objectives, namely developing interesting technology-based learning media and according to the needs of students and

lecturers. This media can assist students in learning the concept of E-Business as well as case studies so that the needs and objectives of the researchers in this study have been met. The results obtained from the validation of this learning media user get a good response in terms of an interactive, simple, easy-to-understand display, and the Chatbot is very helpful for students in increasing grades on E-Business subjects.

5 Conclusions and Suggestions for Further Research

Through the discussion described above about Artificial Intelligence in the Development of Chatbot-based Learning Media, it can be concluded that at the assembly stage it takes a lot of time because at this stage the manufacture of simple machine learning and identification of natural language requires a perfect composition. In addition, at this stage the database used, namely Google Firebase, requires more time in designing the data structure because it uses the NoSQL concept, firebase is used to display the display of material and case study question banks, student profile data, and student academic assessment data. In the results of the questionnaire and validation, the data obtained have satisfactory results both from the validator and from the respondents, so it can be concluded that this chatbot-based learning media is feasible to be used as a supporting tool in E-Business learning.

Suggestions for further studies in order to be able to develop learning media on operating systems other than Android, and testing needs to be done in improving academic achievement and learning motivation when using this Chatbot-based learning media with regression method [15].

References

[1] Efriana, Leli. "Problems of online learning during COVID-19 pandemic in EFL classroom and the solution." JELITA (2021): 38-47.

[2] Holmes, Wayne, Maya Bialik, and Charles Fadel. "Artificial Intelligence in Education." (2020): 1-16.

[3] Sil, Riya, et al. "Artificial intelligence and machine learning based legal application: the state-of-the-art and future research trends." 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS). IEEE, 2019.

[4] Suhel, Sasha Fathima, et al. "Conversation to automation in banking through chatbot using artificial machine intelligence language." 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)(ICRITO). IEEE, 2020.

[5] Mendoza, Sonia, et al. "Supporting student-teacher interaction through a chatbot." International conference on human-computer interaction. Springer, Cham, 2020.

[6] CÎMPEANU, Ionuț-Alexandru. "Business Activities Using Chatbots." Informatica economica 25.3 (2021).

[7] Li, Ding, et al. "What influences an individual's pro-environmental behavior? A literature review." Resources, Conservation and Recycling 146 (2019): 28-34.

[8] National Academies of Sciences, Engineering, and Medicine. How people learn II: Learners, contexts, and cultures. National Academies Press, 2018.

[9] Puspitarini, Yanuari Dwi, and Muhammad Hanif. "Using Learning Media to Increase Learning Motivation in Elementary School." Anatolian Journal of Education 4.2 (2019): 53-60.
[10] Zulfiani, Zulfiani, Iwan Permana Suwarna, and Sujiyo Miranto. "Science education adaptive learning system as a computer-based science learning with learning style variations." Journal of Baltic Science Education 17.4 (2018): 711.
[11] Duncker, Dorthe. "Chatting with chatbots: Sign making in text-based human-computer interaction." Sign Systems Studies 48.1 (2020): 79-100.
[12] Pelau, Corina, Dan-Cristian Dabija, and Irina Ene. "What makes an AI device human-like? The role of interaction quality, empathy and perceived psychological anthropomorphic characteristics in the acceptance of artificial intelligence in the service industry." Computers in Human Behavior 122 (2021): 106855.
[13] Sriadhi, S., et al. "Effectiveness of Augmented Reality-Based Learning Media for Engineering-Physics Teaching." International Journal of Emerging Technologies in Learning 17.5 (2022).
[14] Suprapto, Yuyun, et al. "Design And Implementation Of Self-Test Learning Application To Increase Competence." International Joint Conference On Arts And Humanities (Ijcah 2020). Atlantis Press, 2020.
[15] Mendoza, M. D., O. Y. Hutajulu, and R. Salman. "Community constraints analysis in the use of solar power plants in Indonesia." Journal of Physics: Conference Series. Vol. 2193. No. 1. IOP Publishing, 2022.