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Unveiling the ChatGPT Educational Revolution: Assessing the Dynamic Impact on Students and Educators

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Abstract: Due to shifting social demands and technology breakthroughs, the higher education environment is changing quickly. Despite initiatives to make education accessible to everyone, accessibility is still a major problem, especially in light of the digital divide. This study investigates how ChatGPT, an AI-powered chatbot, can revolutionize higher education by tackling important problems including resource efficiency, personalized learning, and accessibility. This study intends to improve learning outcomes for both students and educators by comprehending how instructors and students incorporate ChatGPT into instructional methods. Students and instructors were given both quantitative and qualitative questionnaires as part of a mixed-methods approach, in order to gather data on the usage of ChatGPT for different academic tasks, such as lesson preparation, grading, and student help. Results showed that most people believe ChatGPT to be a useful tool that improves productivity, saves time, and helps with grasping difficult subjects. Questions were raised concerning the veracity of the data that ChatGPT offered and the necessity of organized training. ChatGPT and other AI technologies have the potential to enhance educational results by enabling personalized instruction and offering on-demand learning help. In addition to the continuing discussion on the use of cutting-edge technology in higher education, the findings provide insightful information for educational institutions seeking to use AI to improve teaching and learning.

Keywords: artificial intelligence, education, student, learning, ChatGPT, personalized learning, regulation

1. Introduction

Numerous possibilities and challenges are causing a significant shift in the field of higher education and research. To remain relevant and successful, institutions must adjust to changing educational paradigms, social demands, and technological breakthroughs. The instant availability of correct information in the necessary format is one of the biggest problems in higher education today. Even with significant progress in ensuring that education is available to everyone, regardless of their location or economic situation, this remains a difficult undertaking.

The transition to online learning has further highlighted the disparities in the access to technology and reliable internet, essentially a matter of investment in support systems and infrastructure. The term "digital divide" refers to the division relating to the access to and use of digital technologies, most important of which is the internet, which exacerbates socioeconomic conditions and opportunities among individuals and communities. Factors such as income, age, geography, environments (both physical and socio-logical) contribute to such disparities. These key determinants, each exerting equal and compounding influence, lead to inequalities in essential services, opportunities for education, healthcare, and employment [1, 2]. There have been clear categorizations: an infrastructure deficit, capacity/bottom-line knowledge gaps, and motivational gaps, which illustrate the deep-seated dynamics of attempts at bridging it [3]. As a result, the divide considerably widens existing harsh inequalities, especially for small and marginalized groups while fostering democratic participation and social inclusion [2, 4]. Eradication of the digital divide demands extensive strategies that promote the only situation with the potential of providing the necessary digital infrastructure, digital literacy, and access to technology. All these motivations further point to the development of economic and work with a broad brush to shrink inequalities around the globe [2]. At the same time, the centrality given to the mental health and well-being of the student clearly indicates the inclusion of various support systems for greater holistic education. However, the future of higher education is not without its issues. Technology can deliver global cooperation, adaptive assessment methods, and personalized learning experiences. Given that complex problems are intrinsically global and require various expertise, multidisciplinary cooperation is growingly encouraged. Academic institutions are traditional themselves and sometimes hinder the process of collaboration. High ethical standards must still be held, especially in new fields like artificial intelligence (AI). Another big challenge is the requirement to resist misinformation and ensure that scientific information is appropriately made known in the digital age. Under these conditions, researchers are expected to work with full scientific honesty and rigor. Nevertheless, for all the hurdles these present, the promise for research remains bright. Collaborative research networks span the globe so that experts can tackle problems too complex to be solved in any other way. Big data, AI, and machine learning have advanced analytics and discoveries, most noticeably in healthcare and environmental science. Technologies of quantum computing and gene editing hold out the hope of transformation across all disciplines. Open access initiatives and new publishing models democratize the dissemination of knowledge and make research findings more accessible. Public-private partnerships catalyse innovation by tapping resources and expertise in academia and industry, while interdisciplinary studies bring fresh perspectives toward the resolution of complex challenges in a holistic way.

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Generative pre-trained transformers (GPTs), which are backed by AI, have advanced significantly in this new setting. These GPTs, like ChatGPT, make it possible to give teachers and students intelligent information in real time, thereby promoting innovation in fresh concepts and approaches to research, education, and learning. Thus, the future of research and higher education will be defined by incorporating these cutting-edge AI technologies that will balance the possibilities and difficulties that constantly arise due to societal changes.

This research contributes significantly by transforming the effects of ChatGPT in higher education systems regarding accessibility issues, improved personalized learning, and optimized resources. However, these advanced AI-driven resources are becoming well integrated into education without evidence of any impact on actual students' engagement, academic support, or even institutional efficiencies—they lack direct evidence on the same. This study fills the gap provision of empirical evidence to support how AI can enhance at-demand learning, bridge the digital divide, and assist educators in delivering adaptive instruction. This work specifically studies the real implementation of ChatGPT in higher education environments instead of existing studies speaking broadly on AI in education. It will analyze the ideal person, considering the applications of personalized learning experiences, intelligent tutoring, etc. Finally, the study creates an integrated framework for using such AI technology in educational contexts for action integrity, meaning ethical considerations as well. It serves as the basis of evidence to offer practical recommendations to institutions like York St John University for developing appropriate policies based on AI in efficiency within teaching methodologies, student engagement, and innovation by institutions. Such contribution goes toward future strategies in adopting AI in education according to its alignment with the university's commitment to embracing technological advancement for educational purposes.

This research is organized into sections. Section 2 details the literature review on AI in education, focusing primarily on the applications, advantages, and hurdles of ChatGPT in education. It also captures relevant studies on the AI-induced learning processes, the ethical considerations of AI, and issues from the global digital divide. Section 3 discusses the research methodology and the framework for study design, the sample characteristics, methods of data collection from the students and educators in York St John University, and analytical methodology on ChatGPT's impact on higher education. Subsequently, it presents the outcomes based on the analysis of both students' and educators' perceptions of ChatGPT, its role in personalized learning, and issues on accuracy, privacy, and critical thinking. Lastly, Section 4 concludes the study by highlighting the key findings and limitations and recommends areas of future research on AI-enabled learning in academia.

2. Literature Review

Over the years, the application of AI in education has sparked debate about its implication on teaching and learning, especially with the emergence of newer AI software tools, such as ChatGPT. Moreover, there have been discussions on how these new technologies would impact the educational experiences of both students and teachers. This study provides an overview of existing literature on ChatGPT across diverse education fields, with a specific focus on potential benefits, challenges, and prospects for use.

Beginning with larger AI-related considerations in education, this study addresses ChatGPT more directly as a tool aimed at enhancing student motivation, engagement, and academic performance. Amid its applications, there are issues on ethical implications, overreliance on ChatGPT from students, and accuracy of generated content. The literature review states the existing knowledge gaps, especially regarding the long-term effects of ChatGPT on education, the contextual research needed for different educational settings, and the ethical questions raised by its application. For resolving these problems empirically, further research is needed to ensure the responsible and effective integration of AI into the practices of teaching and learning.

2.1. The role of AI in education

There have been questions about what and how to teach the next generation, particularly with the introduction of ChatGPT. A great deal of research has been done on AI, including chatbots, with a particular emphasis on ChatGPT in the educational sector [5–8]. AI integration in education, especially ChatGPT, has demonstrated a number of benefits for both instructors and students. A study carried out by the University of Bisha in Saudi Arabia revealed that ChatGPT is a useful tool for encouraging students to improve their spelling and grammar; including ChatGPT into instructional strategies may be inspiring, highlighting its value as a learning aid. There is a request for more thorough research to better understand and solve any problems rather than worrying about possible adverse consequences [5, 9].

2.2. ChatGPT's impact on student learning and engagement

Students consider ChatGPT as a friend in the classroom with a practical value for their learning, work, and life, owing to its ability to provide useful information and assistance [10]. ChatGPT is made to generate text that resembles human language, responding to specific requests or dialogues, facilitating natural and open-ended conversations [11]. Recent research conducted by the University of Jordan showed that students highly value its support in generating writing ideas [12]. Another study aimed to assess university students' perceptions of ChatGPT by exploring variations across gender, grade level, major, and prior experience. With 239 students from Science majors (Biology, Physics, Chemistry) and Mathematics Education Program, the results showed an overall positive perception. Notably, gender differences were observed in "Perceived ease of use", and significant variations were found in "Perceived social influence" among different majors [13]. In the study, "perceived ease of use" refers to what students think about how easy it is to use ChatGPT; the findings indicate that, overall, students find it easy to use. Meanwhile, "Perceived social influence" means how students think others affect their opinions about ChatGPT; this feeling differs among students in different majors, showing that people in various areas of study are influenced differently by their peers. It looks at how friends and classmates shape what students think about ChatGPT.

2.3. ChatGPT in academic writing and information retrieval

ChatGPT has changed how students used to find information, like Google Assistant, and search engines like Google and Bing. It has allowed us to talk and ask questions more naturally to obtain the information needed [14, 15]. Students are using ChatGPT to make their schoolwork better and find information easily. It helps them improve their assignments and quickly get the information they need for their studies [16, 17]. Following a survey on information retrieval for assignments and homework among students, the University of South Africa has raised a question: Is ChatGPT becoming a new alternative to Google? The responses indicated that ChatGPT is becoming a new way to find information, like Google did with its search engine [18]. By using smart technology like large language models (LLMs) such as GPT, ChatGPT gives personalized suggestions for finding information. Just like Google changed how people find things online, ChatGPT is changing things by helping people via chat to find what they need. The surveys show that students think ChatGPT is useful, makes finding

things faster, and changes how they use other tools to find information [19]. However, further research is required to examine this phenomenon more substantially and scientifically.

2.4. ChatGPT's personalized support and teaching support

By evaluating student work and the learning process and offering immediate, tailored feedback, this AI technology not only helps but even solves graduate-level difficulties [20, 21]. Numerous studies have evaluated the benefits, highlighting its capacity to provide individualized education according to each student's unique requirements and skills [22–24]. For instance, in a case study carried out in Australia [25] whereby ChatGPT and the teachers both rated a student's idea, ChatGPT was capable of producing feedback that was easier to read and more consistent, which helped students understand it and inspired them to take corrective action [26].

ChatGPT is a flexible tool that may be used in various educational settings and benefits both teachers and students. According to the study by Bukar et al. [22], there are three ways it may be used in education: to support administration and instruction. Beyond conventional and maybe boring theoretical content, ChatGPT can play a special role in creating innovative and captivating activities for students [27]. It may provide kids ideas for creative lessons, engaging activities, and dynamic learning resources, making their time in school more pleasurable and engaging [28–30]. An trial with 39 third-grade students showed that using lesson plans created with ChatGPT significantly improved academic success in maths classes. This favorable result demonstrates the possible effectiveness of using ChatGPT into teaching methods to raise student achievement in particular topics, such as maths [31].

Teachers can benefit greatly from ChatGPT's ability to automate administrative duties, such as assignment grading. ChatGPT's natural language processing powers allow it to examine and assess textual material, providing assistance with assignment evaluation and feedback. Teachers may spend more time on effective teaching strategies and student engagement by using this technology, ultimately assisting them in managing their workload more effectively. Recent studies evaluated ChatGPT as a tool for grading programming assignments in a 15-week Python programming course involving a total of 67 students [32–34]. When the grades from ChatGPT and a human teacher were compared, there was a significant positive connection, suggesting consistency [35].

The literature study concludes by showing that there is an expanding corpus of research examining ChatGPT's effects in education, particularly on instructors' administrative duties, knowledge retrieval, and student learning. Meanwhile, although students think ChatGPT is helpful for both their personal and academic requirements, there are issues with accuracy and possible over-reliance. The literature also emphasizes how educators must adjust to the changing role of ChatGPT and other AI technologies in the classroom.

2.5. Research gap

Even if the research that have already been done on ChatGPT in education are progressing well, there is still a large knowledge vacuum that has to be filled. In order to close this gap, this study aimed to investigate the possible effects and moral issues related to the use of ChatGPT in the classroom in greater detail. Long-term research are essential to understand the long-term impacts on student learning and educational attainment. Comprehending various circumstances, such as cultural settings and socioeconomic origins, is also crucial.

An all-encompassing strategy is required, taking into account the emotional, social, and cognitive effects on instructors and students. As technology develops and educational methods change over time, research should also look at how the impacts vary. Careful research into ethical issues is required, including teacher workload, academic integrity, prejudice prevention, and data privacy. Effective implementation techniques are essential, including creating instructional frameworks, training teachers, and ensuring that everything is accessible and equitable. Furthermore, proper integration requires assessing ChatGPT's psychological effects, implications for regulations and policies, and unintended repercussions in education.

3. Research Methodology

3.1. Research design

Using a mixed methods approach to assess the use of ChatGPT and other AI technologies for instructional purposes, relevant data from lecturers and students in UK universities were collected through a Microsoft Forms-based online survey, thereby producing both quantitative and qualitative data. The poll contained 31 items categorized into three main areas including the use of ChatGPT for academic purposes. Utmost anonymity was preserved for the participants in order to adhere to ethical standards. To extract insightful findings, exploratory data analysis (EDA) methods were applied for a more comprehensive scrutiny of response types and trends.

3.2. Data collection

In this study, we included students and teachers who had at least some general knowledge of and experience using ChatGPT. The first part of the study comprised four questions common to both groups. The first question asked participants if they consented to be part of the study. Those who agreed proceeded to subsequent items regarding the use of ChatGPT amongst students and teachers at the university. In the teachers' section, the teachers were asked to provide various kinds of information on the use of ChatGPT in academic work and teaching. It also looked into whether ChatGPT assisted lesson planning, grading, and student support activities and how it affected their roles as teachers. Moreover, this section looked into ways in which teachers could use ChatGPT to improve their delivery, which could lead to workshops and training. Meanwhile, in the students' section, the students described how they use ChatGPT in their studies, whether ChatGPT maximizes learning outcomes, assists in academic performance, or provides students with a better educational experience.

3.3. Data privacy and storage

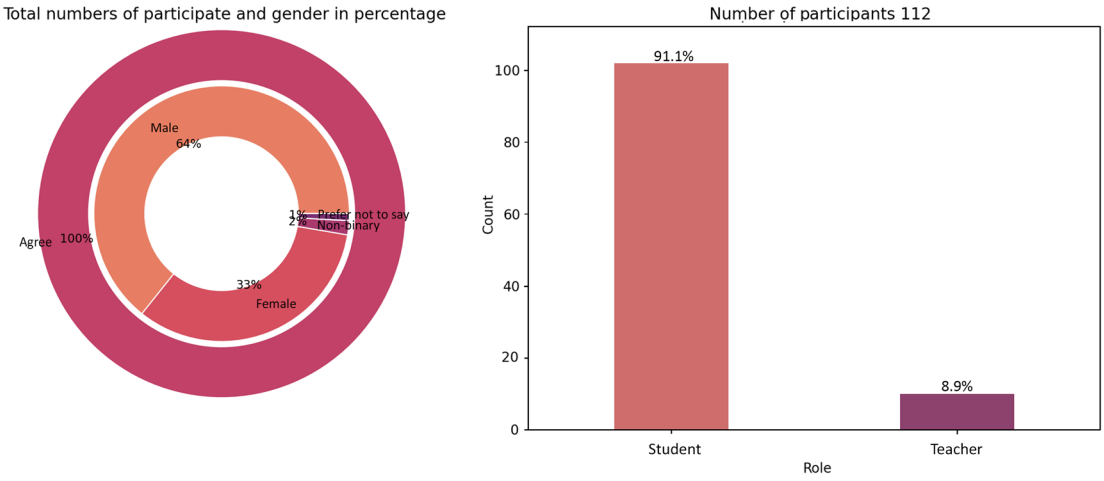
The data collected for this study are strictly anonymous. Thus, no sensitive information was gathered from the participants. Informed consent was obtained; the participants were informed that their participation in the study was voluntary and how the data would be handled. Furthermore, the data collection and storage mechanisms were fully compliant with the stipulated ethical requirements to ensure the protection of participant confidentiality.

The data have been stored securely in the YSJ Research Database, with OneDrive being the platform used for data management. Hence, the storage and analysis mechanisms provide secure and reliable settings to safeguard the information collected from unauthorized access and breach. The data was analysed by the research team only while observing legal procedures regarding privacy and data integrity during the study.

3.4. Data analysis

The data analysis process for this research was conducted from a data scientist's perspective, leveraging exploratory data analysis (EDA) techniques to derive meaningful insights. The analysis is divided

Figure 1
Distribution of participants by role



into three main sections based on the participants: both students and teachers, teachers only, and students only.

3.5. All participants (students and teacher)

3.5.1. Participants' information

A total of 112 postgraduate students and instructors from York St John University had knowledge of and used ChatGPT.

1) Are you a student or teacher?

Figure 1 shows the distribution of participation by role: 91.1% students and 8.9% teachers. This stark imbalance in favor of students implies that most insights or feedback in the study would mostly be based on student experiences or perspectives. Nevertheless, the teachers still add value to the diversity of the data, thereby ensuring that the educators' points of view are represented.

3.5.2. Gender

The gender distribution of participants, as shown in Figure 2, indicates that 64.3% were male, 33.0% were female, 1.8% were non-binary, and 0.9% preferred not to disclose their gender. This not only indicates a predominantly male participant group but also reflects significant representation from females, as well as inclusion of non-binary individuals and those who chose not to disclose their gender.

3.5.3. Nationality of respondents

As shown in Figure 3, among all respondents, 21.4% are Nigerian, all of whom are students. Nepalese participants constituted 29.5% of the total, with the majority being students and 2.7% being teachers. Indian participants account for 24.1%, with most being students and 2.7% being teachers. Ghanaian and Brazilian participants each represent 1.8% of the total and Puerto Rican, Guatemalan, Pakistani participants each make up 0.9%, solely consisting of students. Sri Lankan participants comprise 8.9%, with the majority being students and 1.8% being teachers. Belgian participants account for 0.9%, with equal representation from students and teachers. Finally, Malaysian and British participants each make up 0.9%, consisting only of teachers.

3.5.4. Response on yes/no from all participants

1) Do you believe there should be regulations or guidelines governing the use of user data by ChatGPT platforms?

The majority of 81.4% of students and 90.0% of teachers would like some kind of regulations or guidelines for the use of user data by ChatGPT platforms. A consensus exists between the two groups for regulatory measures deemed necessary. Interestingly, while the concurrence remains high among both groups, the teacher population had a slightly higher approval rating than the student group for the need for regulations, suggesting that the teachers hold a more significant concern or awareness about data privacy issues. Conversely, fewer students (18.6%) and teachers (10.0%) do not wish for any regulation or guideline. Hence, the minority could be those who trust current data handling practices, while the rest may be holding a different view on data privacy.

Figure 2
Gender distribution of participants in the study

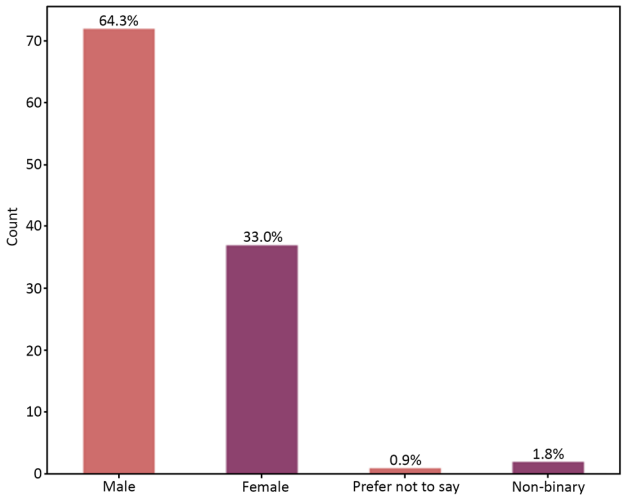
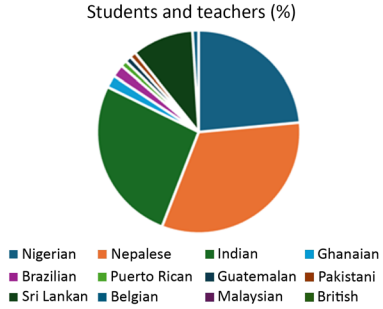


Figure 3
Nationality distribution of participants



As revealed by the results in Figure 4, these observations give a clear indication of the need to formulate stronger and enforceable data privacy policies and guidelines for these ChatGPT platforms. The policymakers and educational institutions would do well to consider these findings during the drafting processes for data protection regulations to fit onto the expectations and concerns of both students and teachers. Such strong support for any regulation also indicates that both consider the associated risks posed through the misuse of user data. This should help point further efforts toward public awareness and edu-training of users on measures to protect their data privacy.

2) Are you aware of how your data may be stored or used by the platform when using ChatGPT?

Figure 5 depicts that 100% of the teachers know how their data could be stored or used by the ChatGPT platform, indicating a high degree of awareness and perhaps a better understanding between educators about information privacy. On the other hand, 57.8% of students were aware of data storage and use, while 42.2% were unaware, thereby signifying the existence of a large unaware group.

Figure 4
Students' and educators' perspectives on the need for regulations and guidelines for ChatGPT in education

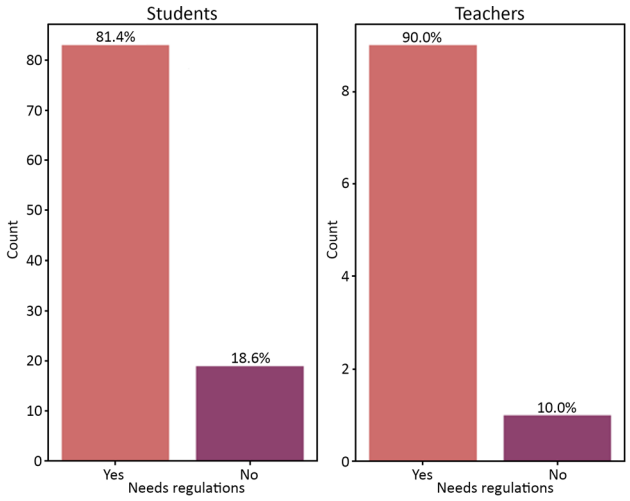
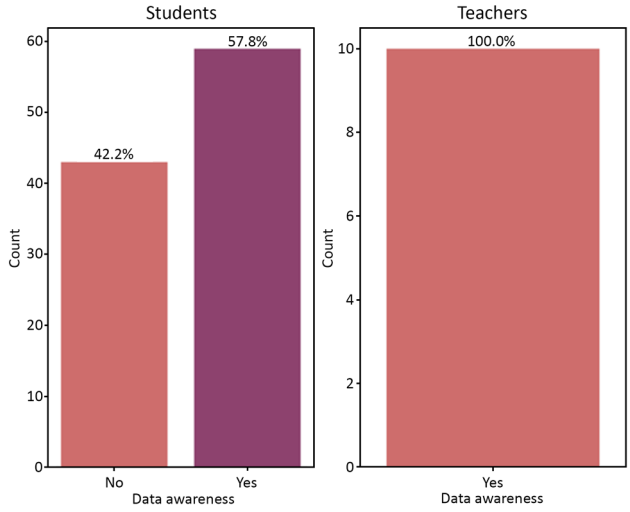


Figure 5
Students' and educators' awareness and perceptions of data storage and security in ChatGPT usage



This discrepancy showcases the wide gap in the awareness levels of students and teachers.

There should be training specifically aimed at increasing students' awareness of the practices associated with data storage and its use when data is shared online and through other online platforms. Efforts could, for instance, look into integrating data privacy into subject curricula or setting up workshops and resources to fill this gap in students' understanding pertaining to the current value and sensitivity of their data in the digital age. Moreover, institutions and policymakers should aim at ensuring that data privacy policies and practices are published clearly and are efficiently communicated by all such entities to fill in the gap in awareness and build that requisite level of trust amongst users, especially students.

Further studies could investigate factors contributing to the differences in awareness levels in students versus teachers, rendering insights that might inform the development of strategies designed to enhance the knowledge of students about data privacy. Increased efforts toward educating students would further support this high awareness level among teachers. A user base that is well informed on how their data is handled when interacting with ChatGPT platforms would be critical in making the platform a safe and trustworthy environment.

3.5.5. Ratings of students and teacher

Participant ideas were surveyed concerning their concerns and confidence about their information privacy and security on ChatGPT. The scale ranged from 1 to 5, with 1 being low and 5 being high.

1) How concerned are you about the privacy and security of your information when using ChatGPT?

Among students, the largest number of respondents expressed a level of privacy concern at level 3 (31.4%), followed by level 4 (27.5%), and level 5 (21.6%). Lower levels of concern constituted a minority: levels 1 and 2 were responded to only by 4.9% and 14.7%, respectively. In general terms, nearly half of the students (49.1%) expressed concern at levels 4 and 5, evidently suggesting concern and worry about data privacy and security.

Among teachers, 30.0% reported the highest level of concern (level 5), while 50.0% gauged it at a moderate level 3, 10.0% at levels 1 and 2, and none at level 4. This distribution denotes that half of the teacher population did have moderate concern, which may indicate that the teachers might not have the full knowledge of how their data could be used; conversely, many teachers still find high privacy concerns (level 5), and this group of teachers is well aware of the potential for their data to be used and may be particularly anxious about such misuse.

These results, as shown in Figures 6 and 7, stress continuously educating the moderately to highly concerned about data privacy and security. The institution should concentrate on improving understanding and providing clear guidelines on how ChatGPT protects and handles user information to alleviate their concerns. Clearly, this conveys the perception of privacy; finally, one should consider this in the creation and communication of a complete set of data privacy policies. An effective way to communicate safety and security measures to targeted users will work well and attend to their concerns.

2) How much do you feel confident that your personal information is kept safe when interacting with ChatGPT?

Regarding the safety of personal information, a comparison can be made with respective levels of confidence due to an interesting difference in comparison with the same assessment levels applied to students. For students, 31.4% were moderately confident (level 3), 25.5% were very confident (level 4), and 18.6% marked level 2. The combined proportion of uncertain and unconfident students was less, with 12.7% for level 1 and 11.8% for level 5. Approximately

Figure 6
Students' and educators' confidence levels in the safety of using ChatGPT

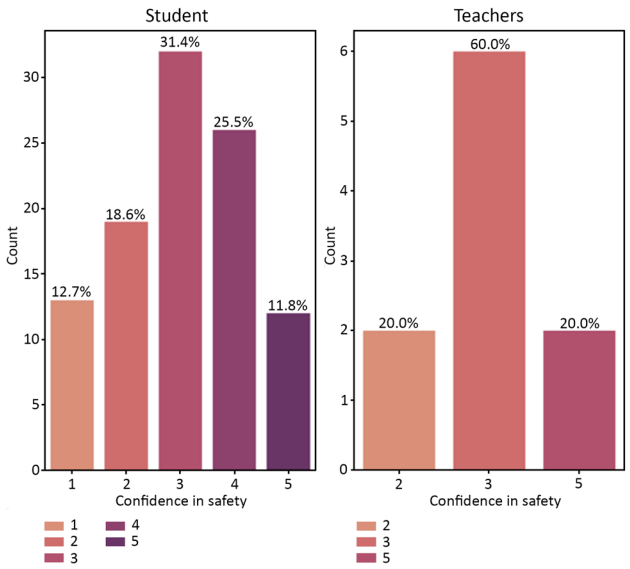
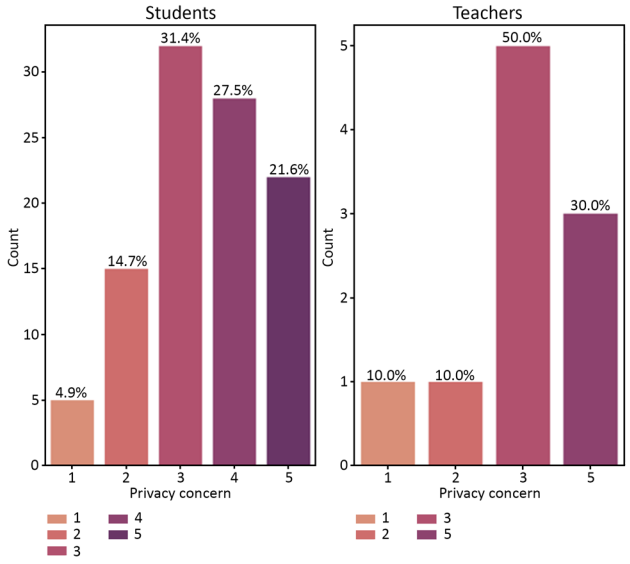


Figure 7
Students' and educators' concerns about privacy and security when using ChatGPT



37.3% of students rated their confidence as very high (levels 4 and 5), 31.3% rated it as low (levels 1 and 2). Among teachers, 60% placed their confidence in the safety of their personal information at level 3 (medium level of confidence), 20% at level 2, and 20% at level 5. There is no reported confidence at level 1 and 4, which suggests that moderate confidence was predominant with a noticeable portion that is highly confident about the safety of their personal information. These findings draw attention to the need for specific education and communication to increase user confidence regarding the safety of their personal information, mainly among students who show a wider range of confidence. Institutions would do well to provide clear and precise statements regarding measures available for the protection of personal information and address any concerns that users may have. Upholding transparency in data protection policies and practices would certainly help to raise a student's trust and confidence. A consistent stream of updates, information on new evidence, and reassurances about the data security would considerably reduce the uncertainties and build confidence among users. Further studies might identify which factors influence confidence levels for students and teachers, respectively. Alternatively, such a study could seek to identify why teachers possess a moderate confidence level so that the root cause(s) may be addressed to enhance confidence.

3.5.6. Comments and feedback - word cloud

Based on the word cloud in Figure 8, words such as "artificial intelligence," "education," "student," "learning," and "technology" appear very often, which shows the important themes in the feedback. Words such as "critical," "positive," "help," "change," "useful," and "reliable" indicate a dichotomy between the positive and the critical views. On the other hand, words such as "thinking," "question," "provide," and "understand" show some engagement and insightful feedback from the participants. Some of the areas of concern referenced include "google," "personalized," "research," "teacher," "productive," "regulation," "information," "educational" and "provide," and "change."

However, if another set of initiatives were to occur, any and all changes to this area would be significant, the AI and education-related words are a constant prominence. The wide range of topics and sentiments indicates that a balance should be achieved between the opportunities and challenges presented by AI in education. Some areas such as personalized learning, regulation, and the positioning of tools such as Google speak to where further research and development may be focused.

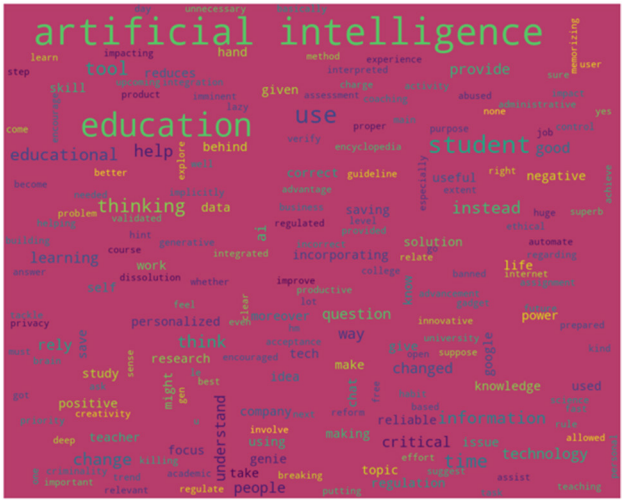
3.5.7. Teacher's section

1) Responses on yes/no questions

Figure 8 gives good detail on the use and perception of ChatGPT for educational needs. Notably, all teachers (100%) found ChatGPT easy to use in performing their educational tasks; thus, it is established as a highly user-friendly and accessible platform whose adoption in educational setups heavily depends on this. However, only 40% have made use of ChatGPT in delivering collaborative learning experiences in the classroom, while 60% have not. This suggests that despite its ease of use, ChatGPT might be little used for collaborative learning, and there should be room for improvement in that respect. Moreover, 60% of respondents believed ChatGPT promotes collaboration between students and/or teachers and students, affirming that the ones who use it see its benefits for collaboration.

A significant majority of 80% stated that ChatGPT does NOT promote students to think critically and solve problems, while only 20% said that it does. By this single implication, it can be inferred that

Figure 8
Word cloud representation of participants' thoughts on ChatGPT



ChatGPT needs to be improved to promote critical thinking further. There is an absolute dichotomy about whether ChatGPT helps in assessing student understanding or progress, where 50% agreed and 50% disagreed, highlighting a mixed opinion regarding assessment capability, thus deserving more debate and improvement. Further, 70% of them confirmed ChatGPT to be good for generating lecture outlines or for organizing ideas, while 30% said it did not. This establishes the expectancy that ChatGPT is seen as a helpful tool in the preparation of instructional materials.

The statements then point out the areas that require special attention and further research. Educational institutions may harness the easy use of ChatGPT to provide training and resources on incorporating ChatGPT fruitfully in collaborative learning and critical thinking activities. With fewer engagements in collaborative settings, it would be worth exploring and highlighting the ChatGPT features that promote collaborative learning. Hence, workshops and demonstrations concerning the best uses of ChatGPT for collaborative projects or peer discussion groups may be warranted.

Few respondents attested that ChatGPT promotes critical thinking and suggested to further improve this feature, for example, working on problem-solving and critical-thinking-skills-targeting features and equipping educators with strategies to incorporate these into their teaching. Mixed responses regarding ChatGPT's usefulness in the assessment of student learning indicate that refinements are required in this area. Further research into which aspects of assessment ChatGPT is lacking could identify avenues to remedy these gaps.

The very good responses received concerning ChatGPT's capabilities to organize lecture outlines and key concepts show one strong use case for further promotion. Success stories, as well as step-by-step guides on using ChatGPT for lecture preparation, could help spread the interest. To conclude, although ChatGPT is widely believed to be easy to use and an aid in organizing educational content, it clearly has untapped potential stimulating its use for collaborative learning, critical thinking, and the assessment of students. Figure 9 gives insights into the efficiency of ChatGPT in preparing lecture materials and interactive engagement by students during lectures prepared with ChatGPT.

2) Response on rating questions

The use of ChatGPT has significantly improved the efficiency of preparing lecture materials, with a combined 70% of teachers rating this improvement highly, 40% at level 4 and 30% at level 5 on a 5-point scale (Figure 10). Only 10% of teachers rated the improvement at level 2, 20% at level 3, and none at level 1. This indicates a substantial perceived benefit from using ChatGPT in their preparation processes.

In terms of student interactivity, lectures prepared with the assistance of ChatGPT were also viewed positively. Half of the teachers

Figure 9
Educators' responses on ChatGPT usage and its impact in education

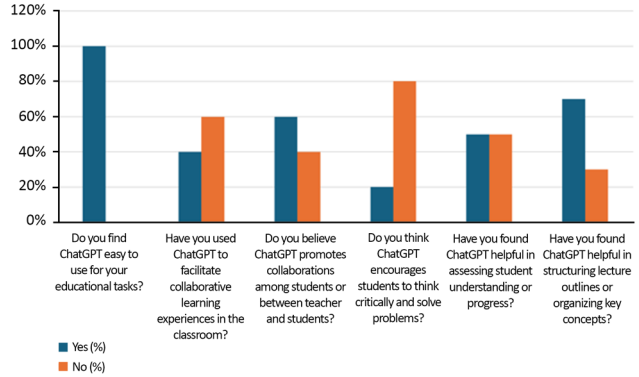
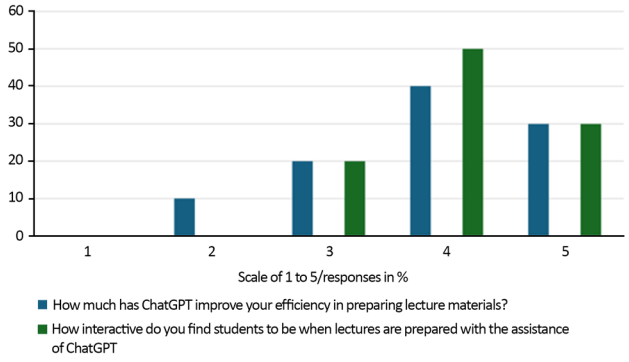


Figure 10
Educators' ratings of ChatGPT's effectiveness in teaching and learning



(50%) rated student interactivity at level 4, and 30% at level 5, suggesting that ChatGPT contributes to creating engaging and interactive learning environments. No teachers rated student interactivity at levels 1 or 2, and 20% rated it at level 3, indicating a generally positive perception of how ChatGPT influences student engagement during lectures.

These findings imply ChatGPT could be used by teachers to prepare lecture materials, thereby saving time and possibly improving education. Sharing of strategies to use ChatGPT for lecture preparation should be taken up by institutions, with training given so that the tool can be maximally used. The positive results show student interactivity; in fact, this potentially is one of the most beneficial methods to creating engaging and interactive learning experiences for the students, which helps keep their interest and participation in lectures.

Further investigation into the features and applications of ChatGPT within these benefits drives the tool's promotion and refinement. A good working knowledge of the efficiency of ChatGPT, alongside the degree of interaction it offers, can direct improvements toward making it more applicable for educational purposes.

3) Frequency scale questions

Table 1 presents how ChatGPT works in putting to rest the issue of the development of critical thinking in students, or feedback regarding student works or assignments. Approximately 30% considered the

Table 1
Educators' responses to frequency scale questions on ChatGPT usage in teaching

How effectively do students demonstrate critical thinking skills when utilizing ChatGPT-generated content to enhance their answers?	Response in percentage
Somewhat effectively	30%
Somewhat ineffectively	20%
Very ineffectively	20%
Very effectively	20%
Neither effectively nor ineffectively	10%

Do you use ChatGPT to provide feedback on student work or assignments?	Response in percentage
Never, I prefer to provide feedback	40%
Rarely, only when necessary	20%
Frequently for detailed feedback	20%
Occasionally for specific tasks	10%

students as somewhat effective in exercising critical thinking skills given ChatGPT-generated content, whereas 20% thought them very effective. On the other hand, 20% rated them somewhat ineffective, 20% very ineffective, and 10% neither effective nor ineffective, showing an ambiguity in interpretation where some students probably benefit from ChatGPT and some probably cannot use it to their advantage.

In providing feedback, 40% are never using ChatGPT, instead of preferring to provide feedback themselves; 20% rarely used ChatGPT and only if needed; and 20% often used it to get detailed feedback. Furthermore, 10% sometimes used ChatGPT for specific purposes. These answers portray a rather hesitant attitude toward ChatGPT for feedback, with many professionals either shying away from use or using it sparingly after all. This would imply that while there is realization of ChatGPT's potential, many professionals still rely upon judgment and experience in providing feedback.

Training with regard to integrating ChatGPT in the teaching method could be brought to the teachers. The cautious mode of using ChatGPT for feedback, on the other hand, implies that teachers value their feedback role and might have apprehensions concerning the ability of the tool to deliver nuanced, individualized feedback. Addressing the specific concerns must be the starting point for institutions to improve the tool, then train staff and demonstrate use cases.

3.5.8. Student's sections

1) Responses on yes/no questions

According to Table 2, students indicated their perceptions concerning ChatGPT's efficiency and usefulness in an educational setting. As can be seen in Figure 10, a majority of 88.2% of students considered ChatGPT effective in helping them understand complex educational concepts, thereby showing great endorsement of ChatGPT's ability to explain difficult topics. Most students (76.5%) view ChatGPT as a tool that saves their time in educational assignments or tasks compared to that of Google searching, a reflection of a better perception of efficiency. Furthering this positive trend, 75.5% believed that ChatGPT should be further formally integrated into educational settings.

A large number of students (72.5%) would recommend ChatGPT to their fellow students for educational purposes, hence indicating satisfaction toward its useful purposes. While 79.4% of students also believed ChatGPT improves their efficiency in studying or accomplishing educational tasks, 73.5% said that they have at some point come across inappropriate information from ChatGPT. In this regard, 85.3% of students agreed that there should be training in the proper use of ChatGPT in educational activities, implying acceptance of a possible improvement in the ways to use ChatGPT through this training.

Table 2
Students' responses on ChatGPT usage and its impact on learning

Question	Yes (%)	No (%)
Have you found ChatGPT to be effective in aiding your understanding of complex educational concepts?	88.2	11.8
Do you believe ChatGPT saves you time in completing your educational assignments or tasks rather than Google search?	76.5	23.5
Do you think ChatGPT should be integrated more formally into educational settings, such as classrooms or online learning platforms?	75.5	24.5
Would you recommend using ChatGPT to your peers for educational purposes?	72.5	27.5
Would you say that ChatGPT enhances your productivity in studying or completing educational tasks?	79.4	20.6
Have you encountered instances where ChatGPT provided incorrect information while assisting you with educational tasks?	73.5	26.5
Do you think there should be some training on to effectively use by ChatGPT in your educational activities?	85.3	14.7

Further, such findings bring up support for the use of ChatGPT as a solid educational instrument with strong support for its incorporation into formal education settings and the need to provide training to facilitate its proper use. Once the accuracy issues are sorted out and methodologies are designed for the correct use of ChatGPT, the value of ChatGPT will reach a stage in which students will be able to use every bit of it.

2) Responses on rating questions

A significant majority of students find ChatGPT helpful in providing suggestions for enhancing the content of their essay drafts, with 44.1% rating its helpfulness at level 4 and 26.5% at level 5 on a 5-point scale. Only 2.9% rated its helpfulness at level 1, and 6.9% at level 2, indicating that most students perceive ChatGPT as a valuable tool for improving their writing.

Similarly, the majority of students rate ChatGPT positively for assisting with their educational tasks, with 40.2% rating its helpfulness at level 4 and 25.5% at level 5. Only 4.9% rated its helpfulness at level 2, and none at level 1, suggesting that ChatGPT was widely seen as beneficial in supporting students' academic work.

In terms of accuracy, students generally perceive ChatGPT as accurate in providing responses to their educational queries, with 45.1% rating its accuracy at level 4 and 35.3% at level 5. Only 5.9% rated its accuracy at level 2, and none at level 1, indicating that students trust the accuracy of ChatGPT's responses to a considerable extent.

According to the data, ChatGPT stands out as a writing support tool and general academic aid. Because of ChatGPT's responses being highly perceived as accurate, it suggests that students trust the tool with high regard, emphasizing the continual refinement to increase its accuracy and reliability to win the trust of students more. Considering its implications for the improvement of the literature drafts, assistance in educational assignments, and accurate answers to the questions asked, ChatGPT seems to provide invaluable tools for the education field.

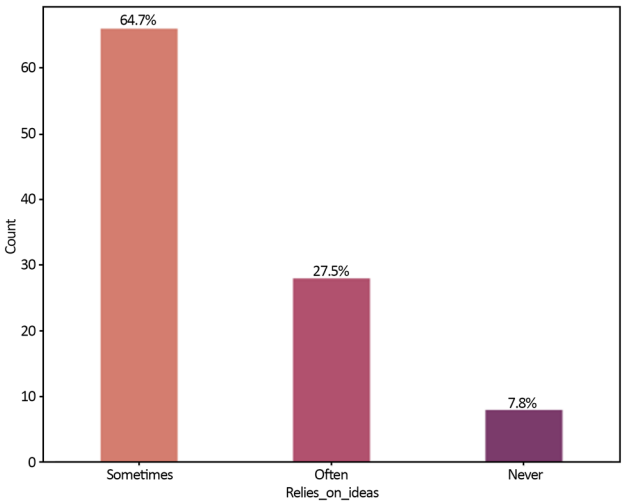
3) Frequency scale questions

A. How often do you rely on ChatGPT for generating ideas or structuring your essay drafts or getting help for assignments?

Figure 11 illustrates how often students rely on ChatGPT for generating ideas, structuring essay drafts, or taking help with assignments. The data reveals that most students (64.7%) "sometimes" rely on ChatGPT for these purposes, indicating that while students do not depend on ChatGPT all the time, it is a common tool for occasional use in their academic work. Additionally, 27.5% of students "often" used ChatGPT, suggesting a moderate to high reliance on the tool for academic support among a substantial group of students. Only a small fraction of students (7.8%) reported that they "never" use ChatGPT for generating ideas, structuring essay drafts, or taking help with assignments, indicating broad acceptance and utilization of the tool by many students.

Based on these observations, it appears that ChatGPT is a popular tool that students use for academic works with a varied reliance on it. A further inquiry could be undertaken to understand why the small proportion that does not use ChatGPT maintains such a posture. Understanding implementation barriers or remedies might pave a pathway toward a complete acceptance of ChatGPT by students.

Figure 11
Frequency scale questions' responses from students



4) The students who often rely on ChatGPT

Table 3 shows the perceptions of 27.5% of students who often rely on ChatGPT for academic support. These students unanimously (100%) found ChatGPT to be an effective medium in helping them understand concepts or ideas that were difficult for them to grasp, which signifies the high regard the students hold for ChatGPT in elucidating difficult topics. Also, 89.3% maintained that ChatGPT saved them more time in working on educational assignments or tasks as compared to Google search, thus indicating a strong preference for ChatGPT as a more time-efficient tool. There is also the view of 85.7% who felt that schools or educational settings should embrace its use in a formal manner, such as in classrooms or online learning platforms, hence displaying a positive attitude toward the formal incorporation of ChatGPT in education. In this very same set of respondents, with an 85.7% majority, respondents would recommend its usage to fellow students, underscoring a maximally positive level of satisfactions and confidence in ChatGPT's utility. Most of the respondents (92.9%) believed that ChatGPT allows them to be more productive in studying or doing other educational tasks.

Table 3
Frequency of students who regularly rely on ChatGPT for academic support

Question	Yes (%)	No (%)
Have you found ChatGPT to be effective in aiding your understanding of complex educational concepts?	100	0
Do you believe ChatGPT saves you time in completing your educational assignments or tasks rather than Google search?	89.3	10.7
Do you think ChatGPT should be integrated more formally into educational settings, such as classrooms or online learning platforms?	85.7	14.3
Would you recommend using ChatGPT to your peers for educational purposes?	85.7	14.3
Would you say that ChatGPT enhances your productivity in studying or completing educational tasks?	92.9	7.1
Have you encountered instances where ChatGPT provided incorrect information while assisting you with educational tasks?	78.6	21.4
Do you think there should be some training on how to effectively use ChatGPT in your educational activities?	89.3	10.7

However, 78.6% reported having experienced situations where ChatGPT gave them wrong answers when assisting with academic tasks, pointing to a validity issue in its proportion of correct answers. However, 89.3% agreed that there should be instruction on using ChatGPT effectively for their educational work, appreciating that such training might improve application. This indicated that there was a very strong backing for its legitimacy, usage as a time-saver, and productivity enhancer from amongst students who often rely on ChatGPT.

5) The students who sometimes rely on ChatGPT

It should be noted that 87.9% of the sampled population, which comprised students sometimes leaning on ChatGPT for academic assistance (64.7%), considered ChatGPT as helpful in understanding complex academic concepts. Therefore, this is a positive endorsement for ChatGPT in demystifying difficult concepts. Conversely, 75.8% of the students were of the opinion that ChatGPT saves more of their time than does Google search when it comes to performing assignments or educational tasks, suggesting that this subset of students views ChatGPT as an efficient tool in accomplishing various academic activities.

Most of them (77.3%) thought there should be integration of ChatGPT in a more formal manner in education, such as in classrooms or online learning environments, which signifies positive feelings toward integrating it formally in education. Also, 72.7% of students would recommend ChatGPT to their peers as an educational tool, which displays a high level of satisfaction and confidence in using ChatGPT. Moreover, 78.8% of students agreed that ChatGPT helps them become more productive in studying or accomplishing educational tasks; hence, it is perceived as a tool that enhances academic efficiency.

Nevertheless, a threat of concern on the reliability of response arises among some 75.8% of students who witnessed instances where ChatGPT returned wrong information while aiding in their educational tasks. Yet, this majority (86.4%) felt there ought to be some training to inform them on the best use of ChatGPT in their educational undertakings, with them realizing that through that training, they can harness ChatGPT more properly.

6) The students who never rely on ChatGPT

The perceptions of 7.8% of students who never rely on ChatGPT for any academic support could be considered: Half this subset regards ChatGPT as effective in helping with grasping the complexities of educational concepts, whereas the other half does not, suggesting that there is an equal split in perception of its utility in this regard. Only 37.5% believed that ChatGPT saves them time while doing some educational assignment or other forms of tasks than searching information on Google, with the majority of 62.5% disagreeing, hence reflecting on their skepticism on any efficiency gains.

Conversely, just 25% hold the belief that ChatGPT should be adopted in a more formal manner into educational environments toward classrooms or an online learning platform, with the majority (75%) downplaying this idea; this conveys an outright unwillingness among the group to formalize the incorporation of ChatGPT. This 25% rating is also reflected in those willing to suggest ChatGPT for their peers when it comes to educational matters versus 75% that would not, thus reflecting low satisfaction and confidence toward its application.

Regarding productivity, 37.5% of non-users reported that ChatGPT increases their productivity while studying or performing educational tasks, whereas the majority (62.5%) felt that it does not contribute meaningfully to their efficiency in academic activities. Additionally, 37.5% have found themselves in a situation where ChatGPT gave them wrong information, whereas another 62.5% had

not, backing up that inaccuracy is an issue, but it is not common among nonusers. Despite some concerns, 62.5% of non-user students thought there should be a training session about how to use ChatGPT effectively in their academic activities, which may indicate that many non-users feel the use of ChatGPT can be improved through proper training.

3.6. Findings

3.6.1. Analysis of student usage of ChatGPT

The analysis reveals diverse usage patterns of ChatGPT in the student community. Most students (64.7%) sometimes used ChatGPT to generate ideas for the or to prepare an essay draft or for assignment help, while 27.5% used it often, whereas the other percentage inciting a huge dependence on it concerning academic aid. A small minority (7.8%) who were either ignorant about or simply doubt the utility of ChatGPT stated that they would never resort to it. Among the students who occasionally rely on ChatGPT, a huge majority (87.9%) believed it helps them in understanding complicated concepts in their studies, and 75.8% believed it saves them time in comparison to using Google search. On the other hand, the never-users of ChatGPT are quite unleashed in their perception, with barely half agreeing that it helps in understanding complex concepts and a majority (62.5%) disagreeing with it being a time-saving tool.

3.6.2. Impact on student learning outcomes

Indeed, ChatGPT seems to have a positive effect on student learning outcomes. Among students that rely on ChatGPT for assistance, 92.9% felt that ChatGPT enhances their productivity almost always, and 78.8% said it sometimes does so. Many also said that ChatGPT gives them a worldview on concepts that were previously very difficult. Yet, accuracy issues continue to be raised by those who sometimes rely on ChatGPT (75.8%) and those who often do (78.6%), who have often faced instances of incorrect information. However, in all groups, most students support the integration of ChatGPT into formal school programs and recommend it to their friends, thereby indicating an overall positive perception of this tool for educational purposes.

3.6.3. Educators' perspectives on ChatGPT

Educators have mixed feelings about ChatGPT. All the educators found ChatGPT easy to use, but its application in team teaching is much more limited, with just 40% having reportedly engaged in such activities. While 60% agreed that ChatGPT fosters collaboration, 80% disagreed that it enhances critical thinking. Half of the respondents are further split on whatever it may or may not be effective in student assessment; more than 70% found it extremely useful for outlining lectures. While these instructors see ChatGPT offering solutions in some areas, they have doubts regarding its general usefulness as an educational tool.

3.6.4. Connection between findings and the research problem

The findings of the current study indeed resonate with the issues raised in the problem context and provide empirical evidence regarding both the advantages and disadvantages of using ChatGPT in education. The outcomes confirm the enhancement of student productivity and learning through ChatGPT: the majority of the students find it useful in understanding some hard concepts and improving academic efficiency. However, misinformation continues to be a significant concern; many students have confronted incorrect information, hence reiterating the need for AI literacy training; although most educators consider ChatGPT useful for structuring lecture content, they still hold reservations concerning it motivating higher order critical thought, confirming the original problem orchestrating the concern that AI may not replace wholly analytical learning. The research also substantiates concerns related to privacy and ethics, given that a good number of participants call for clear regulatory frameworks. Hence, these findings indicate that ChatGPT can become a great tool in education yet dependent on structured implementation, responsible use, and policy-integrated use, as envisioned in the research problems.

1) Discussion

Available research has shown that ChatGPT fosters student learning and enhances student engagement. Earlier studies provided evidence that ChatGPT is regarded as an effective means for academic support and content generation, for example, ChatGPT is considered a good learning tool by students willing to use this application to generate writing ideas or to improve reading comprehension [5, 12]. This study confirmed the previous finding that 88.2% of students reported ChatGPT aids in the understanding of difficult academic concepts, while 79.4% maintained that it contributed to enhancing their academic productivity. In addition, 76.5% of students believed that ChatGPT saves them time working through academic activities versus wider use of traditional search engines, such as Google, thus establishing further indications already seen in literature about ChatGPT's emerging role as a student's assistant in information retrieval and content summarization [19].

The major point of difference between the present study and other studies has been the perspective on the credibility and reliability of ChatGPT as a source. Previous studies by Ali et al. [9] and Yilmaz et al. [13] primarily talked about students' positive perceptions regarding the whole process with ChatGPT, but failed to highlight a lot of risk factors or issues surrounding misinformation. In this study, however, 73.5% of students report having met with some incorrect information put forth through ChatGPT, which raises its question as to reliability for academic purposes. This perspective concurs with the outcomes of the studies stressing that sometimes, ChatGPT's outputs do not know how to cross-check with actual facts and thus requires very critical judgments from the respective user [14]. These differences indicate how even for all its reputation as an efficient learning aid, ChatGPT still requires an appropriate verification mechanism against accuracy in an academic milieu.

Critical thinking and collaborative learning thus assume importance in this study. Evidence from past research has focused on how AI-based tools can augment personalized learning as well as adaptive assessments [22]. From the results of our study, however, even if 60% of teachers believe that ChatGPT fosters collaboration, 80% do not believe it fosters critical thinking. This attitude is in contrast to some studies that have positively pointed out the stimulation of creativity and problem-solving on the part of ChatGPT for the students [29]. Those findings imply that, rather than fostering analytical reasoning, ChatGPT promotes over-dependence on AI-enabled content, thereby impairing the independent development of problem-solving skills in students.

This study enriches academic discourse about AI in education by contributing empirical evidence gathered through a real-life university setting, which contrasts with many earlier studies that were mostly theoretical or small-sclae experimental. A few strengths of this study include a wider perspective that looks at the viewpoints of both students and professors rather than only students as in another study by Ngo [12]. Also, unlike previous studies by Maita et al. [16] that mainly focused on ChatGPT's advantages for students, this paper takes a view on ChatGPT's impact on the workload of educators. The findings, in particular, indicate that 70% of the instructors thought that ChatGPT was useful in structuring lecture outlines, which corroborates the previous conclusion that AI-fueled tools could serve to increase the efficiency of teaching by automating content-generating tasks [21]. Another major strength of the study is that it considers ethical and regulatory issues, a topic that has not been well explored in most previous research. While past research has concentrated on ChatGPT's benefits [5], this research focused on privacy concerns, fake news, and the need for AI regulation. The results show that 81.4% of students and 90% of teachers support a tighter regulation of

ChatGPT, thus strengthening the calls from researchers for AI governance policies in academic domains to be taken seriously [34].

Although this study has strengths, it has some limitations that should be kept in view. One of its important limitations is the small scope, as it was done in one institution (i.e., York St John University), which raises questions about the generalization of findings. Future research findings across multiple educational contexts should examine the cross-institution collaboration. Also, this study assesses impressions of ChatGPT use with their immediate effectiveness about academic performance and learning retention. Future research should include longitudinal studies that address the transformation processes of artificial intelligence-infused education. Moreover, this research work is not experimental but entirely based on surveys. Although past studies show that student writing improves through AI-connected feedback [25], our research does not try that; ChatGPT's effect is measurable on learning. Future research would present controlled experiments or case studies comparing AI-based feedback and human instructor feedback to evaluate learnings and understanding outcomes. Moreover, ethical and policy considerations are other areas that need to be explored. This not only emphasizes issues regarding bias, misinformation, and academic integrity but rather does not provide specific policy directions. Future research would aim at developing programs of AI literacy, ethical guidelines, and institutional policies to manage the responsible use of AI in education within the institutions.

4. Conclusion

Major benefits and challenges of employing artificial intelligence technologies in educational settings are being observed in the context of ChatGPT. ChatGPT does provide considerable insight into educational tasks by using clever retrieval of information and concepts for complex teaching subjects. Most students and instructors have seen it as beneficial, easily accessible, and efficient as an auxiliary learning instrument. Several serious issues must be addressed for ensuring its responsible, efficient functioning in an academic environment. Among these concerns is privacy and data security, which many members discussed in terms of the clear-cut regulation of data mining and its usage. A second issue is the issue of the model's accuracy, which bears down unfailingly about the veracity of inferences between its AI-generated content meant for academic purposes. With no proper verification, students may live by misinformation, thus it is then high time for a generative form of AI-based literacy training aimed toward developing their abilities to appraise matters critically. At the same time, the overall usefulness of ChatGPT in educational settings along with its influence on student critical thinking, academic integrity, and instructor workload still is an area awaiting further inquiry. Future investigation should also ascertain the lasting influence of AI existence on educational attitudes, structures, and outcomes. Extended studies are hence needed to probe AI-centric ethical issues such as AI bias, academic dishonesty, and data privacy regulations, ensuring an academic integrity-conforming use of AI tools. Additionally, the paper ought to pay attention to the plethora of influences that AI introduces to their professors' workload and changes in instructional strategies made by those AI can lead to the development of ways to equitably and sustainably infuse AI into higher education settings.

AI adoption and implementation strategies must be outlined for educational institutions to reap benefits without significant risks from the use of ChatGPT. Allowing students and educators to undergo training programs will be immensely beneficial to developing AI literacy skills among users and teaching behaviors for the responsible utilization and critical evaluation of wat medical AI transforms. AI-based education, via the marriage of ChatGPT with the traditional pedagogical techniques, will increase shared learning and critical thinking and by itself ensure AI's position as a compliment rather than a substitute.

Some of the established guideposts and regulations should deal with data protection, academic integrity, and what it means to use artificial intelligence responsibly; such steps will promote a society characterized by AI responsible utilization. Also, the creation of learning items like training centers, workshops on AI ethics, and various public engagement program targets to assist educators and students in properly utilizing ChatGPT. Further, organized policies and resources within the education sector shall enable the educational institutions to enhance the real educational experience using AI while upholding the academic rigor and integrity.

Recommendations

Integrating AI and tools such as ChatGPT into the educational arena thus bring pluses and minuses. One principal suggestion is that educational institutions incorporate AI tools to maximize learning. This means that practicing AI will be used with the existing base and teaching methods, to awaken judgment and cooperative learning, lest education be unbalanced.

In the meantime, privacy issues must be addressed, and inventing with a constantly inconsistent AI information source. This also calls for structured training for both teachers and students to make the most out of this tool and reduce the risks involved. The training should include how to use AI practically and be aware of its shortcomings, particularly concerning accuracy and data security.

Legislators should put into place ethical guidelines for AI in education, taking care to investigate issues relating to bias, privacy, and academic integrity. Proper frameworks need to be established to ensure AI is used responsibly-another way of protecting both the educators and the students from unintended consequences.

Future inquiries will have to interrelate the very wider spheres of student learning outcomes, workloads on the teachers, and the broader aspects of learning. Meanwhile, public engagement will have to continue, perhaps through webinars and resources, to spread the best practices and support educators in better utilizing AI-based technologies.

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Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

Author Contribution Statement

Swathi Ganesan: Conceptualization, Methodology, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Lakmali Karunarathne:** Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Ghanshyam Mahato:** Methodology, Formal analysis, Writing – original draft. **Sangita Pokhrel:** Conceptualization, Writing – review & editing, Visualization.

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