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Analysis of the use of ChatGPT in Question and Answer Systems as an Educational Tool

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Abstract: In the digital era, the integration of artificial intelligence technologies like ChatGPT in education is becoming increasingly significant. This study seeks to investigate how ChatGPT can be utilized in school learning environments and assess its effectiveness in supporting both students and teachers. The research employs a desk study approach, analyzing various literature on the application of ChatGPT as a learning tool. The analysis aims to highlight the ways in which ChatGPT can assist teachers in areas such as content development, assessment, and classroom management. Additionally, the study will explore the benefits for students, including enhanced motivation, engagement, and problem-solving skills. Ultimately, the findings are expected to offer insights into the potential of ChatGPT to foster a more dynamic and adaptive learning environment while identifying challenges associated with its implementation. This research aims to provide actionable recommendations for educators and policymakers to effectively and ethically leverage this technology to enhance the quality of education.

Keyword: ChatGPT, Education Technology, Artificial Intelligence, Question, Answer Systems

INTRODUCTION

The education sector is undergoing a significant transformation driven by rapid technological advancements. Among these innovations, artificial intelligence (AI) has introduced new possibilities to improve the efficiency and effectiveness of learning experiences. One notable AI development is ChatGPT, a large language model developed by OpenAI, capable of understanding and generating human-like text. This capability positions ChatGPT as a powerful tool for various educational applications. ChatGPT's natural language processing abilities enable the creation of interactive and responsive question-and-answer systems. Students can ask questions about their studies, request clarifications, or even engage in discussions with ChatGPT as though interacting with a tutor. This functionality supports a more personalized and adaptive learning experience, promoting deeper understanding and encouraging active participation in the learning process.

Despite its potential, comprehensive research is essential to explore how ChatGPT can be effectively integrated into education. This study focuses on examining ChatGPT's use in question-and-answer systems as an educational tool, specifically evaluating its effectiveness in this context. The research will assess the accuracy and relevance of ChatGPT's responses to student inquiries and identify the benefits and challenges associated with its implementation. Furthermore, the study will explore the impact of ChatGPT on students' learning processes, particularly in terms of motivation, engagement, and comprehension. To evaluate ChatGPT's effectiveness in educational settings, this research adopts a mixed-methods approach, combining quantitative and qualitative techniques. Quantitative data will be gathered through structured questionnaires using a Likert scale to measure perceptions of usefulness, ease of use, and other critical variables. The target sample will consist of a diverse group of at least 50 participants, aged 13–25, selected through random sampling. Qualitative data will be collected via interviews to gain deeper insights into user experiences and attitudes.

By integrating these methods, the study aims to provide a comprehensive understanding of ChatGPT's influence on student motivation, engagement, and comprehension, while addressing implementation challenges. The findings will offer valuable guidance for educators and policymakers on how to utilize ChatGPT effectively and ethically to enhance learning outcomes. Ultimately, this research seeks to support the integration of AI technologies in education, fostering a dynamic and adaptive learning environment.

METHOD

This study employs a combination of key concepts and research models to gather comprehensive data on user acceptance and experiences with the ChatGPT API as an educational tool. By integrating quantitative methods to capture broad user perceptions with qualitative approaches to delve deeper into user experiences and opinions, the research aims to provide a holistic understanding.

Research Model

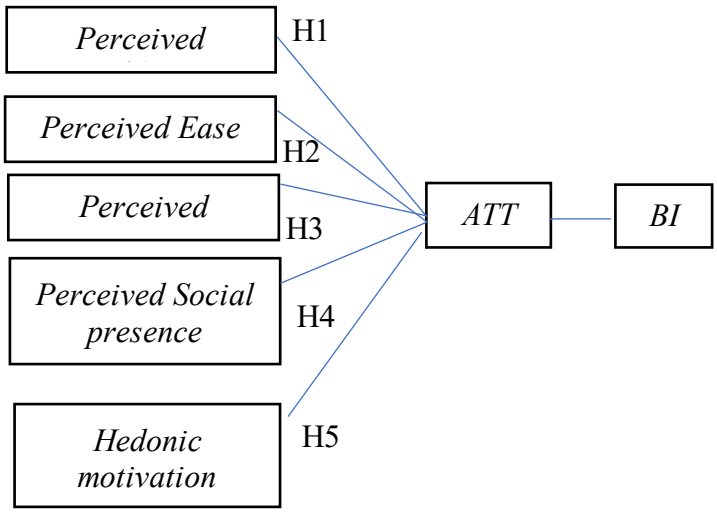
The study, titled "Analysis of the Use of ChatGPT API in question and answer system as an educational Tool," adopts the Technology Acceptance Model (TAM) as its framework. The TAM model is particularly well-suited for exploring factors that influence user acceptance and intention when adopting new technologies, especially AI-driven solutions like the ChatGPT API.

Key Components of the TAM Model:

1. **Perceived Usefulness (PU):**
   The extent to which users believe the ChatGPT API enhances learning activities or helps in completing academic tasks efficiently.
2. **Perceived Ease of Use (PEU):**
   Users' perception of how easy it is to use the ChatGPT API in a question-and-answer system.
3. **Attitude Toward Use (ATT):**
   Users' overall feelings or attitudes toward utilizing the ChatGPT API, whether they view it as a positive or negative addition to the educational process.
4. **Behavioral Intention to Use (BI):**
   The likelihood or willingness of users to adopt the ChatGPT API as an educational tool in the future.
5. **Perceived Credibility (PC):**
   Users' trust in the information provided by the ChatGPT API, including its reliability and adherence to information security standards.
6. **Hedonic Motivation (HM):**

The level of enjoyment or satisfaction users experience when using the ChatGPT API, such as whether it feels engaging or entertaining.

This framework ensures a structured and in-depth exploration of both the functional and experiential aspects of the ChatGPT API, offering valuable insights for its potential application in education.



H1: Perceived usefulness (PU) has a positive impact on users' attitudes toward using (ATT).
H2: Perceived ease of use (PEU) positively affects users' attitudes toward using (ATT).
H3: Perceived credibility (PC) positively influences users' attitudes toward using (ATT).
H4: Hedonic motivation (HM) contributes positively to users' attitudes toward using (ATT).
H5: Users attitudes toward using (ATT) positively influence their behavioral intention to use (BI).
H6: Perceived ease of use (PEU) positively impacts perceived usefulness (PU).

Research Instruments

The user satisfaction scale is measured using a percentage index, categorized into the following levels:

1. **Not at all satisfied:** 1–25%
2. **Somewhat satisfied:** 26–50%
3. **Mostly satisfied:** 51–75%
4. **Extremely satisfied:** 76–100%

Tabel 1. satisfaction scale

No	Variable	Statement	Satisfaction rate
1	Perceived usefulness	ChatGPT assists me in finishing academic work more effectively.	Extremely satisfied
2	Perceived ease of use	ChatGPT is easy to use in my learning activities.	Mostly satisfied
3	Perceived social presence	I felt like I was interacting with a	Extremely satisfied

		companion while using ChatGPT.	
4	Perceived credibility	I believe that the information provided by ChatGPT is accurate and reliable.	Mostly satisfied
5	Hedonic motivation	I am happy to use ChatGPT to help with my learning.	Extremely satisfied
6	Attitude towards ChatGPT	I believe that using ChatGPT in schooling is beneficial.	Somewhat satisfied
7	The intention to employ behavior	I plan to use ChatGPT on an ongoing basis for academic purposes.	Somewhat satisfied

Data Collection Techniques

This research employs both qualitative and quantitative approaches. The quantitative approach involves the distribution of questionnaires, while the qualitative approach entails conducting interviews. Ultimately, the qualitative results will serve to support and strengthen the findings derived from the quantitative approach.

Questionnaires

To implement the quantitative approach, questionnaires were distributed to participants as the primary data collection method. The objective of distributing these questionnaires is to gather structured, measurable data reflecting participants' attitudes, opinions, or behaviours related to the variables under study. In this research, a questionnaire will be developed using Google Forms and will comprise 10 carefully designed questions. To ensure consistency and clarity in responses, the questionnaire will adopt a Likert scale format, allowing respondents to indicate their level of agreement or disagreement with each statement. This structured method simplifies data collection and facilitates the subsequent analysis and interpretation of responses. By employing a Likert scale, the data collected becomes quantifiable, enabling more precise statistical analysis and generating meaningful insights into the research topic.

Interviews

The qualitative approach to data collection is carried out through interviews. This method involves direct interaction with participants to ask questions and gain in-depth qualitative insights. In this study, the interview process includes a set of pre-prepared questions.

Research Population

This research focuses on a population comprising teenagers and adults unaffiliated with Batam International University (UIB). To gather data on ChatGPT usage, a Random Sampling method will be employed to ensure a diverse and representative sample. The target sample size is at least 50 individuals, capturing a broad range of perspectives.

Data Analysis

Quantitative

The research utilized several quantitative methods to examine user acceptance and perceptions of ChatGPT as an educational tool. Data collection was carried out through structured questionnaires distributed to a diverse participant group using a random sampling approach, ensuring a representative sample of at least 50 respondents with varying demographics such as age and gender. The questionnaires, designed with a Likert scale format, allowed respondents to express their level of agreement with statements regarding variables such as perceived usefulness, ease of use, hedonic motivation, and credibility. A descriptive analysis was conducted to calculate percentages and categorize satisfaction levels, ranging from "not at all satisfied" to "extremely satisfied." Additionally, hypothesis testing, grounded in the Technology Acceptance Model (TAM), was performed to assess the relationships between factors such as perceived usefulness and behavioral intention to use ChatGPT. These quantitative methods provided measurable insights into user attitudes and intentions, enabling a robust evaluation of ChatGPT's potential as an educational tool.

Qualitative

In addition to quantitative methods, qualitative techniques were used to gain a deeper understanding of user experiences and perceptions regarding ChatGPT as an educational tool. Data was collected through interviews with participants, enabling direct interaction and an in-depth exploration of their thoughts and opinions. The interviews were conducted using pre-prepared questions designed to complement the quantitative findings by providing richer, more detailed insights. This qualitative approach allowed researchers to examine nuanced aspects of user interaction with ChatGPT, such as emotional responses, challenges encountered, and perceived impacts on the learning process. By triangulating qualitative insights with quantitative data, the research aimed to provide a comprehensive analysis of how ChatGPT influences educational outcomes and user behaviour.

RESULTS AND DISCUSSION

The research questionnaire, distributed among various student groups ranging from middle school to university, produced varied results. Of the 100 respondents who had used ChatGPT as a learning tool, 41 were aged between 13 and 18 years, while 59 were aged between 19 and 25 years. The group consisted of 74 men and 26 women.

Tabel 2. Result Data

Characteristics	Category	Percentage
Age	13-18	41%
	19-25	61%
Gender	Male	74%
	Female	28%
Ever used ChatGPT	Ever	100%
	Never	0%

This study employed a quantitative research approach using a survey questionnaire to gather data on ChatGPT usage among students. The questionnaire was designed with a combination of multiple-choice and Likert scale questions to collect demographic information (age, gender) and assess the frequency and purpose of ChatGPT use in learning activities.The survey was distributed to 100 students across different educational levels, including middle school and university students, ensuring representation from various academic backgrounds.

Participants were recruited using a convenience sampling method, primarily through online platforms and social media groups frequented by students. This method was chosen for its efficiency in reaching a broad student population within a limited timeframe. However, it is acknowledged that this approach may introduce some sampling bias, as the participants may not fully represent the diversity of the overall student population.The survey was administered online through a Google Forms platform. This allowed for efficient data collection and ensured anonymity for the participants, potentially encouraging more honest responses. The survey link was disseminated through various online channels, and participants were given a two-week window to complete the questionnaire.

The data collected was analyzed using descriptive statistics. Percentages and frequencies were calculated to describe the demographic characteristics of the respondents and their reported ChatGPT usage patterns. While this study provides valuable insights into ChatGPT adoption among students, it is important to acknowledge its limitations. The relatively small sample size and the use of convenience sampling may limit the generalizability of the findings to the broader student population. Further research into a larger and more diverse sample is recommended to validate these results.

CONCLUSION

H1: Accepted

The Perceived Usefulness (PU) variable significantly influences Attitude towards Use (ATT). This is in line with the findings that users believe ChatGPT helps complete academic tasks efficiently.

H2: Accepted

Perceived Ease of Use (PEU) positively impacts Attitude towards Use (ATT). The study revealed that respondents found ChatGPT easy to use during learning activities.

H3: Rejected

Perceived Social Presence did not show a significant influence on Attitude towards Use (ATT). Although ChatGPT provided interactive responses, users did not strongly equate the experience with that of interacting with a human friend.

H4: Accepted

Perceived Credibility (PC) significantly influences Attitude toward Use (ATT). Users trust the accuracy and reliability of the information provided by ChatGPT.

H5: Accepted

Hedonic Motivation (HM) positively influences Attitude towards Use (ATT). This study shows that users enjoy using ChatGPT for educational purposes.

H6: Accepted

Attitude towards Use (ATT) significantly influences Behavioral Intention to Use (BI). Positive perceptions towards ChatGPT encourage users to plan for continued use for academic purposes.

Based on the results of the data analysis that has been carried out, student perceptions of the use of ChatGPT are influenced by several key factors that contribute to the continued use of this tool. First, the perceived usefulness of ChatGPT has a very significant influence in shaping students' attitudes towards its use. When students feel that ChatGPT is useful and valuable to meet their academic needs, this positively influences their views and propensity to continue utilizing it.

Secondly, factors such as the perceived ease of use and credibility of ChatGPT are also influential. If students find the platform easy to use and trust the accuracy of the information provided, this encourages a positive attitude towards using ChatGPT.

In addition, hedonic motivation, which is the sense of pleasure or satisfaction gained from using ChatGPT, also affects students' attitudes. When the experience of using ChatGPT is enjoyable or satisfying, it increases the likelihood of students continuing to use the tool.

All things considered, student favorable opinions of ChatGPT have a big impact on their desire to use it again, especially for schoolwork. Based on favorable opinions of ChatGPT's utility, usability, credibility, and user satisfaction, this aim shows their readiness to include it into their academic routine. Thus, making sure these conditions are satisfied and adjusted can promote university students' continuous effective use of ChatGPT.

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