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Efficacy of ChatGPT in Academic Outputs of Fourth-Year BSIT Students

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Abstract

With the recent introduction of the ChatGPT, a lot of remarks and conjectures were made on the possible facets of society that this AI revolution might benefit. The education field is one of the primary domains affected by ChatGPT, the impact to BSIT students remains yet to be fully understood. Investigating the impact of ChatGPT on the academic experiences of fourth year BSIT students becomes paramount to explore its influence on the students' academic outputs. The study used descriptive research design to obtain data through survey questionnaires to provide the researchers with more precise information needed in the study. Moreover, the researchers utilized a survey questionnaire using purposive sampling. The findings showed that ChatGPT is a useful AI tool for improving students' academic outputs, especially in programming-related activities such as debugging, code optimization, and understanding code snippets.

Keywords: *Academic Performance, AI Integration, ChatGPT, Generative AI, Information Technology, Students Outputs*

Introduction

In the 21st century, the educational landscape has been undergoing a rapid and significant transformation due to technological advancements, especially with the advent of Artificial Intelligence (AI) (Petersen, 2021). Recent advancements in machine learning have led to the development of more advanced, cutting-edge technologies for creating digital content (GenAI) (Hu, 2022). The integration of AI technologies has undeniably influenced various aspects of education, providing new avenues for enhanced learning and academic endeavors while redefining traditional learning environments.

Among the recognized AI-driven breakthroughs, ChatGPT, developed by OpenAI on November 30, 2022, has garnered significant attention. ChatGPT is a generative AI chatbot that broke the record for the fastest-growing consumer application by achieving one million users in its first week, with an average of 55 million visitors per day (Brandl, 2023). A study by Rueda et al. (2023) states that the implementation of ChatGPT in the educational environment has a considerable positive impact on the teaching–learning process. However, the results also highlight the importance of users being trained to use the tool properly. The role of ChatGPT in the academic landscape is promising, but to utilize it effectively, users must be

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knowledgeable and equipped to maximize its functions. According to a study conducted by Ting Wang et al. (2023), ChatGPT shows massive potential to improve learning efficiency and provide educational support in various learning environments.

A study conducted by Darren Javier and Benjamin Moorhouse (2023) in the Philippines revealed that teachers can help learners develop the skills needed to use ChatGPT productively and critically, thereby increasing its advantages for language learners. This AI tool can be used in a wide range of subjects and provides benefits in terms of the skills and knowledge required by learners. It has shown varied performance across different subject domains and demonstrated potential benefits as an assistant for instructors and a virtual tutor for students (Chung Kwan Lo, 2023). Addressing complex AI tasks across different domains and modalities is a key step toward artificial general intelligence, particularly in learning environments. ChatGPT's advantages include, but are not limited to, encouraging individualized and interactive education, generating prompts for formative assessment activities, and providing ongoing feedback to inform teaching and learning (Baidoo-Anu & Ansah, 2023).

Literature Review

ChatGPT to Education

Recent studies exploring the opportunities created by ChatGPT in the educational landscape offer significant insights. For example, George et al. (2023) examined how educational systems can leverage AI-powered tutoring services to provide individualized instruction tailored to each student's needs. This approach enables students to receive the specific assistance required to enhance their academic performance and achieve their personal goals. Additionally, Alshater (2022) highlights various ways ChatGPT can advance research. Utilizing ChatGPT in research can lead to improved efficiency, greater flexibility, enhanced objectivity, and increased speed in automating tasks that would otherwise be time-consuming for humans to perform (Bozkurt, 2022).

However, ChatGPT may reproduce biases present in its training data. The study recommends being cautious of this risk and taking steps to mitigate it. Rudolph et al. (2023) suggest that students can benefit from experiential learning since ChatGPT can generate a variety of problem-solving scenarios. According to TESOL International Association (2023), ChatGPT can generate topics for discussion and creative writing prompts, helping students write creatively. It can identify grammatical and structural issues in students' work, provide writing prompts, and offer editing suggestions (Ohio University, 2023). The best part is that the feedback is immediate, unlike teacher input, which naturally takes time (Hong, 2021). This implies that ChatGPT can serve as an efficient personal language tutor.

ChatGPT to Students

ChatGPT can be a valuable technological tool for students in various ways. The Alshater (2022) study demonstrated that using ChatGPT in a case study significantly improves scholarly research in finance and economics. By synthesizing information from diverse sources, it aids in constructing well-informed arguments and enriching the content quality of academic work (Yilmaz

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& Yilmaz, 2023). Research findings showed that using ChatGPT has both benefits and drawbacks as perceived by students learning basic programming. Students admire ChatGPT's capabilities, finding it fascinating, motivating, and helpful for their studies and tasks. They appreciate its human-like interface, which provides well-structured responses andclear explanations, and find it straightforward to use (Shoufan, 2023).

The impact of ChatGPT on written outputs is profound. Its ability to refine writing skills is evident through the provision of constructive feedback, helping students improve their composition abilities (Shidiq, 2023). Through iterative interactions, it enhances the coherence, structure, and eloquence of students' written expressions, thus elevating the quality of their outputs. However, while recognizing the virtues of ChatGPT, it is essential to acknowledge its limitations. The model's proficiency depends on the specificity and clarity of student queries (Lo, 2023). In scenarios requiring nuanced understanding or personalized guidance, human intervention remains indispensable.

The literature and studies clearly indicate that ChatGPT's efficiency in various areas has positive implications. By utilizing natural language processing (NLP) to enable users to communicate with machines conversationally, ChatGPT has the potential to be a valuable tool in any industry. It has been emphasized that ChatGPT is particularly beneficial in education, especially for tasks that can be automated. The use of ChatGPT in IT shows promise for enhancing students' academic outputs. However, when examining the literature, research findings related to using ChatGPT for this purpose are still lacking. There is a gap in the existing literature regarding the efficacy of ChatGPT on BSIT students' academic outputs, which requires further exploration.

Theoretical Framework of the Study

The research investigates the efficacy of integrating ChatGPT within the framework of constructivist learning theory, which emphasizes the active role of students in constructing their understanding of the world. It examines four key attributes of educational systems: context, collaboration, conversation, and construction (Kim & Adlof, 2023), highlighting ChatGPT as a facilitator rather than a standalone solution for enhancing student learning within constructivist environments.

In implementing constructivist theory within the study, the research design prioritizes active student engagement as a central principle of effective learning. By aligning with the constructivist perspective, which emphasizes that learners construct knowledge through firsthand experiences, reflection, and social interaction ("Constructivism," 2023), the study underscores the importance of students being actively involved in their learning process. This active involvement is manifested through activities such as exploration, questioning, and reflection upon personal experiences, all of which are foundational principles of constructivist learning. This interaction fosters a dynamic learning environment conducive to knowledge construction. Moreover, the incorporation of ChatGPT promotes peer interaction, enabling students to collaborate and share experiences, collectively deepening their understanding of the

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material.

Research Questions

This study aims to reveal the efficacy of ChatGPT in the academic performance of fourth-year BSIT students at a state university in the Philippines. Specifically, the study seeks to answer the following questions:

1. What issues and limitations do students encounter when using ChatGPT?
2. For which specific academic tasks is ChatGPT most frequently used by students?
3. What is the frequency of ChatGPT usage for academic purposes?
4. What are the levels of reliability, adaptability, and comfort experienced by students when using ChatGPT?

Methodology

Research Design

The researchers use a quantitative descriptive design to evaluate the effectiveness of ChatGPT on BSIT students' academic outputs. This involves collecting numerical data in an area with limited prior research. Quantifiable data was gathered to statistically analyze a population sample and identify patterns, connections, and trends over time, using surveys, polls, and experiments (Cathy Heath, 2023). The data was collected, analyzed, and summarized to understand the range of outcomes for BSIT students using ChatGPT.

Sampling Procedure

The study was conducted with 110 fourth-year BSIT students in a state university during the 2023-2024 school year, representing 72% of the total 152 fourth-year BSIT students. Purposive sampling was used to select respondents based on the following criteria:

- Enrolled in the BSIT program
- Fourth-year students
- Basic familiarity with ChatGPT
- Have used ChatGPT for academic outputs

Purposive sampling is a technique wherein the researcher relies on specific criteria to choose respondents from the population to participate in the study (Andrade, 2020). This method allows the researcher to conveniently obtain a sample from a readily available source.

Data Gathering and Instruments

In this study, the researchers used the following instruments to gather all necessary data to address the specific problems of the study. A 10-item online survey was developed to evaluate ChatGPT's effectiveness on the academic outputs of fourth-year BSIT students a State University. Administered via Google Forms for efficient data gathering and accessibility, the survey was distributed to respondents across sections of the fourth-year BSIT curriculum. Completed surveys were promptly collected after participants responded. To ensure a high response rate and data accuracy, the researchers retrieved the completed surveys immediately, and the results underwent statistical analysis.

Data Analysis

The data collected from the survey questionnaire was recorded in tables, analyzed, and interpreted based on the results of the statistical treatment. Descriptive statistics will be used to

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summarize the data, including basic measures such as mean, median, standard deviation, and frequency distributions. These measures will provide an overview of the survey responses and will be presented using tables and graphs for clear visualization.

Ethical Considerations

The participants of the study will be required to sign an informed consent form before participating in the study. The informed consent form will explain the purpose of the study, the procedures involved, and the risks and benefits of participation. The participants will also be assured of confidentiality and anonymity.

Results and Discussion

Ninety-three respondents, representing 36.19% of the total, reported using ChatGPT for programming purposes. As shown in the table below, this use case is the most prevalent compared to other academic tasks. Bozkurt (2023) study highlights ChatGPT's potential as a comprehensive debugging toolkit. The study emphasizes the advantages of integrating ChatGPT's capabilities with those of other debugging tools to enhance the identification and resolution of bugs more effectively.

Table 1. *Academic Tasks ChatGPT is typically used*

Tasks	Response	%
Study for exam	37	14.39
Programming activities	93	36.19
Essay	36	14
Code optimization	79	30.74
Others (Understanding code snippets, Code refactoring, and explaining of code	10	3.89
Total	**257**	**99.21**

The survey results reveal that 36.19% of respondents, totaling ninety-three individuals, utilize ChatGPT specifically for programming tasks. This figure indicates that ChatGPT is the most frequently employed tool among the various academic tasks assessed in the survey. The prevalence of ChatGPT in programming suggests a significant interest in its capabilities and potential applications within this domain.

Bozkurt's (2023) study supports these findings by highlighting the value of ChatGPT as a robust debugging tool. According to the study, ChatGPT's advanced language processing abilities can significantly aid in identifying and fixing programming errors. The research suggests that while ChatGPT is effective on its own, its true potential is realized when combined with other debugging tools. This integrated approach allows for a more comprehensive debugging process, leveraging ChatGPT's strengths in natural language understanding alongside the specialized features of traditional debugging tools.

The benefits of such integration are multifaceted. ChatGPT can assist in understanding and interpreting error messages, suggesting code corrections, and providing explanations for complex programming concepts. When used in conjunction with other debugging tools, it can help streamline the debugging process, reduce development time, and enhance overall code quality. This synergy underscores the growing role of artificial intelligence in programming and highlights the importance of exploring collaborative uses of AI and traditional tools to optimize software development practices.

A lower proportion of responders,

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10 (3.89%), chose "other" outputs. Two respondents (0.97%) mentioned presentations; two respondents (0.97%) understood code snippets; two respondents (0.97%) refactored code; and two respondents (0.97%) explained code.

Table 2 *Usage Frequency for academic purposes*

Usage Frequency	Response	%
Very frequently	61	55.5
Frequently	27	24.5
Occasionally	13	11.8
Rarely	9	8.2
Total	**110**	**100**

Table 1.1 illustrates that 80% of students use ChatGPT frequently or very frequently for academic purposes. This substantial proportion indicates a strong reliance on ChatGPT as a supplementary tool for their learning activities. Such high usage suggests that students perceive ChatGPT as a valuable resource for academic support, whether for generating ideas, clarifying concepts, or assisting with research and writing tasks.

The findings are consistent with a survey conducted by Henry (2023), which reported that nearly one-third of college students had utilized ChatGPT in 2022. This earlier study highlights the growing adoption of ChatGPT among the academic community, reflecting a trend towards increased integration of AI tools in education. The contrast between the 80% of students who use ChatGPT frequently and the 8% who use it occasionally, seldom, or never underscores a clear divide in usage patterns.

The significant reliance by the majority suggests that ChatGPT is becoming an integral part of students' academic routines, potentially serving as a "crutch" to support their learning process. This frequent use might enhance students' efficiency and provide valuable assistance; however, it also raises questions about the balance between AI assistance and independent learning.

The smaller group of students who use ChatGPT less often may either prefer traditional methods of study or may be less aware of the tool's capabilities. The disparity between frequent and infrequent users could reflect varying levels of comfort with technology, differing academic needs, or personal preferences in learning strategies.

Table 3. *ChatGPT: on reliability in terms of accuracy and relevance for academic outputs*

Reliability	Response	%
Highly reliable	69	62.7
Moderately reliable	28	25.5
Somewhat reliable	12	10.9
Not very reliable	1	0.9
Not reliable at all	0	0
Total	**110**	**100**

The data reveals that a significant majority of respondents, 69 individuals or 62.7%, perceive ChatGPT as extremely reliable for delivering accurate and relevant information. This high level of confidence underscores the tool's effectiveness in meeting users' informational needs within an educational context. According to Wu et al. (2023), ChatGPT has been shown to enhance transparency and reliability in educational settings, further reinforcing students' trust in its capabilities.

In the context of academic use,

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ChatGPT appears to be valued for its ability to provide students with dependable support for their homework and other educational tasks. This positive perception is notable given the absence of strong negative feedback—none of the respondents rated ChatGPT as wholly unreliable, and only one individual (0.9%) considered it to be not very reliable. This minimal criticism indicates that concerns about ChatGPT's reliability are relatively rare and that, overall, students regard the tool as a valuable academic aid.

Despite the high level of trust in ChatGPT's reliability, it's important to acknowledge that some students may still harbor concerns or reservations. These worries could stem from previous experiences, awareness of potential limitations, or a general skepticism about AI tools. However, the overall positive feedback suggests that, for the majority, these concerns do not significantly diminish their view of ChatGPT as a useful resource.

The consistent confidence in ChatGPT's reliability highlights its growing role as a supportive tool in the educational sphere. It suggests that students are increasingly integrating AI into their learning processes, trusting it to assist with various academic needs. Nonetheless, it is crucial for educational institutions to continue monitoring and evaluating the effectiveness of such tools to ensure that they complement and enhance traditional learning methods rather than replace them. This balanced approach will help in addressing any potential issues while maximizing the benefits that AI tools like ChatGPT can offer in academic settings.

Table 4 *Adaptability level of ChatGPT in Academic Outputs*

Adaptability	Response	%
Very adaptable	73	66.4
Adaptable	25	22.7
Moderately adaptable	8	7.3
Slightly adaptable	4	3.6
Not adaptable at all	0	0
Total	**110**	**100**

A substantial majority of respondents view ChatGPT as highly adaptable, with 66.4% rating it as "Very adaptable." This high level of endorsement highlights the tool's perceived flexibility and effectiveness in accommodating various educational needs and contexts. Firat (2023) supports this view, noting that ChatGPT's adaptability is a key factor in enhancing learners' independence. The tool's ability to adjust to different queries and learning styles makes it a valuable resource for diverse academic tasks.

However, a smaller subset of respondents offers a more nuanced perspective. Specifically, 7.3% rated ChatGPT as "Moderately adaptable," and 3.6% as "Slightly adaptable." These individuals acknowledge ChatGPT's adaptability to some extent but also recognize potential limitations. This range of opinions suggests that while ChatGPT is generally seen as versatile, there may be specific scenarios or applications where its adaptability is less effective or where users experience challenges.

The absence of respondents selecting "Not adaptable at all" further emphasizes the overall positive sentiment towards ChatGPT's flexibility. This

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unanimous agreement on its adaptability underscores the widespread acceptance of the tool's capability to handle a variety of academic tasks and provide relevant support across different subjects.

The strong overall approval of ChatGPT's adaptability indicates that users find it to be a robust tool that can meet a range of educational needs. However, the existence of more cautious opinions also points to the importance of continuous improvement and refinement of AI tools. Addressing any identified limitations and enhancing the adaptability of ChatGPT could further strengthen its role as a versatile educational aid.

Table 5 *Comfort Level with Using ChatGPT for Academic Outputs*

Comfort Level	Response	%
Very uncomfortable	3	2.7
Uncomfortable	1	0.9
Neutral	15	13.6
Comfortable	30	27.3
Very comfortable	61	55.5
Total	**110**	**100**

The survey data shows that 55% of respondents, totaling 61 individuals, express a high degree of ease with ChatGPT, selecting the response "Very comfortable." This significant proportion reflects a strong positive reception of the tool among users. The findings align with the research conducted by Ajlouni, Wahba, and Almahaireh (2023), which highlights a general high level of comfort with using ChatGPT as an academic tool. This comfort likely stems from the tool's user-friendly interface, its effectiveness in addressing academic queries, and its ability to assist with a range of educational tasks.

The overwhelming majority of respondents feeling "Very comfortable" indicates that ChatGPT is well-received and integrates smoothly into users' academic routines. This high level of comfort suggests that the tool is perceived as accessible and supportive, contributing positively to the users' learning experiences.

In contrast, a small minority of respondents report discomfort with ChatGPT. Specifically, only 1 respondent (0.9%) feels "Uncomfortable," and 3 respondents (2.7%) are "Very uncomfortable" using the tool for academic tasks. This minor level of discomfort points to potential areas for improvement, such as addressing specific user concerns or enhancing the tool's functionality to better meet diverse needs. The presence of some discomfort, albeit minimal, highlights the importance of acknowledging and addressing individual user experiences. Even though the overall sentiment towards ChatGPT is largely positive, understanding the reasons behind the discomfort reported by a few users can provide valuable insights for further refinement and user support.

Table 6. *Quality of Academic Outputs with the Assistance of ChatGPT*

Quality of	Response	%
Excellent	58	52.7
Good	44	40
Average	8	73
Below Average	0	0
Poor	0	0
Total	**110**	**100**

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The survey reveals that 58 respondents, accounting for 52.7% of the total, rated the quality of outputs generated with ChatGPT as "Excellent." This indicates a strong overall satisfaction with the tool's ability to produce high-quality responses. Such a high rating suggests that users generally find ChatGPT to be highly effective and reliable in meeting their needs, whether for solving problems, generating content, or providing information.

The positive perception of ChatGPT's output quality aligns with the findings from Wardat et al. (2023), which indicate that the accuracy and effectiveness of ChatGPT's solutions are influenced by various factors, including the complexity of the queries, the quality of the input data, and the clarity of the instructions provided. This suggests that while ChatGPT performs exceptionally well in many cases, the quality of its responses can be affected by the specifics of the input and the nature of the task.

In contrast, a smaller group of 8 respondents (7.3%) rated the quality as "Average." This rating indicates that while these users found the tool to be satisfactory, they may have experienced limitations or inconsistencies in the output. The "Average" rating suggests that there is room for improvement, particularly in cases where the complexity of the task or the clarity of the instructions may affect the quality of the responses.

The absence of any ratings below "Average" highlights a generally favorable view of ChatGPT's output quality. This absence of negative feedback underscores that, despite some variations in perceived quality, there are no significant concerns regarding the tool's performance overall.

The high proportion of "Excellent" ratings and the lack of lower ratings indicate that ChatGPT is well-regarded for its output quality, contributing positively to users' experiences. However, the feedback from those who rated the quality as "Average" provides valuable insight into areas where improvements could be made. Enhancing the tool's ability to handle complex queries and improving response accuracy could address these concerns and further bolster the overall positive perception of ChatGPT.

Table 7 *Students Beliefs on Whether or Not ChatGPT Enhanced their Academic Performance*

Academic	Response	%
Significantly	67	60.9
Moderately	33	30
Slightly enhanced	10	9.1
Not enhanced	0	0
Declined academic	0	0
Total	**110**	**100**

In table 3 60.9% (67 respondents) believed ChatGPT significantly enhanced their academic performance. 9.1% (10 respondents) who acknowledged a little enhancement while no participant mentioned that their academic performance had declined.

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Table 8. *Limitations BSIT Students Encountered While Using ChatGPT for Academic Outputs*

Limitations Encountered	Response	%
Limited understanding of complex tasks	36	21.3
Difficulty in providing context-specific information	37	21.9
Generating outputs that require creativity and critical thinking	34	20
Technical issues or errors in generated	60	35
None	2	1.8
Total	**169**	**100**

`The table indicates that 60 respondents, or 35% of the total, reported encountering limitations in generating outputs due to technical issues with ChatGPT. This significant proportion highlights that despite the advanced capabilities of AI tools, there are still inherent constraints that users face. These limitations often stem from the tool's handling of complex or subjective tasks, where human reasoning and interpretation are crucial.

Adeshola and Adepoju (2023) emphasize that AI tools, including ChatGPT, may struggle with tasks requiring nuanced, subjective perspectives. While AI can process vast amounts of data and provide accurate information based on patterns, it may not fully grasp the subtleties and intricacies of subjective judgment. This gap underscores the importance of human reasoning in areas where personal interpretation, empathy, and contextual understanding are essential. As a result, users may encounter limitations when using ChatGPT for tasks that require a deep, subjective analysis or personalized insights.

The fact that 1.8% of respondents reported experiencing no limitations whatsoever is noteworthy. This small percentage suggests that, for some users, ChatGPT performs exceptionally well and meets their needs without technical issues. These users likely engage with tasks where the tool's strengths are fully leveraged, such as generating straightforward information or assisting with well-defined queries.
Overall, the 35% of respondents who faced limitations highlight the need for ongoing improvements in AI technology. Addressing these technical issues could involve enhancing the tool's ability to handle complex or subjective tasks and refining its algorithms to reduce errors and limitations. This feedback is crucial for developers aiming to create more robust and versatile AI tools that better serve users across a wide range of applications.

Table 9. *Concerns or Issues BSIT Students Encountered While Using ChatGPT for Academic Purposes.*

Concerns or Issues Encountered	Response	%
Plagiarism	36	26.1
Potential biased prompt	60	43.5
Data security	5	3.6
Privacy Concern	5	3.6
None	32	23.2
Total	**138**	**100**

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The survey results reveal that a substantial majority of respondents, specifically 60 individuals or 43.3%, express concern that biased prompts could impact the content generated by ChatGPT and potentially undermine academic integrity. This concern reflects a growing awareness of how AI tools can be influenced by the nature of the input they receive. If prompts are biased or improperly framed, the AI's responses may reflect these biases, leading to skewed or unreliable content. Such issues are particularly pertinent in academic contexts, where accuracy, fairness, and objectivity are paramount. This concern underscores the need for careful prompt design and critical evaluation of AI-generated content to ensure it upholds academic standards.

In addition to concerns about bias, 5 respondents raised issues related to data security and privacy. These concerns are increasingly relevant as educational tools become more integrated with digital technologies. Users are rightfully cautious about how their data is handled and whether their interactions with AI tools are secure. Ensuring robust data protection measures and transparent privacy policies is crucial for maintaining user trust and safeguarding sensitive information.

On a more positive note, 32 respondents, representing 29.1% of the sample, reported having no ethical issues with using ChatGPT. This group likely views the tool as a valuable asset for academic work without major reservations about its ethical implications. Their lack of concern may reflect confidence in the tool's capabilities or satisfaction with how it is managed and used within their academic environment.

The survey highlights a range of ethical considerations associated with the use of ChatGPT. The predominant concern about biased prompts indicates a need for ongoing efforts to mitigate bias and ensure that AI tools contribute to fair and accurate academic practices. Addressing data security and privacy issues is also essential to foster a safe and trustworthy environment for users. While a significant portion of respondents do not perceive ethical issues, it is important for developers and educators to remain vigilant and address concerns raised by users to enhance the responsible use of AI tools in academic settings.

Conclusion

The results reveal that ChatGPT has positive effects when used in academic settings. It is widely utilized across various applications, including programming activities, code optimization, learning programming concepts, and essay writing. In diverse academic fields and assignments, the AI can effectively assist students, who are quickly adapting to this technology. Participants have expressed confidence in ChatGPT’s ability to provide quality, reliable, and accurate information to support their tasks. ChatGPT is indeed an innovative tool with tremendous potential to enhance students' efficiency, facilitate knowledge acquisition, and aid in task completion.

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