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# Chatbots as Online Chat Conversation in the Education Sector

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***Abstract:*** *Chatbot technologies as virtual assistants have significantly emphasized streamlining and augmenting learning processes by integrating pedagogical approaches and innovative technologies. This research reviews the use of chatbots in education. The results of this review provide a comprehensive comprehension of the prior research on the use of Chatbots in education, including information on existing studies and its benefits, as well as prospective research areas on implementing Chatbot technology in the education sector. This study utilizes library research. The analysis shows that Artificial Intelligence technology permits incorporating Chatbot systems into various educational contexts and purposes, including for teachers, students, and administrators (institutional employees). First, teachers using chatbots can be virtual assistants for teachers to save time, including setting schedules, answering questions from students, and providing technical information about the learning system. Thus, the teacher has much time to prepare lesson plans or subject matter, make a set of questions, check assignments, and make other teaching preparations. Second, students using a chatbot can analyze student needs and provide teaching materials that are appropriate and specific to their needs. Learning can be done anytime and anywhere because of its ability to be able to reply to chats automatically. Chatbots will make it easier for students to get material and ask questions if they experience difficulties. Chatbots also make teaching and learning more manageable and teach-student communication and activities. Third, administrators using chatbots can simplify administration. The staff would be assisted in conveying information related to administrative matters and the student's registration process. Chatbots can be one of the best solutions to serve users by answering simple questions anytime without stopping. Chatbots can send broadcast messages to all students at once, and the data provided will be more personal, such as a reminder of tuition payments. Day by day, the popularity of chatbots is getting more attention and has penetrated the education sector. Chatbots should not threaten humans, but t can be used to help them. The teacher's role may be one of the parties that can be replaced by AI technology. However, it should be noted that AI cannot develop the character of both students and students, including providing motivation and establishing emotional relationships between teachers and students.*

***Keywords:*** Artificial Intelligent (AI), Chatbot, Chatterbot, Education, Online Chat Conversation

## 1. INTRODUCTION

The implementation of numerous digitally-based applications was facilitated by the rapid growth of information and communication technologies (Topal et al., 2021). Information technology and communication have evolved because of the complexity of artificial intelligence (AI) systems. AI systems are confronting human activities such as making decisions at the moment and conducting day-to-day responsibilities (Hiremath et al., 2020). Chatbot is one of the applications of AI technology that facilitate human activities. It means that a chatbot is a software programmed and designed to simulate conversation with human users through Artificial Intelligence (AI) (Sophia & Jacob, 2021).

Chatbot with another name, chatterbot, is a virtual conversation where one party is a chat robot that aims to be a means of entertainment. This chatbot feature has been used in various industries to convey information. Chatbots are one example of computer programs that use Artificial Intelligence (AI) to simulate human conversation. It is intended to be the ultimate virtual assistant for entertainment purposes, assisting with answering inquiries, obtaining driving directions, adjusting the thermostat in a smart home, and playing one's preferred music, among others (Ranoliya et al., 2017).

Chatbot is a computer program that can converse with users using natural language. Chatbots can be used to answer questions, provide information, and perform other specified tasks. According to Samperura et al. (2023), the history of chatbots started in the 1950s. At that time, artificial intelligence was still very basic and could only handle very simple queries. In the 1960s, ELIZA, a computer program the first to use to have a conversation with a user, launched. In the 1990s, chatbots became used in commercial applications such as customer service and systems help. In the 2000s, chatbots began to be used in applications mobile and web applications. With advances in technology, today's chatbots can be used in a variety of applications and using technology more sophisticated ones such as deep learning and natural language processing. Chatbots are computerized programs that act as a common language between humans and bots, virtual assistants that have become very popular in

recent years mainly due to dramatic improvements in fields such as artificial intelligence, machine learning, and other foundational technologies such as neural networks and natural language processing (Zulrahman & Syahputra, 2023).

Fryer et al. (2019) state that Chatbots (Chatterbots) began as a computer-based experiment with language. A chatbot is software (a computer program) that simulates human-to-human conversations using natural language (Rice & Gregor, 2016; Shingte et al., 2021). Chatbots converse with the client based on the input of a human and respond to the client's questions. It makes the user believe they are speaking with a human when they are conversing with a computer. Chatbots are designed to be virtual assistants, providing people with entertainment, assisting with answering queries and obtaining driving directions, serving as human companions in smart homes, etc. (Khin & Soe, 2020). A chatbot is software (or a machine) that can converse with a user; it is a virtual assistant that can respond appropriately to various user queries (Saadna et al., 2022).

Chatbot technology is also a digital assistant that can quickly understand and process user requests and provide relevant answers. That is why this term is known as a "bot". Bots are automation programs that can perform specific tasks and even imitate human conversations in the form of text or voice that are applied to websites and applications such as social media (Facebook, WhatsApp, Line, Twitter, Telegram, and others). Many types of chatbots can respond with a wide variety of human input. These bots scan keywords in the input, after which they respond with the most suitable keywords or the most similar word patterns from the textual database. So, if a user sends a request, the bots will send back a specific response based on the query sent. At that time, all the operator needs to do is give it an order. Besides that, a conversation can be made either via text or audio. After that, the bots start looking for the required data based on the keywords provided, whether text or audio. After getting the required data, it will be conveyed back to them in the form of text or audio. Not only, but this technology can also carry out transactions based on the orders given. If the user sends a command in the form of a word key that the Chatbot can identify, then the Chatbot will send back a specific response based on the query that was sent user (Trigreisian & Harani, 2023). Chatbots are systems that help users or companies with a range of tasks previously only able to be performed by humans (Aryasa, 2022).

Chatbots are often described as sophisticated and promising expressions of interaction between humans and machines. Behind the scenes, how chatbots work is divided into two tasks at the core of the first analysis of user requests and responding. The Chatbot returns a response based on input from the user. This process may look simple in practice but is quite complex (Fitria, 2023b). Chatbots use various up-to-date technologies, such as Artificial Intelligence (AI), Machine Learning, Deep Learning, and Natural Language Processing (NLP). Machine Learning can be applied as a machine that learns, analyzes, and recognizes various languages in chatbots. At the same time, Natural Language Processing (NLP) can understand and understand human language and then respond according to the language used by chatbot users. This type of Chatbot is supported by sufficient Al Software complex than rule-based chatbots (Fahrudin & Taufiqi, 2021). Al chatbot tends to build conversations based on historical data and has a predictive ability. This type of Chatbot is indeed more interactive and personalized. These features mean that the system is designed to answer user needs individually based on user background, profile, and activities. These chatbots collect user data over time, work contextually, use natural language understanding, and apply predictive intelligence to personalize user experience. Machine learning-based conversational systems provide impressive performance if the problem fits perfectly with the ability. By its nature, it learns from patterns and experiences previously. Colace et al. (2018) state that Chatbots are utilized in various applications, particularly systems that provide intelligent user support. These systems are frequently equipped with Chatbots that can interpret the user's queries and provide quick, accurate responses. The purpose of chatbots is to assist humans in conducting

tasks efficiently, and they require a minimal level of digital literacy to interact (Ouatu & Gifu, 2021).

According to Hussain & Athula (2018)**,** chatbots and conversational agents are computer programs that interact with users using natural language and artificial intelligence to give the impression that they are conversing with a human. Mateos-Sanchez et al. (2022) state that a chatbot is a software application that enables an automatic conversation between a user and a machine. A chatbot is an application that simulates human conversation through auditory or textual means. It is also known as a dialogue system, intelligent agent, and conversational agent (Yin et al., 2021). Chatbots are conversational AIs that mimic humans while conversing and automate mundane tasks to eliminate the need for humans (Meshram et al., 2021).

In recent years, chatbots have grown in popularity, with several instant messaging services introducing chatbot support, making it easy to create chatbots for various applications (Sreelakshmi et al., 2019). There are many different types of chatbots: some are built using artificial intelligence (AI), others rely on humans controlling them via keyboard commands or voice commands, and some even have multiple forms of input so users can choose how they interact depending on their preferences. Some may also be able to use facial expressions or other gestures instead of just typing words into a box as traditional chatbots do. These types add another level of interaction and increase user satisfaction as it feels more natural to talk to another person instead of just talking to someone over text.

Chatbots are an application in artificial intelligence currently gaining popularity (Kaur et al., 2021). Chatbots have gained popularity in numerous sectors, including healthcare, marketing, social media, banking, customer service, support systems, cultural heritage, entertainment, and even education (Clarizia et al., 2018; Saadna et al., 2022). It underpins the knowledge of whether or not machines can use algorithms based on empirical evidence to improve efficiency, communication, and dialogue. Many people interact with chatbots daily through their smartphones without realizing it. From catching up on sports news to navigating bank apps to playing casual games on Facebook Messenger, chatbots are changing how we live. Healthcare payers, providers, and medical assistants also use these AI-enabled tools to simplify patient care and reduce unnecessary costs. Health chat in the medical field always works whenever a patient talks to a medical representative who may sound human but is an intelligent conversational machine. Chatbots are used for various tasks such as customer service, sales, marketing, advertising, and public information dissemination (to name a few). They can be designed to do anything from finding the nearest coffee shop to helping people buy tickets to a sporting event – or whatever else we want them to do. However, not only popular in the business world or essential sectors such as health or banking, chatbots have penetrated the world of education as one of the innovations that can support learning. ChatBot technological advances have positively impacted various aspects of life (Prayitno et al., 2021). Technological developments are increasingly rapid, making the education sector participate in innovating by utilizing Chatbots in education, especially in the teaching and learning process.

A new era of education and research based on chatbots and artificial intelligence is quickly growing (Kooli, 2023). Several studies have been conducted on Chatbot technology, with an emphasis on educational applications will be discussed in this research. As Artificial Intelligence (AI) advances technologically, it will unavoidably affect classroom practices in numerous ways (Chiu et al., 2023). The results of this review provide a comprehensive comprehension of the prior research on the use of Chatbots in education, including information on existing studies and its benefits, as well as prospective research areas on implementing Chatbot technology in the education sector. Therefore, this research aims to review the use of chatbots in education.

## 2. METHOD

This study utilizes library research. A library research method is a research method that involves witnessing related literature in the form

of papers, books, or writing that addresses research problems (Roosinda et al., 2021). The purpose of the research method is to acquire data and information from various library materials, with the results serving as the fundamental and primary instruments for field activities. In this study, the researcher describes Chatbots in education, including information on existing studies, benefits, and challenges—method documentation for data collection. Suharto et al. (2022) state that a documentation study attempts to collect secondary data through documents; therefore, the document itself is the instrument. Some are common and suitable for use in our literature and scientific publications. In this study, the researcher utilizes literature and journal articles concerning using chatbots in education. The method of data analysis consists of data reduction, data presentation, and conclusion. (Miles et al., 2018). The data obtained from this study will be analyzed by data reduction. Researchers evaluated and selected the most critical aspects, presented as narrative data, and conclusions derived from these data. The data analysis phase employs descriptive analytics and focuses on using Chatbot in education.

## 3. FINDINGS AND DISCUSSION

Innovative pedagogical approaches have been developed and incorporated with new technologies to enhance the learning experience due to the rapid expansion of technology in the education sector (Bahja et al., 2019). Virtual assistants or chatbot technologies have significantly emphasized streamlining and augmenting learning processes by integrating pedagogical approaches and innovative technologies. The introduction of Artificial Intelligence technology permits the incorporation of Chatbot systems into a variety of educational contexts. Increasingly, this technology is used for educational purposes. Okonkwo & Ade-Ibijola (2021) state the potential for chatbot technology to provide rapid and individualized services to everyone in the sector, including teachers, students, and institutional employees.

Chatbot is a feature with artificial intelligence (AI) to reply to messages quickly. Chatbot is a computer program that simulates human chat or conversation. Those conversations can be voice commands, text chats, or even both. Chatbot is an interactive application design that can converse with humans through several platforms. This function includes subscription messaging services such as communicating directly with relevant conversations. Therefore, Chatbot is a virtual conversation service with the second party being a robot. However, due to several limitations, the Chatbot can only partially replace the role of humans, including teachers, in this case, Chatbots, in the world of education. Even so, this Chatbot has benefits as a learning medium.

Numerous helpful review on chatbots in education has been carried out (Nee et al., 2023). Several studies have been conducted on Chatbot technology, and this research will focus on educational applications. As Artificial Intelligence (AI) technology advances, it will inevitably influence classroom practices in various ways. This review provides a thorough understanding of the prior research on using Chatbots in education, including information on existing studies, benefits, challenges, and prospective research areas on implementing Chatbot technology in the education sector. The ability of chatbots to interact with students using natural language has allowed them to penetrate the educational sector (Qin et al., 2020).

First, chatbots can potentially be administrators (Palasundram et al., 2019). For instance, a tutor can be available 24/7 to answer and elucidate any queries from students who missed class. We can see this from the findings from several previous research. Santoso et al. (2018) state that Universitas Dian Nuswantoro (UDINUS) University provides the services through corporate websites. The name of this Chatbot is Dinus Intelligent Assistance (DINA). It employs a knowledge-centered machine learning approach. The pattern extracted from the knowledge base can be utilized to provide the user with responses. Shingte et al. (2021) state that a chatbot as a messaging assistant application enables students to learn about the college admissions process from any location with an internet connection and receive prompt responses. This chatbot system reduces the

burden of the department responsible for the admissions process by providing the necessary information to students or guardians and reducing the department's need to continue answering all students' questions. Nguyen et al. (2021) state that after adding this Chatbot to the NEU Admissions Fanpage on Facebook, users have received many inquiries from students and parents regarding NEU enrollment procedures. Chatbot programs can respond to all queries automatically and without human intervention at any time. So, it is rational to apply this Chatbot to university admissions, particularly at the National Economics University, thereby reducing the burden of admission counseling. Mursidah et al. (2022) state that the postgraduate registration chatbot is implemented using the Dialogflow tool with the Natural Language Processing (NLP) method and the WhatsApp API, which is expected to design a chatbot to make it easier for applicants and the postgraduate programs of Informatics Engineering to answer questions related to selection into postgraduate programs. The results show that the Chatbot can answer questions regarding ITS postgraduate registration with an accuracy of 98.82%. The Chatbot can be an intelligent assistant, providing solutions for higher education institutions to enhance their current services, reduce labor costs, and develop new innovative services (Hien et al., 2018).

Second, Chatbot has the potential to help teachers. Pham et al. (2018) state that a chatbot, 'English Practice,' can be installed on mobile devices so users can communicate via a messaging interface. It can autonomously remind students to study and recommend answers to multiple-choice questions. It also assists users with acquiring vocabulary and new courses. The result indicates that users utilize the majority of the system's fundamental features. Haristiani (2019) states that chatbots have a high potential for use as a language-learning tool, both as a teacher for language practice and as an autonomous learning tool. The result reveals that language learners are interested in using chatbots because they can be used anytime and anywhere. They are more confident when using chatbots to acquire languages than when working with human instructors. Afrianto et al. (2019) state that Chatbot technology can be an interactive learning media solution for practicing spoken and written English conversations. The existing error correction and self-evaluation features can help users improve their English conversation skills. Haristiani and Rifa'i (2020) state that Chatbot (Gengobot) is a chatbot-based grammar application that includes Japanese Language Proficiency Test Level grammar materials in Indonesian, English, and Japanese. The test confirms that Gengobot has been developed effectively and operates correctly. The students agreed that the materials and features of Gengobot were adequate, beneficial, user-friendly, and appropriate for language acquisition. Gengobot is also highly accessible due to its integration with the social media platform LINE, allowing students to customize its use according to their individual learning preferences and requirements. Sarosa et al. (2020) state the chatbot application, named ELA-bot or English Learning Assistant Bot, has been implemented for students of the D3 English study program at the State Polytechnic of Malang that Chatbot will automatically assist if someone who is learning has difficulty.

The test results showed that 98% of students stated that chatbots help them learn English structure. It shows that the Chatbot is one of the advanced computing technologies that can be used for learning, particularly language learning (Haristiani, 2019). Lee et al. (2020) state that chatbots can respond to natural language and command questions after teachers upload the necessary course-related data to an online database. The Chatbot can respond to inquiries about course materials and class schedules. The Chatbot also supports an authentication system to provide responses based on various student profiles. (e.g., schedule of their enrolled class and score dissemination). A survey of computer science students revealed that Chatbot could function effectively as an online tutor to alleviate instructors' burdens and will be a valuable addition to other e-learning platforms. Parina et al. (2022) state that the Cerdasbot application can provide convenience for elementary school students to learn more interactively in an all-rounded digital time. Chatbots are intelligent agents that simulate human conversational skills

with users/humans. In education, chatbots can be used to construct learning media by presenting interactive and engaging materials and queries.

Teachers may be overburdened and exhausted from working outside their office hours to provide their students with a great learning experience. Most of the tasks performed by teachers are repetitive and mediocre. For example, they track student attendance, grade tests, or send students assignments. Repetitive assignments can be easily done using chatbots as teacher assistants. With AI, chatbots can help teachers justify their work without overwhelming them. For example, if an institution automates student attendance records, it should ensure that the Chatbot in the school sends notes and recorded lecture recordings during their absence. Implementing digital-era learning as it is now is not enough if the teacher only explains and students sit quietly in class to listen. Using Chatbot, learning can be done anytime and anywhere. Because of its ability to reply to chats automatically, this Chatbot can analyze student needs and provide subject matter that is appropriate and specific to what we are studying.

Third, Chatbot has the potential to help students. Bariyah and Imania (2022) conducted a study involving the development of a Whatsapp-based virtual assistant chatbot to facilitate students' access to lecture information. This Chatbot technology makes it simpler for students to obtain information. Chatbots can be helpful as a system that can reduce the workload of universities in answering student questions, provide 24-hour service, and respond more quickly to student questions. They concluded that Chatbot is a messaging system commonly used by humans in information services to aid the service work (Bariyah & Imania, 2022). In a different focus, Khalil & Rambech (2022), used Eduino a chatbot created on the social media platform Telegram that functions as a conversational agent for learning-based platforms. Eduino provides features for acquiring lecture notes and course schedules, completing course-related exams, and communicating with course professors via a conversational messaging interface. According to Essel et al. (2022), students who interacted with the Chatbot performed significantly better academically than those who interacted with the course instructor.

AI chatbots can provide personal attention to students and their study habits. They can closely observe learning patterns and content consumption, and based on that, they can help students excel in their streams. With an intelligent tutoring system, schools can provide personalized learning experiences. Not all students understand and learn similarly; some even have disabilities. Lesson plans can be adapted and ensure that students gain maximum knowledge- in and outside the classroom using chatbots. They help students with all subject matter as and when they need it. A "chatbot" is a computer program that interacts with and processes human dialogues, allowing humans to interact and communicate with digital devices.

Additionally, it is characterized as one of the most sophisticated and promising forms of human-machine interaction. Its primary purpose is to answer students' questions (Shah & Panchal, 2022). Students can use chatbots wherever and whenever they want, so they are very flexible to become interactive learning media. Teachers can provide explanations in the form of writing, video, and even audio so that there will be more benefits from learning media like this. This is undoubtedly very helpful for students who experience learning lag.

These findings are similar to Zahour et al. (2020) that the positive aspects of chatbots can benefit the educational sector, where learning can take place anytime and anywhere. Because of its ability to reply to chats automatically, this Chatbot can analyze student needs and provide teaching materials that are appropriate and specific to what we are learning. All users can find information about the school, from lessons, teachers, and payment, to complete study time via the Chatbot alone. Chatbot technology helps and supports the learning process. Chatbots can be virtual assistants for teachers and save time. For example, setting schedules, answering questions from students, and providing technical information about the learning system. Thus, the teacher has much time to prepare lesson plans or subject matter, make a set of questions, and check assignments. Chatbots will make it easier for students to get material and ask questions if

they experience difficulties. Chatbots also make the teaching and learning process easier, as well as teacher-student communication and activities; there is also information about extracurriculars and student interactions. Thus, students are more active and do not quickly lose focus while studying. Chatbots can simplify administration. This staff will be assisted in conveying information related to administrative matters and the student registration process. Therefore, chatbots can be the best solution for users to answer simple questions anytime without stopping. Chatbots can send broadcast messages to all students simultaneously. The data provided will be more personal, such as a reminder of tuition payments, which will be adjusted to the majors and classes being taken. Likewise, if students need help during the registration process, changes to activity schedules, and important notifications, the Chatbot will personalize it according to each student's data. It means that a university/school must provide outstanding service in higher education services, including admission services, to ensure student candidate satisfaction. In addition to the quality of the education, consultation services, and information must be provided to student candidates to achieve their satisfaction.

Those studies show that chatbots in education are increasingly being adopted in education, such as by administrators, teachers, and students. These findings are similar to Essel et al. (2022), that chatbots are expanding significantly across many industries, including education. As a complex and integrated topic, chatbots provide comprehensively accessible guidance in any form. Chatbots are different from other computer programs because they are specifically designed to communicate with humans and replace the role of humans. Apart from that, chatbots can be an alternative to solving problems in education (Achzab & Budiyanto, 2018). Using chatbots as conversational agents is one of the technologies educators can leverage to support teaching and learning (Gonda & Chu, 2019).

Pérez et al. (2020) identify two groups of applications defined through chatbot activity: "service-oriented chatbots" and "teaching-oriented chatbots ."One of the most common use cases for chatbots is during the college application process, where institutional resources are often overwhelmed. At the same time, students and parents are often left frustrated and confused. Chatbots can allow users to make course requests, and start the registration process, on the one hand, and on the other hand, act as virtual teaching assistants reducing the teacher's workload. The second type of Chatbot is designed to answer common student questions and direct them to relevant information such as lesson plans, course modules, deadlines, and assignments. The education sector is becoming more technology-driven. Chatbots provide direct answers to questions, guide students and parents through the sales funnel and motivate them to take further action.

Day by day, the popularity of chatbots AI is getting more and more attention and has penetrated other sectors, such as education (Fitria et al., 2022). The role of AI, which is said to reduce human error, has made some parties boast that later this technology will replace the role of humans in various fields, including education (Fitria, 2021, 2023a; Fitria et al., 2022). Ultimately, artificial intelligence should not be a threat but can be used to help someone. The role of teachers and educators is one of the parties that is quite busy being said to be replaced by AI technology. However, it should be emphasized that artificial intelligence cannot develop the character of both students and students, including providing motivation and establishing emotional relationships between teachers and students. The presence and progress of AI technology today will be beneficial in facilitating the work of educators, including in administrative matters, provision of intelligent content, voice assistants, automatic assessments, and others. The role of AI in life will facilitate all daily activities. However, it must be understood that this technology cannot replace or even shift human functions and roles because no technology has properties as complex as humans until recently.

## 4. CONCLUSION

Chatbot is a feature with artificial intelligence (AI) to reply to messages quickly. Chatbot is a computer program that simulates human chat or conversation through several

platforms. This technology is used for educational purposes, including for administrators (institutional employees), teachers, and students. First, chatbots can serve as intelligent assistants, providing solutions for institutions that employ higher education to enhance their current services, reduce labor costs, and develop new innovative services. Administrative staff will be assisted in conveying information related to administrative matters, such as answering questions and the student registration process. Second, chatbots can be virtual teaching assistants, such as preparing lesson plans or subject matter, making questions, checking assignments, etc. Second, students using a chatbot can analyze student needs and provide teaching materials that are appropriate and specific to their needs. Third, Chatbot technology makes it simpler for students to obtain information. Chatbots make it easier for students to get material and ask questions if they experience difficulties. Chatbots make the teaching and learning process more manageable as well as teacher-student communication and activities. As a complex and integrated topic, chatbots provide comprehensively accessible guidance in any form.

As clever as ChatGPT is, humans will always be able to find new ways to take advantage of this technology. The world of education must be able to see ChatGPT as a tool, not as a competitor or even as an opponent. In the end, even though ChatGPT raises new challenges, it can also be an opportunity for students to overhaul the learning system in a better direction.

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