The Influence of ChatGPT on Computer Engineering Students: Quantitative Research on Adoption and Dependency

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ABSTRACT

In the recent years, dynamic technological advancements have led to the introduction of various Artificial Intelligence (AI) tools accessible to a broad spectrum of the internet users. ChatGPT was first introduced in the public back in 2018, standing out its capabilities in generating text, answering questions, and performing calculations. While ChatGPT has numerous applications in customer service, healthcare, and education, according to some sources, it also has certain drawbacks, such as inaccuracies in mathematical and software engineering responses.

This study focuses on the influence of ChatGPT on third-year Computer Engineering students at Bulacan State University. The researchers of this paper aimed to determine the extent of adoption and the level of dependency on ChatGPT among students. The researchers survey 30 students across three sections which reveals significant findings: 93.3% believe it helps them complete their schoolwork more efficiently. Furthermore, 83.3% of students trust the guidance provided by ChatGPT, and 96.6% find it useful for resolving academic issues. However, the study also highlights a dependency on ChatGPT. While 73.4% of students consider it necessary for effective work completion, and 70% find it easy to use for timely assignment submission, only 40% believe it enhances their academic performance. Overall, the study underscores the importance of providing clear instructions and guidance on the appropriate use of ChatGPT in academic settings to maximize its benefits and mitigate potential drawbacks.

Keywords: Adoption and Dependency, ChatGPT, Efficiency, Instruction, Computer Engineering Students

INTRODUCTION

In the recent years, significant advancements in dynamic technological innovation have led to an introduction for numerous Artificial Intelligence tool that are available to a broad spectrum of users. One of the notable tools that is accessible by the masses is the ChatGPT. Introduced by OpenAI in 2018, ChatGPT is an Artificial Intelligence tool that can be utilize for variety of tasks such as generation of texts, answering questions and calculations. The tool is designed to interpret input and producing text that resembles human like response. Despite its intrinsic usefulness, the ChatGPT has certain drawbacks.

By studying many advantages of chatbots such as areas of which includes Customer Service, Healthcare, and Education. Thus, observe the development and underlying technology on it. The presence of technology with chatbot capabilities has accelerated and advanced knowledge significantly, thanks to the integration of artificial intelligence (AI). Moreover, ChatGPT can easily address the history, uses, complications, and potential future developments of this technology. (Tianyu, 2023)

In some occasion, ChatGPT have shown inaccuracy with its response to a certain type of questions. In terms of mathematical questions, according to Shakarian P. (2023), ChatGPT has only an accuracy of 60% solving mathematical problems. As for the software engineering questions, according to Ortiz S. (2023), out of 512 questions given to the chatbot, only 248 (48%) were correct. Thus, using the chatbot without caution may lead the user into misinformation.

ChatGPT serves as a versatile tool that is capable to provide a content in response to user requests and prompts.

For example, a user may prompt to ask an inquiry that is related to academic topics and subjects. The capability of the tool to provide a response is particularly helpful to students that needs an assistance in terms of academics.

ChatGPT is a new tool that can be used for a variety of tasks, such as university teaching and learning. It has advantages and disadvantages, much like many other tools. It can enhance learning when used appropriately but negatively impact learning if misused. According to Singh, Tayarani-Najaran, Yaqoob (2023) The study of what students think about the tool's potential benefits for educational activities. 430 computer science students from the University of Hertfordshire in the UK are surveyed, and their responses about the tool are examined. The purpose of the survey is to gather information about the various ways that the tool can be used in academia and how it can benefit or hurt students' learning experiences. The results imply that even while a large number of students are familiar with the technology, they do not consistently use it for academic reasons. Moreover, students doubt the tool's ability to improve learning and believe that colleges need to offer clearer instructions and greater instruction on the appropriate uses of the tool.

The involvement of ChatGPT into the areas of education has drawn an interest to the researchers. The researchers aim to know how many Computer Engineering students in Bulacan State University are using ChatGPT, does it enhance the academic efficiency, how much do the student trust the tool, and how does it affect the efficiency of students' workloads. Hence, the researchers will undertake a study regarding "The Influence of ChatGPT on Computer Engineering Students: Quantitative research on Adoption and Dependency".

A. Objectives of the Study

- To be able to identify the extent of adoption of ChatGPT among 3rd year computer engineering students in academic settings?

- To be able to show how students assess the effectiveness of ChatGPT in assisting academic challenges?

- Identify what is the level of dependency of the students on ChatGPT for accomplishing tasks?

METHODOLOGY

A. Research Design

According to Bhandari (2021), "correlational research design investigates relationships between two or more variables without the researchers controlling or manipulating them."

The researchers of this study have chosen correlational research as its research design, as it explores the relationship between variables without manipulating them. Given that the objective of this study is to assess and investigate the influence of ChatGPT among computer engineering students, using correlational research would be most suitable. The study aims to assess the influence of ChatGPT on students, examining both its adoption and the degree of dependency. Lastly, the study sought to determine the average level of influence of ChatGPT among students, considering factors such as academic performance and demographic characteristics.

B. Participants and Sampling Technique

The researchers of this study decided that the target population would be the 3rd- year Computer Engineering (CPE) students of Bulacan State University - Main Campus. A total of 30 students will cover the target population in accordance with the Central Limit Theorem (CLT), which states that a normalized sample size should be at least 30 for the study to conduct significant statistics. As the 3rd-year Computer Engineering students of Bulacan State University are divided into three (3) sections, the researchers have determined that at least 10 students per section would adequately represent the population. Regarding the demographics of the respondents, the researchers decided to categorize the respondents according to their respective sections.

The researchers used a simple random sampling in choosing the respondents for this study. The respondents are grouped according to the 3rd-year CPE sections (3) respectively. The list of Computer Engineering (CPE) students from section A, B, and C were combined into one with the separation of their respective demographic

profiles according to the respondents' sections. The researchers decided to use a simple random sampling for this paper to give every individual in the population an equal chance of being selected for the study, ensuring unbiased representation and reliable results.

C. Data Gathering Procedure

To administer the formulated survey questionnaire thoroughly, the researchers submitted it to a professional in the field of this topic for validation. Once the survey questionnaire receives an approval, the researchers carried out the plan to administer the survey questionnaire to the three (3) sections of 3rd Computer Engineering (CPE). Due to time constraints, the researchers decided to employ a digital survey form in order to gather data and digitally distribute the survey to the respondents. The researchers ensure to include a consent form on the first page along with proper guidelines for completing the questionnaire. The collected data from the students will undergo analysis and evaluation using the appropriate methods to assess the influence of ChatGPT on the computer engineering students.

D. Data Analysis Procedure

The data gathered from the survey are arranged accordingly, depending on its value, it would go analyzation and interpretation through the use of correlational statistical technique.

In this study, a 4-point Likert scale was selected for the survey questionnaire. The researchers have decided to use this type of Likert scale to omit the midpoint of the standard 5-point Likert scale, which simplifies the response options for participants. Another reason why researchers have used the 4-point Likert scale is to avoid a neutral response from the respondents, which may lead to a misinterpretation of the data gathered. Utilizing this Likert scale would make the respondents think thoroughly about the statement and pick what choice fits the best toward the given statement, whether it is "agreed" or "disagree." Ultimately, this approach would enhance the efficiency and clarity of the survey instrument.

E. Ethical Considerations

To ensure the confidentiality of the respondents, aliases and will be used instead of their actual names. Also, the online form that submitted by the respondents does not include their names or sensitive information. Lastly, all the respondents shall be informed about where their responses will be used, as such, will be solely on this study.

Table I Likert Scale

Value	Mean Range	Classification
1	1.00-1.74	Strongly Disagree
2	1.75-2.49	Disagree
3	2.50-3.24	Agree
4	3.25-4.00	Strongly Agree

Mean = Sum of all values / Total number of values

Median = Middle value

Mode = Most common value

RESULTS AND DISCUSSION

Table II. Extent Of Adoption of Chatgpt in Academic Settings

Questions	Mean	Interpretation
"ChatGPT provides accurate and relevant information when students seek academic assistance."	2.87	Agree
"The ChatGPT enhances students' efficiency in completing academic tasks."	3.33	Strongly Agree
"Students can place in the recommendations and guidance provided by ChatGPT for academic challenges."	3.13	Agree
"ChatGPT assists students in finding solutions to academic problems."	3.40	Strongly Agree
"ChatGPT can adapt to students' specific academic needs and queries."	3.27	Strongly Agree
"ChatGPT assists you with academic assignments and projects in computer engineering."	3.07	Agree
Overall	**3.17**	**Agree**

According to Table II, question 1, This distribution suggests that while a significant portion of students find ChatGPT useful for academic support, there is room for improvement to address the concerns of those who disagree.

On question 2, This overwhelmingly positive response suggests that students find ChatGPT to be a valuable tool for improving their academic efficiency.

Then in question 3, these findings suggest that most students perceive ChatGPT as a reliable and beneficial resource for academic guidance. The relatively low levels of disagreement indicate that while there is some room for improvement, the majority of students find ChatGPT's recommendations and guidance helpful for tackling academic challenges. This positive perception is crucial for the acceptance and continued use of ChatGPT as an academic support tool.

For question 4, These results suggest that students overwhelmingly perceive ChatGPT as a useful tool for solving academic problems. The high levels of agreement highlight that ChatGPT is considered a valuable resource in academic problem-solving, indicating strong user satisfaction and acceptance of the technology. The minimal disagreement further underscores its effectiveness and the overall positive impact it has on students' academic endeavors.

Then for question 5, This distribution suggests that the majority of participants believe ChatGPT effectively adapts to and meets students' academic requirements. The findings align with the principles of the Technology Acceptance Model (TAM), highlighting a strong acceptance and perceived usefulness of ChatGPT among students in an academic setting.

Lastly for question 6, This positive reception underscores the perceived usefulness of ChatGPT within the framework of the Technology Acceptance Model (TAM), indicating strong acceptance and effectiveness in supporting computer engineering students with their assignments and projects.

To summarize, the overall mean is 3.17 interpreted as "Agree" meaning that there is a good extent of adoption of ChatGPT among computer engineering students in their academic settings.

Table III Effectiveness of Chatgpt in Assisting Academic Challenges

"ChatGPT is a valuable resource for studying computer engineering subjects."	2.97	Agree
"ChatGPT can increase your interest in exploring advanced topics in computer engineering."	2.87	Agree
"ChatGPT is recommendable to other computer engineering students for academic use."	3.03	Agree
"ChatGPT has the potential to revolutionize learning in the field of computer engineering."	3.03	Agree
"ChatGPT may be considered as essential for efficiently completing your academic tasks."	2.83	Agree
"I'm not having difficulty using ChatGPT to complete academic tasks on time."	2.90	Agree
Overall	**2.94**	**Agree**

According to Table III, question 1, these findings suggest that ChatGPT is largely perceived as a beneficial resource for computer engineering education. This aligns with the Technology Acceptance Model (TAM), demonstrating substantial acceptance and perceived usefulness of ChatGPT among students studying computer engineering subjects.

For question 2, . These findings indicate that while there is a notable minority with reservations, the majority of participants view ChatGPT as an effective tool for encouraging deeper exploration of advanced subjects in computer engineering. This conclusion supports the Technology Acceptance Model (TAM) by demonstrating that ChatGPT is perceived as a valuable resource for increasing engagement and interest in advanced academic topics.

For question 3, while a majority of the respondents recommends ChatGPT for academic use, there's a notable minority that does not, highlighting the mixed perception amo

For question 4, the results indicate strong adoption and a growing dependency on ChatGPT among computer engineering students, with most students viewing it as a revolutionary tool for their studies.

As for question 5, the result indicates the majority of the respondents recognize the importance of ChatGPT in their academic works, with a smaller segment opposed to the statement. This points to a trend of growing adoption and perceived dependency on ChatGPT among computer engineering students.

Then lastly for question 6, the result shows that there is a high perceived ease of use among computer engineering students on using ChatGPT for completing academic tasks on time.

To summarize, the overall mean is 2.94 interpreted as "Agree" meaning that ChatGPT is effective in assisting computer engineering students in academic challenges.

Table Iv Level of Dependency on Chatgpt for Accomplishing Tasks

"ChatGPT is the primary source for information and assistance in completing tasks."	2.33	Disagree
"ChatGPT has become indispensable for you in your academic endeavours."	2.50	Agree
"By relying on ChatGPT, I'm enhancing my academic skills."	2.33	Disagree
Overall	**2.38**	**Disagree**

According to Table IV, question 1, This distribution suggests that despite the usefulness of ChatGPT, it is not the primary source of the respondents source of information but rather an assisting tool in accomplishing tasks.

As for question 2, respondents somewhat agree that the use of ChatGPT is an indispensable tool in succeeding academic endeavors.

Lastly for question 3, respondents do not solely rely on the use of ChatGPT in enhancing their academic skills

In summary, the overall mean is 2.28 interpreted as "Disagree" meaning that the respondents or computer engineering students do not solely rely on ChatGPT in accomplishing academic tasks.

SUMMARY OF FINDINGS

The purpose of this study was to determine the extent to which third-year computer engineering students have incorporated ChatGPT into their academic lives, how useful they perceive it to be, and how reliant on it they have grown. Many students have adopted ChatGPT in sections 3A, 3B, and 3C. Impressively, 66.6% of them claim to get correct and pertinent material for their studies via ChatGPT. Even more startling is the fact that 93.3% of users believe ChatGPT makes it easier for them to finish their schoolwork. Most people appear to have found ChatGPT to be a reliable ally in their academic journey.

Regarding addressing academic difficulties, there is an enormous amount of confidence in ChatGPT. Students have a strong degree of confidence in the instrument, as seen by the 83.3% of them who trust the counsel and guidance it offers. Furthermore, 96.6% of respondents find it useful for resolving academic issues, and 83.3% think it fits their particular wants and inquiries well. With 83.4% of students saying that ChatGPT is helpful, it seems that it is especially helpful for projects and assignments. Furthermore, 76.7% believe it to be a useful tool for learning computer engineering subjects.

The study also examined students' dependence on ChatGPT. Surprisingly, 73.4% of students believe ChatGPT is necessary for completing their work effectively, and 70% of students find it easy to use to do assignments on time. This dependence does have subtleties, though. Among the students, half utilize ChatGPT as their main information source, and 56.7% consider it to be essential. Only 40% of respondents believe that utilizing ChatGPT improves their academic performance in spite of this dependence. Although ChatGPT is a potent tool, its usefulness in skill development is still debatable, based on this conflicting impression.

CONCLUSIONS

After addressing the research questions in this research, researchers came up at the following conclusions:

• ChatGPT is widely adopted among third-year computer engineering students, indicating its significant integration into their academic routines. The tool's ability to provide accurate and relevant information makes it a valuable asset for students.

• ChatGPT is perceived as highly effective in enhancing academic efficiency and providing reliable guidance. Students acknowledge its utility in solving academic problems and adapting to their needs.

• The use of ChatGPT is correlated with improved academic performance due to its assistance in efficient task completion and project support. Nonetheless, there are mixed feelings about its role in enhancing academic skills.

• Students rate the effectiveness of ChatGPT highly, especially in task efficiency and problem-solving. However, there are reservations about its ability to enhance academic skills comprehensively.

• There is a notable trend towards growing dependency on ChatGPT for academic tasks. Despite this, students maintain a balanced perspective on its indispensability and primary use for information.

RECOMMENDATIONS

To optimize the use of ChatGPT in the academic setting and address the concerns raised by the findings, several recommendations are proposed. These recommendations aim to enhance the utility of ChatGPT, promote effective usage, and ensure that it complements rather than replaces essential academic skills and independent problem-solving abilities:

- Continuous updates and improvements should be made to ensure ChatGPT provides the most accurate and relevant information.

- Implement training programs to help students effectively utilize ChatGPT, maximizing its potential while minimizing over-reliance.

- Incorporate ChatGPT into the curriculum, particularly for problem-solving and project-based learning, to provide structured support.

- Develop features within ChatGPT that focus on enhancing students' academic skills, promoting a more holistic educational experience.

- Continuously monitor and evaluate usage patterns and effectiveness to identify areas for improvement and ensure the tool meets the evolving needs of students.

- Promote a balanced approach where ChatGPT is used as a supplementary tool, encouraging diverse learning and research methods to foster independent thinking and problem-solving.

REFERENCES

1. Arasa, D. (2023, May 11). How to boost learning with ChatGPT | Inquirer Technology. INQUIRER.net.https://technology.inquirer.net/123951/how-to-boost-learning-with-chatgpt

2. Ayman, S. E., El-Seoud, S. A., Nagaty, K. A., & Karam, O. (2023). The Impact of ChatGPT on Student Learning/performing.ResearchGate. https://doi.org/10.13140/RG.2.2.28890.11205

3. Cam, L. L. (1986). The central limit theorem around 1935. Statistical Science, 1(1), 78–91. https://www.jstor.org/stable/2245503

4. Caratiquit, K., & Caratiquit, L. J. C. (2023). ChatGPT as an academic support tool on the academic performance among students: The mediating role of learning motivation. Journal of Social, Humanity, and Education, 4(1), 21–33. https://doi.org/10.35912/jshe.v4i1.1558

5. Davis, Fred. (1987). User acceptance of information systems: the technology acceptance model (TAM). https://www.researchgate.net/publication/30838394 User_acceptance of_information systems_the_technology_acceptance_model_TAM

6. Dempere, J., Modugu, K., Hesham, A., & Ramasamy, L. K. (2023). The impact of ChatGPT on higher education.https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4592192

7. Llego, M. A. (2023, April 11). How to Survive the AI Revolution: A Human-Centered Approach to AI in Philippine Education. TeacherPH. https://www.teacherph.com/surviving-ai-revolution-philippines-education/

8. Ligot, D. (2023, November 7). How educators in the Philippines react to AI in education.https://www.linkedin.com/pulse/how-educators-philippines-react-ai-education-dominic-ligot-9ya5f

9. Lo, C. K. (2023). What is the impact of CHATGPT on education? A rapid review of the literature. Education Sciences,13(4),410.https://doi.org/10.3390/educsci13040410

10. Olson, G. M., & Olson, J. S. (2003). Human-Computer interaction: Psychological aspects of the human use of computing. Annual Review of Psychology, 54(1), 491–516. https://doi.org/10.1146/annurev.psych.54.101601.145044

11. Ortiz, S. (2024, April 11). What is ChatGPT and why does it matter? Here's what you need to know. ZDNET. https://www.zdnet.com/article/what-is-chatgpt-and-why- does-it-matter-heres-everything-you-need-to-know/