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Analysis of the Implementation of Chemistry Learning Assisted by Interactive Media AI Chatbot Based on ChatGPT as Teaching Tool for Students

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Abstract

The objective of this research are to describe how do students in the Fatmawati Sukarno State Islamic University Science Education Study Program react to interactive AI chatbot media based on ChatGPT as a learning aid in the study of basic chemistry, and how well do students in the Science Education Study Program at Fatmawati Sukarno State Islamic University comprehend the concept after using interactive AI Chatbot media based on ChatGPT as a learning aid in simple chemistry learning. This kind of study uses a qualitative descriptive methodology. Researchers use observation, questionnaires, interviews, and documents to gather data. According to the study's findings, students' answers to interactive AI chatbot media based on ChatGPT as a learning aid yielded an average percentage with an interpretation interval value of "Very Good" for the ChatGPT-based AI chatbot media learning method. Following their use of AI CHATGPT media, pupils demonstrated a deeper comprehension of fundamental chemical principles. The use of ChatGPT-based AI chatbot media as a teaching tool has been shown to improve student engagement.

Keywords**:** ChatGPT; Chemistry; Interactive Media

Introduction

The study and development of ideas, methodologies, techniques, and application systems to mimic and enhance human intelligence is the focus of the emerging technical science known as artificial intelligence (AI). A chatbot is a computer program that simulates natural language communication between humans and bots. It is a type of virtual assistant that has gained a lot of popularity in recent decades as a result of significant advancements in artificial intelligence, machine learning, and other fundamental technologies like neural networks and natural language processing.

Students frequently struggle to comprehend and apply chemical concepts, which includes using less thorough teaching techniques and procedures, particularly when it comes to tackling chemical challenges that call for in-depth knowledge. To reduce the incidence, an innovative system that can raise the standard of competence, quality, and mindset is necessary.

Students can benefit from an engaging and customized learning experience when chemistry lessons are taught using AI chatbot media. In real time, this chatbot can explain chemical concepts to pupils according to their needs and comprehension level. Additionally, chatbots can give pupils detailed feedback and adaptive chemical problem-solving activities. Chemistry is a branch of science that examines the characteristics, composition, structure, changes, and reactions of matter. It is also closely related to concepts and real-world applications, so understanding concepts is crucial before putting learned theories into practice. Enhancing students' comprehension of concepts can be measured by a number of factors, including their ability to explain, provide examples, compare, and do other similar tasks.

Therefore, using artificial intelligence (AI) chatbot technology to enhance the learning process is one way to change learning progress in a dynamic, interactive, and personalized way. The 'Chat Generative Pretrained Transformer', often known as ChatGPT, is one of the more advanced AI-powered chatbots that will be widely accessible starting on November 30, 2022. With the help of ChatGPT-based chatbots, students can look for or discover specific answers to the issues they are facing. They can also boost their motivation to learn by interacting with them and helping them finish different assignments, which will improve their comprehension of the material.

Because chatbots are more convenient than traditional forms of communication, students frequently use them as a tool for interactive and personalized learning to solve difficulties (Sandu & Gide, 2019). Numerous studies have examined the advantages of implementing AI in the classroom, including: (1) Anuyahong et al. (2023) found that AI-based systems can increase student learning motivation; (2) Koong Lin (2022) stated that AI chatbot-based tutorials increase enjoyment and support positive emotions in users; (3) Selvina et al. (2023) found that the application of AI to respiratory system material in elementary schools received a positive response of 63.52% and agreed 36.72%; (4) Slimi (2021) found that AI plays an efficient role in improving the quality of education and learning practices; and (5) According to Febria Yantika (2023), knowledge that is reconstructed through autonomous learning experiences can satisfy each person's unique demands and improve the efficacy of the educational process.

Several findings were drawn from one study on the usage of ChatGPT in the learning process, including the following: (a) up to 73.2% of users said that using ChatGPT improved their capacity to learn, whereas 26.8% reported no improvement. (b) Because of ChatGPT's simplicity of use in finding resources and information, as well as the variety of information it offers, 85.4% of respondents said that their learning outcomes had changed significantly. Even though just 14.6% of them didn't use

ChatGPT, their learning outcomes differed slightly. Because of this, it can be said that using ChatGPT improves learning outcomes (Sholihatin et al., 2023).

According to Setiawan et al. (2023), the use of interactive media like ChatGPT in the learning process allows lecturers to take on the role of facilitators rather than just information providers. ChatGPT generates text of excellent and natural quality and offers precise, understandable, succinct, and unambiguous responses. This is a result of ChatGPT's accurate, effective, methodical, and informative information processing (Zhai, 2022); (Murcahyanto, 2023). A professor can use ChatGPT to generate content such as scientific papers, quizzes, assessments, presentations, coding, and lesson plans. It can be used by students to create essays, solve problems, and receive constructive criticism on their work (Qadir, 2023). Because ChatGPT is effective at providing learning materials and evaluation tools rapidly and responsively, it plays a crucial role in learning preparation by assisting lecturers with lesson planning (Serdianus & Saputra, 2023).

Given this context, the researcher hopes to investigate the use of AI chatbot-based technology, namely ChatGPT, one of its applications. This technology is anticipated to create more efficient learning strategies for enhancing student skills and learning. The research problem is stated as follows: (1) How do students in the Fatmawati Sukarno State Islamic University Science Education Study Program react to interactive AI chatbot media based on ChatGPT as a learning aid in the study of basic chemistry? (2) How well do students in the Science Education Study Program at Fatmawati Sukarno State Islamic University comprehend the concept after using interactive AI Chatbot media based on ChatGPT as a learning aid in simple chemistry learning?

Additionally, the goal of this research is to advance AI technology in the educational setting, particularly through the application of ChatGPT-based chatbots as interactive learning resources that can respond to inquiries about specific issues and logical knowledge. It is envisaged that this research project would give scholars more options for obtaining high-quality, interactive learning methodologies for next generations.

Research Methodology

This kind of study uses a qualitative descriptive methodology. By presenting the research subjects' conclusions in narrative texts on the variables under study, the researcher carried out a more thorough and thoughtful analysis of the data. The study was conducted on students enrolled in the Science Education Tadris Study Program at the State Islamic University of Fatmawati Sukarno Bengkulu. The study site is located in Bengkulu City on Jl. Raden Fatah in Pagar Dewa.

Purposive sampling was the method employed for sampling in this investigation. One sampling method with some implications is purposeful sampling. The traits of the participants that are connected to the formulation of the problem being solved are the factors that the researcher takes into account when employing this sampling technique. The habits of the research participants who have

utilized digital media for social, recreational, or daily lessons are examined in order to ascertain their features.

Researchers use observation, questionnaires, interviews, and documents to gather data. By directly witnessing events in the field, observation enables the author to corroborate previously collected data. This entails the systematic and direct observation of relationships, behavior, or research-relevant settings. In-depth knowledge of the experiences, opinions, and viewpoints of study participants pertaining to the research issue is obtained through interviews. Because participants mark the responses they believe to be accurate and compose essays in response to questions or statements, the survey employed in this study is both open-ended and closed-ended. Documentation, questionnaires, interview instructions, and observation sheets were the research tools employed in this study.

The following are the steps of data analysis used in this study, per Miles and Huberman (1992:15–19):

1. Data collection: identifying the focus and depth of data for the subsequent gathering procedure by conducting observations, interviews, and documentation at the research site.
2. To give a clearer picture and make it easier to collect more data, data reduction attempts to include summarizing, choosing the key points, and searching for significant themes or patterns in the data. In some cases, researchers will concentrate on the research subjects' everyday living and working conditions. The study's goals, which are mainly to discover novel findings, serve as a guide for researchers as they reduce data. As a result, the primary focus of data reduction shifts to items that are deemed unfamiliar or lack a pattern.
3. Data display, or data presentation, can take several forms, such as a lowchart, chart, relationship between categories, or a brief summary.
4. Conclusions can take the shape of a causative or interaction relationship, hypothesis, or theory, or they can take the form of a description or image of an object that was previously unclear but becomes evident after study.

Descriptive analysis, which is derived from the questionnaire data collection method, is the data analysis methodology used for perception data. It describes the distribution of questionnaire responses according to user perceptions and provides percentage indicators for statistical analysis.

With the information gathered, displayed in table form, and explained using the Likert Scale percentage formula, the questionnaire's percentage in assessing the impact of student perceptions on the use of interactive AI chatbot media based on ChatGPT as a learning aid for students learning chemistry material (Sugiyono, 2011: 109) is as follows:

Table 1. Likert Interpretation Score

N	Interpretation	Score
1	Strongly Agree (SA)	4
2	Agree (A)	3
3	Disagree (D)	2

4	Strongly Disagree (SD)	1

Source: Hadi, 1991

Percentage = $\frac{sum\ of\ likert\ scale\ scores}{maximum\ respondent\ score} x100\%$

For the purposes of analysis in this study, the respondents' answers in the questionnaire were scored with alternatives ranging from good to bad, which are presented as follows:

Table 2. Likert Interval Score

N	Interpretation	Interval
1	Very Good	> 75%
2	Good	51% – 75%
3	Poor	26% – 50%
4	Very Poor	< 26%

Source: Hadi, 1991

Findings and Discussion

Findings

The observation results obtained are: (a) Many students actively utilize ChatGPT's features (voice note and log history); (b) Many students ask the same question again using ChatGPT, and some of them have the same answers as other students; (c) When working on the questions, some students use one ChatGPT at a time due to low cellphone battery; (d) Screenshot of ChatGPT answers, combining explanations with other references (books, YouTube).

According to the findings of the interview, the informant acknowledged that utilizing ChatGPT was enjoyable and helpful because it allowed them to learn about topics they were unfamiliar with and provided them with precise responses. This is a sample taken from a student interview:

"ChatGPT adalah aplikasi yang bisa memberikan jawaban secara informatif dan cepat, serta terasa lebih fleksibel dibandingkan Google. Sementara Google sering menggunakan media dari data skripsi atau makalah yang membutuhkan waktu. ChatGPT langsung memberikan jawaban inti secara singkat. Saya berpendapat bahwa pembelajaran langsung dari guru tetap lebih baik, namun ChatGPT membantu memperjelas detail yang mungkin belum dijelaskan oleh guru, sehingga meningkatkan pemahaman saya. Saya sangat mendukung penggunaan ChatGPT untuk belajar karena memungkinkan eksplorasi materi lebih luas dan mendalam dibandingkan metode konvensional. Saya juga termotivasi untuk menggunakan AI lainnya, seperti AI untuk menerjemahkan, membuat makalah, dan sebagainya." According to the quote, ChatGPT is an application that is more adaptable than Google and can deliver responses in a timely and informative manner. ChatGPT instantly offers succinct solutions to the most common questions. ChatGPT makes the teacher's explanations more understandable. Learning using ChatGPT enables a more thorough and extensive investigation of the subject matter.

34 students participated in the questionnaire-based data collection process. The following are the findings from the researcher's examination of how students see interactive AI chatbot content using ChatGPT:

Table 3. Student Responses to the Questionnaire

N	Statement	Response				%	Interpretation
		SA	A	D	SD		
1	AI chatbot media can increase student engagement in the learning process	13	19	2	-	83%	Very Good
2	AI chatbot media is one of the supporting factors for innovative and creative learning.	16	17	1	-	86%	Very Good
3	Using ChatGPT chatbot as a useful tool in the learning process	17	17	-	-	88%	Very Good
4	ChatGPT's ability to understand questions and provide relevant answers in basic chemistry material	6	23	5	-	76%	Very Good
5	Using ChatGPT can help solve problems or answer complex questions in basic chemistry problems.	7	24	3	-	78%	Very Good
6	ChatGPT's ability to provide clear and easy-to-understand explanations regarding the basic chemistry concepts asked.	6	24	4	-	76%	Very Good

Discussion

By providing precise and thorough responses, ChatGPT enhances student comprehension during the learning process. ChatGPT increases student participation in discussions while providing flexibility and convenient access to information searches. Even though ChatGPT is helpful, lecturers still play a crucial role because ChatGPT cannot take the place of face-to-face communication. The drawbacks of ChatGPT, like as sluggish response times and lengthy responses, must be taken into account.

By giving them information and resources on a given subject, pointing out previously undiscovered details, and exposing them to fresh research topics, ChatGPT can also assist students in developing their conceptual understanding abilities and improve their comprehension and assessment of the subject (Kasneci et al., 2023). As an educational media innovation in the era of digital transformation or society 5.0, ChatGPT can: (1) boost student engagement and interaction in the learning process; (2) make information easily and quickly accessible; (3) offer real-time feedback; and (4) offer individualized support based on each user's needs (Nailus, S. & Hasanudin, C., 2023). In addition, ChatGPT can make a significant contribution to improving the quality of student productivity. It can help students in many ways such as providing useful information and resources, helping to improve language skills, facilitating collaboration, increasing time efficiency and effectiveness, and providing support and motivation (Fauzi et al., 2023).

Conclusion and Suggestion

According to the study's findings, students' answers to interactive AI chatbot media based on ChatGPT as a learning aid yielded an average percentage with an interpretation interval value of "Very Good" for the ChatGPT-based AI chatbot media learning method. Following their use of AI

CHATGPT media, pupils demonstrated a deeper comprehension of fundamental chemical principles. The use of ChatGPT-based AI chatbot media as a teaching tool has been shown to improve student engagement.

Our recommendations are as follows: (1) more thorough or in-depth research on the application of ChatGPT-based AI chatbot learning materials in other learning is necessary; (2) data collection methods, particularly observation, should be used as often as feasible to increase the strength and completeness of the data.

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