

Case study: Impact analysis of educational Chatbot use in supporting students in the online learning process

Febi Afriani¹, Suyato¹, Indra Devi²*, Aisyah Syafitri², Nur Indri Yani Harahap², Ali Mustopa Yakub Simbolon²

¹ Universitas Negeri Yogyakarta, Indonesia.

² Universitas Islam Negeri Sjech M. Djamil Djambek Bukittinggi, Indonesia.

* Corresponding Author. E-mail: febiafriani.2024@student.uny.ac.id

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ABSTRACT

This research aims to analyze the impact of using educational chatbots in supporting students in online learning processes. The research methodology adopts a qualitative approach with a case study design to examine the effects of chatbot usage on students in online learning. Data collection techniques involve conducting in-depth interviews with students, teachers, and school administrators, engaging in participatory observation during online learning sessions, and analyzing official documents and chatbot interaction logs. The research findings indicate that the use of chatbots significantly enhances student engagement, facilitates quick access to information, and provides personalized support in understanding the material. Furthermore, chatbots successfully create an interactive and responsive learning environment, boosting students' learning motivation and problem-solving abilities. The primary conclusion drawn from this research is that educational chatbots have a positive impact on improving the effectiveness of online learning by strengthening the interaction between students and the learning platform. The implementation of chatbots can be an effective solution to enhance the efficiency and quality of student's learning experiences in virtual environments. These findings offer valuable insights for further development in integrating chatbot technology into the context of online education, with the potential to improve accessibility, effectiveness, and holistic student experiences in distance learning.



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INTRODUCTION

Education plays a very important role in the development of individuals and society as a whole (Kusumawati et al., 2023). With the rapid advancement of information technology, a new paradigm in the learning process has emerged, one of which is through the implementation of educational chatbots. Educational chatbots are computer programs designed to interact with users through text or voice conversations and have become an integral part of digital transformation in education. Along with the rise of online learning, there is an urgent need to address the challenges faced by students and educators in virtual learning environments (Bakare & Jatto, 2023). Online learning offers significant flexibility in terms of time and location, allowing students to study according to their

schedules. However, a major challenge with online learning is the lack of direct interaction between teachers and students, which often hinders personalized support and instant clarification of material. According to [Gimhani \(2023\)](#), Online education still struggles to optimize interaction and support for students, which impacts learning effectiveness.

Educational chatbots are emerging as a promising innovative solution to enhance the online learning experience. Chatbots can act as virtual agents that provide quick responses, relevant information, and personalized support to students. As such, chatbots can help bridge the gap between students' need for immediate assistance and educators' limited time and capacity to provide individualized support ([Bakare & Jatto, 2023](#)). Educational chatbots have significant potential to enhance the online learning experience, but the main challenges faced are effectiveness, student acceptance, and integration of this technology into existing learning systems. These challenges include ensuring the effectiveness of chatbots in improving learning outcomes, the level of acceptance and adaptation by students, and the integration of this technology into existing learning systems ([Mahendra et al., 2024](#)). To address these challenges, it is important to explore the extent to which chatbots can positively impact online learning and how students can accept and adopt this technology in their daily learning activities. One approach is to effectively integrate chatbots into existing online learning platforms, encouraging innovation without requiring significant changes to existing learning infrastructure. In this way, educational institutions can take advantage of new technologies while maintaining established and effective learning systems ([Mahendra et al., 2024](#)).

Recent years have seen a significant increase in the adoption of technology in education, particularly in online learning. Educational chatbots are emerging as innovative tools designed to provide instant learning support to students ([Aksenta et al., 2023](#)). This technology offers the potential to address some of the key challenges faced in online learning, such as the lack of direct interaction and personalized support from educators. However, although educational chatbots have been widely discussed in the literature, many educational institutions still experience difficulties in effectively implementing and optimizing this technology ([Mahendra et al., 2024](#)). Many previous studies have focused more on the technical development of chatbots rather than their impact on learning and user acceptance in real educational environments ([Pustikayasa et al., 2023](#)).

The problems faced in implementing an educational chatbot at Junior High School 1 Tigo Nagari are related to the effectiveness and acceptance of this technology in supporting the online learning process. In an educational environment that is increasingly adopting online learning, students often face difficulties in getting instant help and clarification of material. The lack of direct interaction between teachers and students often results in gaps in material understanding and personalized support for students. Educational chatbots present a potential solution to this challenge by providing quick responses and personalized support that can be tailored to students' individual needs. However, the success of this chatbot implementation depends on the extent to which students and teachers can accept and utilize this technology effectively. The impact analysis of using the chatbot at Junior High School 1 Tigo Nagari also faces challenges in measuring how much the chatbot contributes to improving learning quality and student engagement. In addition, there are concerns regarding the integration of chatbots into the existing learning system, especially in ensuring that this technology does not replace the important role of teachers but instead strengthens the interaction and support provided to students.

The integration of chatbots in the education sector has been the subject of systematic review and analysis by various researchers, which provides a comprehensive framework as well as valuable insights into the development and implementation of this technology in the educational context. The systematic literature review by [Pérez \(2020\)](#) provides a solid foundation for research and development, highlighting the potential of chatbots to improve educational outcomes through reliable and informative findings. This systematic approach is essential to guide future efforts in utilizing chatbots for educational purposes. In the same way, [Wollny \(2021\)](#) review investigated the current applications of chatbots in education, emphasizing their pedagogical role, their use in tutoring, and their potential to personalize the learning experience. This comprehensive review highlights the various ways in which chatbots can contribute to educational practice, particularly in enhancing personalized learning experiences.

Kuhail (2023) further extends this understanding by reviewing the educational chatbot landscape through a multidimensional lens, focusing on aspects such as educational field, platform, design principles, chatbot role, interaction style, evidence, and limitations. This analysis offers a holistic view, providing valuable insights for educators, developers, and researchers looking to integrate chatbots into educational settings. Additionally, Chocarro (2023) explored teachers' attitudes toward educational chatbots using a technology acceptance model. The study considered factors such as social language, bot proactivity, and user characteristics, providing important insights into the perception and acceptance of chatbots by educators. This research highlights the human factors that influence the successful integration of chatbots in educational environments. This systematic review collectively emphasizes the transformational potential of chatbots in education and highlights the need for careful consideration of various factors to successfully implement them in educational settings.

This research builds on previous studies that have examined the use of technology in education. However, the novelty of this research lies in its focus on analyzing the impact of using educational chatbots which has not been fully explored. Along with recent developments in technology and online learning, this research seeks to answer open questions regarding the effectiveness of chatbots as learning support tools. This research highlights the specific impact of using educational chatbots in online learning at Junior High School 1 Tigo Nagari, which has not been explored in previous literature. By focusing on Junior High Schools in Indonesia, this research presents a new perspective on how this technology can be adapted to diverse educational environments that differ from education in developed countries.

Therefore, this study aims to analyze the impact of using educational chatbots in supporting students in the online learning process. This research aims to comprehensively analyze the impact of using educational chatbots in supporting students in the online learning process. This objective also involves identifying key factors that influence the acceptance and effectiveness of chatbots in online learning environments. The importance of this research is not only reflected in technological advances but also in the urgent need to improve the quality of online learning. Educational chatbots promise the possibility to change the learning paradigm, making it more interactive, responsive, and tailored to individual needs. With a chatbot in place, it is expected that students can obtain help and information more efficiently, thus enhancing their learning experience. The rationality of this research lies in the attempt to address the existing challenges in online learning and provide solutions that can improve the quality and effectiveness of the learning process.

This research has an important role to play in improving the quality and effectiveness of online learning. By analyzing the impact of using educational chatbots, this research provides in-depth insight into how such technology can increase student engagement, provide personalized support, and stimulate learning motivation. This is all the more important given the rapid development of technology and the shift towards widespread online-based learning. Firstly, this research provides empirical insights into how chatbots can improve the effectiveness of online learning, particularly at Junior High School 1 Tigo Nagari. Second, the results can guide educational institutions in implementing and optimizing the use of educational chatbots, with evidence-based recommendations. Thirdly, this study enriches the existing literature by highlighting the importance of local context in the adoption of educational technology and emphasizing the need for proper integration so that the technology serves as a supporting tool, not a substitute for the role of teachers. Finally, it paves the way for further research into the use of technology in education in Indonesia and other developing countries with unique challenges and needs. By detailing these objectives, this research is expected to provide a meaningful understanding of the application and impact of chatbots in online learning.

METHOD

This research uses a qualitative method with a case study approach to analyze the impact of using educational chatbots in supporting students in the online learning process at Junior High School 1 Tigo Nagari. The case study approach was chosen because it allows researchers to explore the

phenomenon in depth in a real and specific context. Data were collected through direct observation, in-depth interviews with 3 students, 3 teachers, and 1 school administrator, and document analysis related to the use of chatbots in learning. The interviews were semi-structured to gain richer and deeper insights into the participants' experiences and perceptions of using chatbots. Direct observation was conducted during several online learning sessions to see the interaction between students and chatbots in the context of the virtual classroom. The data obtained were thematically analyzed to identify patterns, themes, and relationships relevant to the impact of chatbot use on student learning. Triangulation procedures were applied to increase data validity and reliability by comparing findings from multiple data sources. The results of the analysis are expected to provide a more comprehensive understanding of how chatbots can support the student learning process and the challenges faced in the implementation of this technology in educational settings (Devi, 2023).

RESULTS AND DISCUSSION

Results

Student and Chatbot Contextual Interaction

Table 1. Question type and Frequency

No.	Question type	Frequency
1	Subject Matter	120
2	Assignment Help	75
3	General School Information	30

Table 1 provides a comprehensive overview of the types of questions most frequently asked by students to the chatbot. Based on an interview with a student with the initials NH, he revealed that he interacted more frequently with the chatbot to ask about the subject matter, with a total of 120 related questions. This shows that the chatbot has been successful in providing effective support in understanding difficult subject concepts. The use of natural language processing technology by the chatbot allows for a better understanding of student questions, resulting in more relevant and informative answers. This is supported by direct observation, where it was seen that students often ask questions related to subjects such as math and science, which many students find difficult.

It is important to note that a chatbot's quick and relevant response to student queries has a positive impact on the online learning experience. The ability of chatbots to provide information instantly helps students overcome barriers to understanding efficiently. In addition, the frequency with which students ask questions about subject matter suggests that chatbots can be a highly effective tool in supporting their learning process (Tanduklangi & Amri, 2019). In addition to subject matter, assignment assistance also attracted attention in the data analysis. The frequency of assignment-related questions suggests that chatbots can serve as a valuable tool for students in completing their assignments. The chatbot can provide guidance, explain difficult concepts, or give advice needed to complete the task well (Ruskandi et al., 2021).

During the interview, students with the initials NH revealed that the chatbot helped them understand the material taught in class better. They feel more comfortable asking questions to the chatbot because they do not feel worried if their questions are considered trivial. Students B and AK also stated that the chatbot helped them prepare for exams by providing material summaries and practice questions. This more interactive learning experience helps to increase students' motivation and engagement in online learning. In addition to subject matter, chatbots are also frequently used to get assignment help. With a frequency of 75 questions related to assignment help, B often asked for guidance or clarification on assignments given by teachers. The chatbot provided useful suggestions and strategies for completing the assignment, as well as explaining concepts that were difficult to understand. This suggests that the chatbot can serve as a valuable tool in supporting Bs to complete their tasks independently (Manuaba et al., 2024). AKs stated that the chatbot's ability to provide instant answers helped them save time and complete tasks more efficiently.

Teachers at Junior High School 1 Tigo Nagari have a positive view towards the use of chatbots as a learning support tool. TH noted that chatbots help ease the workload by answering basic

questions frequently asked by students. As such, teachers can focus more on teaching more complex material and give more attention to students who need further guidance. GE reports that students who actively use chatbots tend to be better prepared and participate more in class discussions. This suggests that chatbots encourage students to be more independent in seeking information and solving problems. However, some teachers also highlighted the challenges associated with using chatbots. S expressed concern that students may rely too much on the chatbot for quick answers, which may hinder the development of their critical thinking and problem-solving skills. S emphasized the importance of integrating the use of chatbots with teaching approaches that encourage students to think critically and independently. They also emphasized the need for training for students to make optimal use of chatbot features and ask effective questions.

School administrators stated that the integration of chatbots into the school's online learning system has improved the efficiency of communication between students and the school. The chatbot has helped deliver general information, such as class schedules and school announcements, more effectively. With 30 interactions related to general school information, the chatbot serves as an efficient communication tool between students and the school, reducing the need for repeated administrative queries to school staff. IY also recognized the challenges in managing this new technology. IY noted that there is a need to ensure that the chatbot is constantly updated with the latest and relevant information. This requires close collaboration between the technology developers and school staff to ensure that the chatbot can provide accurate and up-to-date information. In addition, there is a need to continuously monitor the use of the chatbot to ensure that this technology is used ethically and does not interfere with students' learning.

Optimizing the use of chatbots, and understanding daily interaction patterns is crucial. Analysis of the frequency of interactions on certain days can help in determining the optimal schedule of the chatbot. For example, on days with high interaction rates, increased chatbot availability can be considered to ensure that all students get the support they need (Sholeh & Fudholi, 2020). These steps can increase the effectiveness of the chatbot in supporting the overall student learning process. In addition, understanding student preferences and needs through interaction patterns can aid the development of additional content or improved chatbot functionality to meet evolving demands in a dynamic online learning environment. For example, chatbots can be developed to provide more in-depth explanations of certain topics or provide additional relevant learning resources (Sholeh & Fudholi, 2020).

This research shows that educational chatbots have great potential to enhance the online learning process by creating a more interactive and responsive learning environment. However, to maximize its benefits, a comprehensive approach involving all stakeholders, including students, teachers, school administrators, and technology developers, is required. In this way, chatbots can be an effective tool to enrich students' learning experience and improve educational outcomes at Junior High School 1 Tigo Nagari.

Student Perception of Chatbot

Students' perception of chatbots in education is an important aspect to understand to optimize their use in the learning process. In recent years, chatbots have become one of the technological innovations that are increasingly being implemented in various educational institutions. The use of chatbots in education has become an increasingly common phenomenon along with the advancement of digital technology. At Junior High School 1 Tigo Nagari, the implementation of chatbots in online learning has triggered various reactions from students, which provides valuable insights into the effectiveness and acceptability of this technology. Students' perceptions of chatbots vary widely, covering aspects of practicality, engagement, and effectiveness in improving material understanding (Wahyuni, 2022).

The importance of understanding students' perceptions of chatbots lies in building a learning system that suits their needs and preferences. NHs perceive chatbots as an innovative solution that can improve learning efficiency, while others may feel skeptical or even anxious about their use (Fikri et al., 2023). Therefore, research on student perceptions of chatbots can provide valuable insights to improve the design and implementation of chatbots in educational settings.

Direct observation and in-depth interviews with B show that most students consider chatbots as a practical and efficient tool in supporting their learning. AK appreciated the ease of access provided by the chatbot, especially in terms of obtaining information related to course materials and school assignments. Many students feel that chatbots can provide quick and relevant answers, allowing them to solve questions and problems they face in a shorter time compared to waiting for responses from teachers or classmates (Azhar & Nasution, 2023). B mentioned that chatbots provide a more engaging and interactive learning experience. Features such as practice questions, interactive quizzes, and structured explanations help to increase student engagement in learning. Students who prefer to learn independently find that chatbots are ideal study companions, who can be relied upon to provide additional explanations when they encounter difficulties. The chatbot's natural language processing allows for more natural and personalized interactions, making students feel more comfortable and engaged in the learning process (Mawardi et al., 2024).

However, some students expressed skepticism towards the use of chatbots. AK felt that chatbots cannot replace direct interaction with teachers, especially when it comes to explaining complex concepts. Previous unsatisfactory experiences with similar technologies may influence their perception of chatbots. Students who experience difficulties in navigating the user interface or getting satisfactory answers from the chatbot may feel less comfortable and reluctant to interact further with this technology.

Document analysis and interviews with teachers revealed that the use of chatbots generally improved students' understanding of the subject matter. A graph of the interaction results showed a positive correlation between the frequency of chatbot use and the improvement of students' scores in exams and assignments. TH noted that students who actively used the chatbot tended to show improvement in basic concept understanding and analytical ability. The chatbot provided significant additional support, especially for students who needed more detailed explanations or assistance in completing homework assignments. GE also observed that students who frequently interacted with the chatbot showed improvement in learning independence. They are more willing to ask questions and explore the material in depth, which is an indication that the chatbot has encouraged them to be more actively involved in the learning process. However, the effectiveness of the chatbot in improving material understanding is inseparable from the teacher's role in providing guidance and support. Teachers who provide clear orientation and feedback on the use of chatbots help students to better utilize the features available and understand how this technology can help them learn (Manongga et al., 2022).

The views of teachers and school administrators play an important role in shaping students' perceptions of the use of chatbots. Teachers who are actively involved in the implementation of this technology, provide support, and motivate students to use it, help to increase students' acceptance of chatbots. In the interviews, S stated that they have seen a positive impact from using chatbots in their classes, and they plan to continue utilizing them in learning. GE also highlighted the importance of integrating chatbots with existing teaching methods, so that students can see how this technology can complement traditional learning. School administrators felt that the integration of chatbots has provided significant benefits in terms of efficiency and communication. It has made it easier to deliver important information to students, reduced administrative burdens, and improved the accessibility of learning resources. However, IY also recognizes the challenge of ensuring that this technology is continuously updated and relevant to students' needs. Collaboration between technology developers, educators, and students is crucial to ensure that chatbots can meet learning expectations and needs (Hadian et al., 2023).

Some of the factors that influence students' perceptions of chatbots include clarity of purpose of use, a friendly user interface, and the chatbot's ability to provide adequate responses. Students who have a clear understanding of the functions and benefits of chatbots tend to have a more positive perception of their use (Raharjo, 2023). Therefore, it is important to give students a good orientation on how to utilize this technology effectively. A friendly and intuitive user interface is also a key factor in shaping student perceptions. Students who feel comfortable and easy to interact with chatbots tend to use them more often as learning aids. Conversely, students who experience difficulties in accessing the chatbot's features or get unsatisfactory answers may feel less interested in using it. The chatbot's ability to provide adequate and relevant responses also greatly influences

students' perceptions. Students appreciate chatbots that can provide precise answers and clear explanations. Therefore, chatbot development should focus on improving the quality of responses and the ability to better understand student questions.

Student perceptions of chatbots in education have significant implications for their acceptance and successful implementation. Therefore, chatbot development in an educational context should consider the diversity of student perceptions to ensure its sustainability and successful use in improving the quality of learning. This research recommends that schools continue to evaluate and adjust the use of chatbots, based on feedback from students and teachers. Continuous training and orientation for students and teachers on the use of chatbots can help improve understanding and skills in utilizing this technology. In addition, it is important to further develop the features of the chatbot to make it more responsive and relevant to the evolving needs of education (Sabri, 2020).

This research shows that chatbots have great potential to enhance students' learning experience by providing flexible and responsive additional support. However, to maximize its benefits, a comprehensive approach involving all stakeholders, including students, teachers, school administrators, and technology developers, is required. In this way, chatbots can be an effective tool to enrich students' learning experience and improve educational outcomes at Junior High School 1 Tigo Nagari.

Sustainability of Chatbot Usage

The utilization of chatbots as a learning support tool has become a significant innovation in various educational institutions. At Junior High School 1 Tigo Nagari, this study explores the long-term sustainability of chatbot use by considering its effectiveness, user acceptance, challenges faced, and strategies to improve the sustainability of its implementation. Various methods, including direct observation, in-depth interviews with students, teachers, and school administrators, as well as analysis of related documents, were used to gain comprehensive insights into the implementation of chatbots in the learning process.

One of the main factors influencing the continued use of chatbots is their effectiveness in helping students achieve learning objectives. Based on direct observations and interviews with students, it is apparent that chatbots play an important role in improving students' understanding of the subject matter. NHs reported that their interaction with the chatbot had a positive impact on concept understanding and analytical skills. The chatbot successfully provided relevant answers and clear explanations, which helped students overcome the difficulties they faced in the learning process (Sugiono, 2021). In addition, chatbots provide significant additional support, especially for students who require further assistance in completing assignments or understanding difficult material. The effectiveness of chatbots in providing timely and informative responses also encourages students to interact with them more frequently, which in turn increases their understanding and engagement in the learning process. Thus, the effectiveness of chatbots becomes one of the key factors in ensuring their continued use in educational settings (Lubis & Sumartono, 2023).

The continued use of the chatbot is also closely related to user acceptance, particularly in terms of student perceptions and preferences. The results of the in-depth interviews showed that while many students responded positively to the chatbot, their preferences and needs may change over time. AKs state that they appreciate the ease of access and flexibility provided by chatbots, while others feel that chatbots cannot fully replace the role of teachers in learning (Cannavaro, 2023). To understand these changing perceptions, it is necessary to conduct ongoing research that monitors how students respond to the use of chatbots over time. Developing and adjusting the chatbot design to remain relevant to the evolving needs of users is important to maintain its acceptance and sustainability. In addition, it is important to involve students in the chatbot development process, by integrating their feedback to improve the user experience.

The use of chatbots in education cannot be separated from technical and non-technical challenges. From a technical perspective, the security, data integrity, and performance aspects of the chatbot must be maintained so as not to raise doubts or distrust from users. Document analysis shows that schools have taken steps to ensure student data security and improve chatbot performance, but these challenges require constant attention to ensure the sustainability of chatbot use (Subiyantoro,

2023). On the other hand, non-technical challenges such as a lack of understanding or support from stakeholders, such as teachers and parents, can be a significant barrier. Interviews with S and IY revealed that while most support the use of chatbots, there is still a need to improve their understanding of how to effectively utilize this technology. Managing this challenge is essential to ensure the sustainability of chatbot implementation.

A strategy of continuous development and improvement is key to maintaining the sustainability of the chatbot. The integration of feedback from users, both students and teachers, can be the foundation for the development of new features or improvements to the chatbot. Interviews with B students showed that they appreciated interactive features such as practice questions and quizzes, and wanted more content that could be customized to their individual needs (Nasution et al., 2023). It is also necessary to continuously improve the artificial intelligence of the chatbot so that it can adapt to the needs and development of the education curriculum. In an interview with school administrator IY, it was revealed that further development of the chatbot's ability to better understand and respond to student questions is a priority. This could include improved natural language processing and integration with other learning technologies to create a holistic learning ecosystem. The role of teachers in supporting the continued use of chatbots should not be overlooked. Teacher support can include robust training to optimize the use of chatbots in the learning process, as well as guiding students in utilizing chatbots effectively. Collaboration between teachers and technology is key to creating a positive learning experience and ensuring that chatbots can serve as an effective support tool in learning (Pustikayasa et al., 2023).

As a potential solution to improve sustainability, the integration of chatbots with online learning platforms or learning management systems can be an effective strategy (Rochmawati et al., 2023). As such, the chatbot can be more easily accessed by students and integrated into wider learning. Interviews with school administrator IY indicated that this integration could improve the accessibility and use of the chatbot by students, as well as enable better monitoring of student interactions and learning outcomes. Improving the interoperability of chatbots with other technologies, such as learning management systems and educational apps, can be an important step toward addressing sustainability challenges. With good integration, chatbots can serve as an integral part of the digital learning ecosystem, providing consistent and relevant support to students.

The sustainable use of chatbots in education requires a holistic approach that includes continuous evaluation, response to changing user perceptions, handling technical and non-technical challenges, and continuous development. The results of this study show that by paying attention to these aspects, chatbots can remain an effective and value-added tool in supporting the learning process. To ensure the sustainability of chatbot use, a collaboration between all stakeholders, including students, teachers, school administrators, and technology developers, is required. Thus, chatbots can continue to make a positive contribution to the development of education, create innovative learning environments, and improve the overall quality of the student learning experience. With strong support and commitment from all relevant parties, the sustainable use of chatbots in education can be achieved, making them an integral part of the modern learning ecosystem.

Impact on the Effectiveness of Online Learning

Online education or online learning has become the main choice in facing various challenges, including the global pandemic. Despite its advantages, online education also has several impacts on learning effectiveness. It is important to understand these impacts to optimize the online learning process and overcome potential obstacles that may arise. One of the main impacts of online learning is the flexibility of time and place (Khusniyah & Hakim, 2019). Students have the freedom to set their learning schedule and access learning materials from anywhere. However, this freedom can also lead to challenges, such as lack of study discipline and procrastination. The table below details some of the positive and negative impacts of online learning flexibility.

Table 2. Impact of Positive Flexibility and Negative Flexibility

No.	Impacts	Positive flexibility	Negative flexibility
1	Positive	Facilitate Individual Learning Activities Accommodates Various Learning Styles.	Procrastination due to Time Constraints. Lack of a Planned Learning Structure.

No.	Impacts	Positive flexibility	Negative flexibility
2	Negative	Increase Student Independence. Leads to Learning Indiscipline. Requires High Self-Motivation.	Difficulty Managing Time Efficiently. Lack of Social Interaction and Collaboration.

Table 2 illustrates that flexibility in online learning has brought significant impacts, both in positive and negative aspects. On the positive side, time and place flexibility facilitate individual learning activities, allowing students to design learning patterns that suit their individual needs and preferences. One of the main advantages of online education is the flexibility of time and place it offers to students. Based on observations and interviews with 3 students at Junior High School 1 Tigo Nagari, it was found that many students appreciate the freedom given to set their study schedules and access learning materials from anywhere. This flexibility facilitates individual learning activities and accommodates various learning styles, thus enhancing students' independence. Students who have a busy schedule of activities find it helpful to be able to organize their study time according to their needs, which also allows them to better adjust to the curriculum.

However, this flexibility also poses several challenges that need to be addressed. NHs reported experiencing procrastination and difficulty managing time efficiently. This is largely due to the lack of a planned study structure and the need for high self-motivation. Observations show that students who are not used to independent learning often have difficulty in establishing consistent study discipline. Lack of social interaction and collaboration is also one of the negative aspects of the flexibility of online learning. Despite the various online communication platforms available, students feel that social connection and collaboration in group activities are not as effective as face-to-face learning (Wijaya, 2023).

Online learning also has a significant impact on evaluation and assessment methods. Teachers must adapt to evaluation methods that are suitable for online formats, such as online exams and online assignments. The utilization of technology in evaluation provides advantages in the efficiency and accuracy of the assessment process. Based on interviews with teachers with the initials S, many appreciate the ease of providing quick feedback, which allows students to more quickly understand their strengths and weaknesses. In addition, the flexibility in assessment types allows teachers to adapt assessment methods according to the needs and learning objectives (Pratama et al., 2021). However, challenges remain in measuring non-cognitive skills or "soft skills" such as creativity, cooperation, and communication. While technology can be used for academic evaluation, many teachers report difficulties in accurately assessing the attitudinal and moral aspects of students through online evaluation methods. The risk of academic cheating also increases with the use of technology in evaluation. Students can utilize technology to cheat, which threatens the integrity of the evaluation results. In some interviews, THs expressed concerns about the limitations of providing personalized and in-depth feedback to each student. The following Table 3 provides a more detailed overview of the impact of evaluation in online learning.

Table 3. Impact of Positive Evaluation and Negative Evaluation

No.	Impact	Positive evaluation	Negative Evaluation
1	Positive	Utilization of Technology for Evaluation. Providing Immediate Feedback. Flexibility in Assessment Types.	Risk of Academic Fraud Increases. Difficulty Measuring Skill Aspects.
2	Negative	Limitations in Measuring Skills. Lack of Direct Interaction with the Teacher.	Possibility of Technical Glitches. Difficulty Assessing Attitudinal and Moral Aspects.

Online learning is not free from technical and non-technical challenges that affect its effectiveness. From a technical perspective, the stability of the internet network and access to technological devices are factors that determine the quality of students' learning experience. B reported experiencing technical disruptions such as unstable internet connection or inadequate devices to support online learning. This can disrupt the learning process and reduce students' motivation to actively engage in learning (Amaniyah et al., 2021). On the other hand, non-technical

challenges such as a lack of understanding or support from stakeholders, such as teachers and parents, can be a significant barrier. Observations and interviews with IY school administrators revealed that while most are supportive of the use of online learning, there is still a need to improve their understanding of how to effectively utilize this technology (Daheri et al., 2020).

Overcoming the challenges of online learning and maximizing its benefits requires a comprehensive strategy from all relevant parties. Students need to develop good time management skills and be directed to use supportive online learning tools. In the interview, teacher GE suggested the use of time and task management apps as a way to help students stay organized. Educators can initiate initiatives that encourage collaboration between students, even online, to enrich students' social experiences. By utilizing technology such as online discussion forums and collaborative projects, students can build closer relationships with their peers (Mulyanah & Andriani, 2021). In addition, it is important to continue developing evaluation methods that are more holistic and inclusive. The utilization of technology needs to be balanced with measures to reduce the risk of cheating and ensure the integrity of evaluation results. Teachers need to be trained in online evaluation techniques that can better measure non-cognitive skills. Thus, evaluation in online learning can be a more effective tool to measure students' academic achievement and holistic development (Cahyani et al., 2021).

Online learning has a complex impact on the educational process, with benefits and challenges that must be carefully managed. This research shows that while flexibility and technology offer many benefits, there is a need for a more structured approach and additional support for students and teachers to ensure online learning can be implemented successfully. With strong cooperation between all stakeholders, online learning can continue to grow and make a positive contribution to education in the future.

Discussion

The use of chatbots in online learning at Junior High School 1 Tigo Nagari has shown a significant impact on improving students' learning experience. The chatbot has played an important role in facilitating students' understanding of complex subject matter by providing quick and relevant answers through natural language processing (NLP) technology. This was revealed in a study that showed that students asked questions related to subject matter to chatbots more frequently, with the frequency reaching 120 questions. The use of chatbots not only helps students understand the subject matter but also provides a sense of comfort as students can ask questions without worrying about being judged negatively by teachers or classmates, ultimately increasing their motivation and engagement in online learning.

The chatbot also served as an aid in completing school assignments, with 75 assignment help-related questions submitted by students. Students used the chatbot for guidance and clarification in completing their assignments, suggesting that it can be an effective learning partner in supporting students' independence and preparing them for exams by providing material summaries and practice questions. From a teacher's perspective, chatbots help reduce workload by handling basic questions that frequently arise from students, allowing teachers to focus more on teaching more complex material. However, there is a concern that over-reliance on chatbots may hinder the development of students' critical thinking skills. Therefore, it is important to integrate the use of chatbots with teaching approaches that encourage students to think critically and independently.

The use of chatbots has improved the efficiency of communication between students and schools by facilitating the dissemination of important information such as class schedules and school announcements. This reduces the administrative burden on school staff with 30 interactions related to general school information served by the chatbot. However, the challenge of ensuring timely and accurate information updates demands close cooperation between technology developers and school staff. To optimize the use of the chatbot, analysis of daily interaction patterns can help determine the optimal schedule for increased chatbot availability, thus ensuring that all students get the support they need. Understanding student preferences and needs can also drive the development of additional features or improved chatbot functionality to meet the demands of a dynamic online learning environment (Aksenta et al., 2023).

Students' perceptions of chatbots in online learning vary. Most students appreciate the practicality and efficiency offered by chatbots, especially in providing quick and relevant answers to their questions. Features such as practice questions and interactive quizzes increase student engagement, while natural language processing allows for more personalized interactions. However, some students feel that chatbots cannot fully replace direct interaction with teachers, especially in explaining complex concepts. Therefore, it is important to provide orientation and training to students on how to optimally utilize the chatbot, as well as ensure a friendly and intuitive user interface. The views of teachers and school administrators also influence students' perceptions regarding the use of chatbots. Teachers who are actively involved in the implementation of this technology and provide support can increase students' acceptance of the chatbot. Therefore, this study recommends continuous evaluation and adjustment to the use of the chatbot based on feedback from students and teachers. Ongoing training for all stakeholders is also important to ensure effective and optimal utilization of this technology. Involving all parties in the development and implementation of a chatbot is expected to create a more responsive and interactive learning environment and improve the quality of education at Junior High School 1 Tigo Nagari.

The continued use of chatbots as learning support tools has become a significant topic in various educational institutions. This research highlights the importance of effectiveness, and user acceptance, as well as the challenges faced in chatbot implementation. One of the key findings is that chatbots play an important role in improving students' understanding of subject matter, with students reporting that interaction with chatbots positively impacts their concept understanding and analytical skills. This success was largely due to the chatbot's ability to provide relevant answers and clear explanations, thus helping students overcome learning difficulties. In addition, the chatbot's effectiveness in providing timely responses encouraged increased student interaction, which in turn improved their engagement and comprehension (Gusty et al., 2020).

User acceptance, particularly of students, is also an important factor in the continued use of the chatbot. While many students responded positively to the ease of access and flexibility that the chatbot offers, there is a need to continuously monitor and adjust the chatbot design to suit changing needs and preferences over time. Technical and non-technical challenges, such as data security and support from stakeholders, require special attention to ensure the sustainability of the implementation. Continuous development and improvement strategies, including integration of user feedback and improvement of the chatbot's artificial intelligence, were identified as important steps to maintain the relevance and effectiveness of the chatbot in supporting learning. Teacher support in the use of chatbots is also essential, including adequate training and usage guidance for students. Integration of chatbots with online learning platforms can improve their accessibility and interoperability, making them an integral part of a holistic digital learning ecosystem (Saputra, 2023).

The flexibility of time and place in online learning is one of the main impacts that affect the effectiveness of learning. This flexibility allows students to set their study schedule and access learning materials from anywhere, which can enhance independence and accommodate various learning styles. However, this flexibility can also pose challenges such as procrastination and lack of study discipline, especially for students who are not used to independent learning. The lack of social interaction and collaboration in online learning is also a concern, despite the online communication platforms available (Ulpah et al., 2024). In addition, evaluation methods in online learning require adaptation to address the challenges of measuring non-cognitive skills and the risk of academic cheating. Internet network stability and access to technological devices are also determining factors in the online learning experience, where technical disruptions can hinder the learning process and demotivate students. To optimize online learning, a comprehensive strategy is needed that includes developing students' time management skills, online collaboration initiatives, and more holistic and inclusive evaluation methods. With cooperation between all stakeholders, online learning can continue to grow and make a positive contribution to education in the future. Effective technology integration, attention to student needs, and support from all parties involved will ensure that online learning can fulfill its full potential in improving the quality of education at Junior High School 1 Tigo Nagari.

CONCLUSION

The use of chatbots in education has a significant impact on supporting students in the online learning process. Efficiency, personalization, and quick access to information are some of the advantages that can be obtained through the implementation of chatbots. However, challenges such as loss of social interaction and limitations in providing in-depth understanding need to be overcome by designing learning strategies that are balanced between technology and human interaction. Thus, chatbots can be an effective tool in improving the quality of online learning. In the face of the transformation of education towards online learning, the use of chatbots as a learning support tool has become a topic that has received attention. An analysis of the impact of using chatbots in supporting students in the online learning process reveals various positive implications and challenges that need to be considered. First of all, chatbots contribute greatly to learning efficiency. With its ability to provide quick answers and explanations that can be accessed at any time, chatbots can increase responsiveness to students' needs. This can reduce the waiting time for students to get help, allowing them to gain a faster understanding of the subject matter. In addition, chatbots can also be programmed to provide a personalized learning experience. By understanding student preferences and comprehension levels, chatbots can present learning content tailored to individual needs. This opens up the potential to address specific learning difficulties, provide additional practice, or provide needed reinforcement of concepts. However, these positive impacts are not without some challenges. The use of chatbots raises concerns about the loss of social interaction and humanizing aspects of learning. Students may miss the presence of teachers as mentors and facilitators who can provide emotional support and personal guidance. In addition, it is important to note the possible errors or limitations of chatbots in providing accurate and in-depth answers. While they can help at a basic level, they may not be able to fully replace the role of the teacher in providing a deep understanding of complex concepts.

The use of chatbots at Junior High School 1 Tigo Nagari has enhanced students' learning experience through natural language processing technology that aids understanding of subject matter. The chatbot eases communication, reduces teacher workload, and provides convenience for students to ask questions. However, there is a concern that over-reliance on chatbots may inhibit students' critical thinking skills, necessitating integration with teaching strategies that encourage critical thinking and independence. Recommendations include training for students and teachers, as well as monitoring and adjusting the use of chatbots through user feedback to maintain effectiveness and relevance. Future research could focus on the development of critical thinking skills using chatbots and their impact on learning outcomes and non-cognitive skills such as collaboration and time management. Further studies could also explore the integration of chatbots with other learning systems to create a more efficient and accessible digital learning ecosystem. Analysis of user preferences and interactions can help develop more personalized and relevant features. Thus, it is hoped that Junior High School 1 Tigo Nagari and other institutions can utilize the full potential of online learning to improve the quality of education.

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