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**Rizaldy Garcia**
Rizal Technological University, Philippines

**Julian Grace Fojas**
Rizal Technological University, Philippines

**Jeff Nicole Formanes**
Rizal Technological University, Philippines

**Danica Garcia**
Rizal Technological University, Philippines

**Charmanie Habol**
Rizal Technological University, Philippines

**Lodie Orapa**
Rizal Technological University, Philippines

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# Perspective of Science Educators and Students on the Use of ChatGPT: A Study of Artificial Intelligence

**Rizaldy Garcia, Julian Grace Fojas, Jeff Nicole Formanes, Danica Garcia, Charmanie Habol, Lodie Orapa**

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## Abstract

The perspectives of science teachers and students is of paramount focus of this study regarding the use of ChatGPT in the science classroom as a supplementary tool within Mandaluyong City, Philippines for the school year 2023-2024. 899 junior high school students and 26 science teachers were surveyed using the quantitative research design, analyzing the results through descriptive and comparative statistics. Results show that by offering personalized, real-time feedback, ChatGPT improves student involvement in the classroom and comprehension of scientific ideas. Its ability to customize and enhance educational experiences was acknowledged by both teachers and students. However, serious questions concerning prejudice, privacy, and the moral implications of AI in educational contexts were brought up. The study found that demographic variables including age and years of teaching experience had an impact on different judgments. In conclusion, even though ChatGPT has a lot to offer in terms of student interaction and material delivery, it must be carefully managed to reduce dangers associated with data privacy and AI biases. The study emphasizes the necessity of strong ethical guidelines and ongoing assessment to guarantee the ethical and efficient use of AI tools in learning settings. This strategy will aid in optimizing the educational advantages.

## Introduction

artificial intelligence (AI) emerging as a disruptive force that is changing sectors and how people use technology. Artificial Intelligence (AI), which is defined as technology that mimics human-like judgment, reasoning, and intentionality (Shubhendu & Vijay, 2013), has created new possibilities for individualized training, adaptive feedback, and interesting learning resources. The capacity of OpenAI's ChatGPT AI language model to produce conversational responses that resemble those of a person makes it stand out among these developments. Its incorporation into educational platforms has attracted a lot of interest since it provides learning tools that are available around-the-clock, allowing students with diverse schedules or time zones to get timely help with their scientific assignments and inquiries.

A possible revolution in teaching and learning processes is indicated by the increasing use of AI in education,

especially through programs like ChatGPT. Because of its conversational capabilities, ChatGPT can offer students individualized responses that are catered to their particular requirements and preferences. It gives teachers access to the most recent scientific discoveries and aids curriculum development, lesson planning, and content creation. Through interactive experiments and simulations, it has the potential to make science education engaging and fun, which helps students who struggle with difficult subjects (Baker & Smith, 2019). Furthermore, ChatGPT is an unavoidable development in educational technology because of the ten years of AI advancements brought about by big data analytics and greater processing power, which have produced algorithms that learn and get better on their own (Grassini, 2023).

Nevertheless, there are difficulties in incorporating AI tools like ChatGPT into the classroom. It is necessary to address ethical concerns about bias, privacy, and an over-reliance on AI. The early stages of AI adoption across industries are highlighted by discussions concerning the technology's societal effects, such as arguments about how it will affect employment and whether AI-generated work could be considered art (Pavlik, 2023). Due to its underdeveloped use of AI, education is frequently referred to as the "Cinderella of the AI story" (Lameras & Arnab, 2021). As such, it necessitates a more proactive investigation of its potential. The revolutionary potential of AI in teaching and learning environments is something that educators have yet to completely grasp .

This study, which is theoretically grounded, uses the Uses and Gratification Theory (Katz & Blumler, 1973) to comprehend how educators actively influence the use of ChatGPT and other AI tools. When incorporating AI into lessons, evaluations, and classroom activities, this idea firmly places power in the hands of educators by highlighting users' free will to choose how media affects their actions. Furthermore, ChatGPT's function in improving mental performance and effectively controlling cognitive overload through mediation is highlighted by the Cognitive Mediation Networks Theory (Souza & Rangel, 2015), which sheds light on the cognitive and sociocultural changes brought about by digital technologies.

ChatGPT has the potential to revolutionize how teachers and students engage with content and one another in the context of scientific education. It encourages the growth of critical thinking skills, the production of specialized teaching resources, and the improvement of teacher-student relationships. However, it also brings up moral concerns about transparency, privacy, and the dangers of being overly reliant on AI. By examining the viewpoints of junior high school science teachers and students in the Mandaluyong City Division during the 2023–2024 academic year, this study seeks to address these problems. The goal of the study is to investigate how ChatGPT might be used to increase student participation, enhance instructor facilitation, and guarantee fair and efficient use in learning environments. ChatGPT has important ramifications for science education, including tailored instruction, engaging learning opportunities, and expedited curriculum creation. To optimize its potential and reduce hazards, a careful analysis of its pedagogical and ethical issues is necessary. By examining ChatGPT's integration, this study advances knowledge on how AI can be used responsibly to assist scientific teachers and students, ultimately influencing the direction of education.

The purpose of the study was to investigate how science teachers and students in Mandaluyong City felt about ChatGPT being used as an additional resource in science classes in the 2023–2024 academic year. It concentrated

on profiling student respondents by age, sex, and school, and teacher respondents by age, sex, school, and years of teaching. The frequency of ChatGPT use, content integration, and its effect on student learning outcomes were all investigated in this study. The study also looked at issues like privacy, bias, justice, and accountability that arise when AI is used in science teaching.

## Review of Literature

### ChatGPT in Education: Usage Patterns and Integration

Since its November 2022 introduction, ChatGPT has emerged as a significant educational tool. 33% of college students use ChatGPT several times a year, 32% several times a week, and 13% everyday, according to a study by The Knowledge Academy. This indicates how integrated ChatGPT is into academic tasks including research, problem-solving, and content creation (Williams, 2024). In order to create a dynamic learning environment, educators utilize it to change their responsibilities from producing content to facilitating critical thinking. Nonetheless, there are still worries that ChatGPT can encourage dependence, reduce critical thinking, and interfere with rigorous academic participation (Espino, 2025; Theelen et al., 2024; Skavronskaya et al., 2023).ChatGPT's incorporation into educational procedures provides chances for individualized, interactive instruction catered to each student's requirements. While Baidoo and Ansah (2023) underlined ChatGPT's significance in formative assessments, offering real-time feedback and enabling adaptable learning paths, Kohnke et al. (2023) highlighted that ChatGPT increases motivation and engagement. Thorp (2023), however, contended that although ChatGPT produces a variety of scholarly material, its shortcomings in terms of precision and depth call for a reexamination of conventional tests. In order to overcome these constraints and capitalize on the advantages of the technology, educators must modify their pedagogical approaches.

Accessibility issues are brought up by ChatGPT's integration, despite its revolutionary potential. While Luckin et al. (2022) pointed out that fair frameworks are essential for inclusive adoption, Pedro et al. (2019) highlighted the moral conundrums connected to unequal access. By addressing these discrepancies, ChatGPT can effectively support a diverse student body.

### Impact on Student Learning and Teacher-Student Interaction

ChatGPT's ability to give immediate feedback, encourage participation, and increase confidence has a big impact on students' learning outcomes. According to Limna et al. (2023), students who obtain prompt answers to their questions perform better academically and participate more actively. It supports learning at all levels by allowing students to communicate as they would with a tutor thanks to its natural language processing features (Rahman & Watanobe, 2023). ChatGPT also helps students with disabilities and other varied learners strengthen their analytical thinking, problem-solving, and teamwork skills (Rahman & Watanobe, 2023).According to Firaina and Sulisworo (2023), students run the risk of mindlessly accepting inaccurate or biased information if AI-generated outputs are not validated against reliable sources. With ChatGPT, the dynamics of teacher-student interaction also change. Although the program increases productivity by automating repetitive processes like class planning and evaluation, it cannot take the place of teachers' thoughtful, compassionate advice. Limna et al. (2023) and Lukpat

(2023) emphasized the value of face-to-face communication in meeting individual needs and building trust. By using ChatGPT as an additional tool, educators can concentrate on more intricate academic problems and deeper connections (Smith & Johnson, 2021).

**Ethical and Privacy Considerations in AI Adoption**

There are serious privacy and ethical issues with using ChatGPT in the classroom. Concerns over data breaches and the improper use of personal data were brought to light by Limna et al. (2023), who emphasized the necessity of strong security measures such access limits and explicit data usage guidelines. Additionally, Stockman and Nottingham (2021) pointed out that instructors are wary of technology that gather a lot of student data, and they called for openness to foster user confidence. Fairness and bias are important factors. Rahman and Watanobe (2023) and Pedro et al. (2019) cautioned that ChatGPT's training data might represent societal prejudices, producing unfair or biased results. Diverse and balanced datasets as well as accountability systems are necessary to address these risks and guarantee moral results. Academic integrity is also threatened by worries about plagiarism and cheating. King (2023) stressed the necessity of strict regulations and oversight to guard against abuse while preserving the reliability of evaluations.

Accountability and transparency are also essential to ChatGPT's operation. OpenAI admits that ChatGPT can generate erroneous or biased results, frequently representing Western viewpoints (King, 2023). To ensure that AI tools improve rather than compromise educational integrity, educators must set explicit guidelines for their ethical use. According to Xu (2020) and Luckin et al. (2022), in order for educators to safely utilize AI's pedagogical contributions, they must have a thorough understanding of them.

## Methodology

All 26 science teachers in the schools involved in this study were selected as participants. Additionally, 899 junior high school students from selected schools were surveyed. Stratified random sampling was employed to ensure an equal chance of selection for all individuals in the population. Age, sex, school affiliation, and years of teaching experience were used to profile the teacher respondents. Female teachers made up 80.77% of the respondents, and the majority of teacher respondents (69.23%) were between the ages of 23 and 27. The majority of teachers (57.69%) had one to five years of teaching experience, and the majority (46.15%) were from Andres Bonifacio Integrated School. Profiles of the student responders were created based on their age, sex, and school affiliation. Male students somewhat outnumbered female students (50.38%), with the majority of student respondents (73.86%) being between the ages of 14 and 18. A combined 26.14% of the responders came from Andres Bonifacio Integrated School and Addition Hills Integrated School.

Two customized survey questionnaires, each with four sections, were used in the study. Section I collected demographic data, such as years of teaching experience, school affiliation, age, and sex. The opinions of science teachers about ChatGPT's use as an additional resource were examined in Section II. Teachers' and students' opinions of ChatGPT's incorporation into science classroom interactions were evaluated in Section III. Section

IV looked at respondents' perceptions of the ethical ramifications of using AI. A teacher from Isaac Lopez Integrated School and two specialists from Rizal Technological University verified the instrument. Expert judgment, pilot testing with chosen teachers and students, and adjustments in response to input were all part of the validation process.

Based on demographic characteristics, respondent profiles were described using frequency distribution and percentage. To answer the research questions about viewpoints on ChatGPT, a weighted mean was employed. ANOVA, or analysis of variance, was used to look at group differences. Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) were used to analyze the data. The study followed ethical research guidelines, which included voluntary participation, informed permission, and response confidentiality. Participants were told about the study's objectives and had the option to withdraw at any moment without penalty.

## Results

### Respondents Profile

*Teacher Profiles*

The demographic data of teacher responders show a plurality of younger educators, with 69.23% between the ages of 23 and 27, indicating a considerable presence of early-career teachers.

Table 1. Profile of Teacher Respondents

| Variable | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| **Age** | 23-27 | 18 | 69.23 |
| | 28-32 | 4 | 15.38 |
| | 33-37 | 1 | 3.85 |
| | 43-47 | 2 | 7.69 |
| | 53-57 | 1 | 3.85 |
| **Sex** | Male | 5 | 19.23 |
| | Female | 21 | 80.77 |
| **School** | Andres Bonifacio Integrated School (IS) | 12 | 46.15 |
| | Addition Hills IS | 6 | 23.08 |
| | SPN Gonzales IS | 4 | 15.38 |
| | Ilaya Barangka IS | 4 | 15.38 |
| **Years of Teaching** | 1-5 | 15 | 57.69 |
| | 6-10 | 7 | 26.92 |
| | 11-15 | 2 | 7.69 |
| | 16-20 | 1 | 3.85 |
| | 31-35 | 1 | 3.85 |
| **Total Respondents** | | 26 | |

Legend: Andres Bonifacio Integrated School (ABIS), Addition Hills Integrated School (AHIS), Senate President Neptali Gonzales Integrated School (SPNAGIS), Ilaya Barangka Integrated School (IBIS)

The gender distribution is significantly skewed, with females accounting for 80.77% of responses, indicating a substantial female representation on the teaching faculty, which may reflect broader employment patterns in education. School affiliation has a diverse representation among numerous integrated schools, with Andres Bonifacio Integrated School having the highest share (46.15%). Furthermore, the respondents' teaching experience is largely between 1 and 5 years, accounting for 57.69% of the total. This shows that the majority of teachers are in their early careers, which may influence how they address educational issues and innovations. All things considered, these demographics paint a picture of instructors who are relatively new to the field, mostly female, and dispersed among various educational establishments. These factors may have an impact on their pedagogical approaches and receptiveness to educational policies and programs.

*Student Profile*

The study's concentration on high school-aged students is highlighted by the fact that, although the student profile data covers a wide range of ages, the vast majority (73.86%) are between the ages of 14 and 18. With 49.61% of respondents being female and 50.38% being male, the gender distribution is nearly equal. This almost equal representation guarantees that the study's conclusions can be regarded as representative of the experiences of both male and female students in the educational systems under investigation. Although the respondents' schools are diverse, the largest groups are from Andres Bonifacio and Addition Hills Integrated Schools, which together account for 26.14% of the sample.

Table 2. Profile of Student Respondents

| Variable | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| **Age** | Under 13 | 233 | 25.92 |
| | 14-18 | 664 | 73.86 |
| | 19-23 | 1 | 0.11 |
| | 24+ | 1 | 0.11 |
| **Sex** | Male | 453 | 50.38 |
| | Female | 446 | 49.61 |
| **School** | Andres Bonifacio IS | 235 | 26.14 |
| | Addition Hills IS | 235 | 26.14 |
| | Senate President NAG IS | 216 | 24.03 |
| | Ilaya Barangka IS | 213 | 23.69 |
| **Total Respondents** | | 899 | |

**Student's Perspective to ChatGPT as Supplemental Tool**

Students generally concur that ChatGPT helps them study by acting as an extra resource, improving comprehension of the material, and producing superior learning results. The item where students regard ChatGPT for helping them grasp science topics has the highest agreement, suggesting that they really value its capacity to make difficult ideas understandable. This widespread recognition of ChatGPT's value in enhancing science

classroom instruction is indicated by its consistent approval across a range of criteria.

Table 3. Students' Perspective on Using ChatGPT as a Supplemental Tool in Science Education

| Category | Item | ABIS | AHIS | SPNAGIS | IBIS | Overall Mean |
|---|---|---|---|---|---|---|
| Frequency of Use | ChatGPT as an additional source | 2.75 (A) | 2.74 (A) | 2.65 (A) | 2.83 (A) | 2.74 (Agree) |
| | ChatGPT for brainstorming science projects | 2.72 (A) | 2.64 (A) | 2.61 (A) | 2.70 (A) | 2.67 (Agree) |
| | ChatGPT to review notes after lectures | 2.66 (A) | 2.61 (A) | 2.49 (A) | 2.63 (A) | 2.60 (Agree) |
| | ChatGPT to understand scientific terminology | 2.72 (A) | 2.71 (A) | 2.57 (A) | 2.71 (A) | 2.68 (Agree) |
| | ChatGPT for help with science topics | 2.90 (A) | 2.85 (A) | 2.72 (A) | 2.83 (A) | 2.83 (Agree) |
| Content Integration | ChatGPT helps understand scientific concepts connections | 2.73 (A) | 2.70 (A) | 2.74 (A) | 2.63 (A) | 2.70 (Agree) |
| | ChatGPT relates scientific theories to real-world applications | 2.63 (A) | 2.63 (A) | 2.58 (A) | 2.55 (A) | 2.60 (Agree) |
| | ChatGPT enhances interdisciplinary topic exploration | 2.69 (A) | 2.63 (A) | 2.74 (A) | 2.54 (A) | 2.65 (Agree) |
| | ChatGPT provides resources complementing curriculum | 2.76 (A) | 2.73 (A) | 2.73 (A) | 2.60 (A) | 2.71 (Agree) |
| | ChatGPT simplifies complex concepts into accessible language | 2.76 (A) | 2.74 (A) | 2.74 (A) | 2.64 (A) | 2.72 (Agree) |
| Student Learning Outcomes | ChatGPT improves understanding of complex scientific concepts | 2.82 (A) | 2.75 (A) | 2.70 (A) | 2.86 (A) | 2.78 (Agree) |
| | ChatGPT encourages exploring new science areas | 2.65 (A) | 2.59 (A) | 2.50 (A) | 2.72 (A) | 2.62 (Agree) |
| | ChatGPT enhances engagement with science education | 2.63 (A) | 2.62 (A) | 2.51 (A) | 2.73 (A) | 2.62 (Agree) |
| | ChatGPT improves scientific communication skills | 2.63 (A) | 2.61 (A) | 2.66 (A) | 2.73 (A) | 2.66 (Agree) |
| | ChatGPT provides personalized support in learning | 2.75 (A) | 2.73 (A) | 2.63 (A) | 2.87 (A) | 2.75 (Agree) |

Legend: 4.00- 3.00 Strongly Agree (SA), 2.99 - 2.00 Agree (A), 1.99-1.00 Disagree (D), 1.00-0.99 Strongly Disagree (SD)

**Teacher's Perspective to ChatGPT as Supplemental Tool**

The flexibility of ChatGPT to adjust to different learning styles and help with language translation is the area where teachers most strongly think that it is a useful tool for everyday activities, material integration, and

improving student learning results. The overwhelmingly positive comments show that ChatGPT's contribution to more interesting and successful teaching methods is highly valued. This agreement emphasizes how the instrument can improve instructional strategies and accommodate a range of learning requirements in the scientific curriculum.

Table 4. Teachers' Perspective on Using ChatGPT as a Supplemental Tool in Science Education

| Category | Item | ABIS | AHIS | SPNAGIS | IBIS | Overall Mean |
|---|---|---|---|---|---|---|
| **Frequency of Use** | ChatGPT as a resource in daily tasks | 2.67 (A) | 2.50 (A) | 3.00 (SA) | 2.50 (A) | 2.67 (Agree) |
| | ChatGPT for developing scientific ideas | 2.67 (A) | 3.17 (SA) | 2.75 (A) | 1.75 (D) | 2.59 (Agree) |
| | ChatGPT in lesson planning and content integration | 2.50 (A) | 3.00 (SA) | 2.25 (A) | 2.75 (A) | 2.63 (Agree) |
| | ChatGPT for creative writing and content generation | 2.25 (A) | 2.83 (A) | 2.50 (A) | 2.25 (A) | 2.46 (Agree) |
| | ChatGPT assists in language translation and content explanation | 2.83 (A) | 3.00 (SA) | 3.00 (SA) | 2.50 (A) | 2.83 (Agree) |
| **Content Integration** | ChatGPT supports integration of diverse scientific concepts | 2.33 (A) | 2.83 (A) | 3.00 (SA) | 2.75 (A) | 2.73 (Agree) |
| | ChatGPT facilitates real-world examples in lessons | 2.50 (A) | 3.17 (SA) | 2.75 (A) | 2.25 (A) | 2.67 (Agree) |
| | ChatGPT addresses cross-disciplinary topics | 2.50 (A) | 2.67 (A) | 3.00 (SA) | 2.75 (A) | 2.73 (Agree) |
| | ChatGPT saves time in lesson planning | 2.75 (A) | 2.83 (A) | 3.00 (SA) | 2.75 (A) | 2.83 (Agree) |
| | ChatGPT adapts complex concepts for easier student comprehension | 2.50 (A) | 2.67 (A) | 3.00 (SA) | 2.25 (A) | 2.61 (Agree) |
| **Student Learning Outcomes** | ChatGPT enhances understanding of scientific concepts | 2.25 (A) | 2.83 (A) | 3.25 (SA) | 2.25 (A) | 2.65 (Agree) |
| | ChatGPT empowers focus on individual student needs | 2.25 (A) | 2.67 (A) | 3.25 (SA) | 3.25 (SA) | 2.86 (Agree) |
| | ChatGPT tailors science content to student interests | 2.33 (A) | 2.83 (A) | 3.00 (SA) | 2.00 (A) | 2.54 (Agree) |
| | ChatGPT enhances student engagement with science content | 2.75 (A) | 2.67 (A) | 3.25 (SA) | 2.50 (SA) | 2.79 (Agree) |
| | ChatGPT adapts to various learning styles | 2.67 (A) | 3.17 (SA) | 3.00 (SA) | 3.75 (SA) | 3.15 (Strongly Agree) |

Legend: 4.00- 3.00 Strongly Agree (SA), 2.99 - 2.00 Agree (A), 1.99-1.00 Disagree (D), 1.00-0.99 Strongly Disagree (SD)

**Student's Perspective to ChatGPT as to its Ethical Implications in Science Education**

There are areas of agreement where students acknowledge the possible risks and advantages of AI technologies like ChatGPT, according to a thorough analysis of their worries and thoughts on the use of AI in science education across a variety of ethical aspects. Although privacy and potential biases are major concerns, the necessity of transparency and responsible AI use is also acknowledged. These observations demonstrate students' sophisticated grasp of these ethical concerns and highlight how crucial it is to address them in order to create a safe, just learning environment that uses AI technologies sensibly.

Table 5. Students' Perspective on Ethical Implications of Using AI in Science Education

| Ethical Aspect | Question | ABIS | AHIS | SPNAGIS | IBIS | Overall |
|---|---|---|---|---|---|---|
| **Privacy Concerns** | ChatGPT raises privacy concerns | 2.67 (A) | 2.61 (A) | 2.55 (A) | 2.74 (A) | 2.64 (Agree) |
| | ChatGPT can keep important personal info | 2.61 (A) | 2.44 (A) | 2.47 (A) | 2.66 (A) | 2.55 (Agree) |
| | ChatGPT's answers could accidentally share private information | 2.52 (A) | 2.56 (A) | 2.54 (A) | 2.57 (A) | 2.55 (Agree) |
| | ChatGPT's data storage might raise privacy concerns | 2.67 (A) | 2.54 (A) | 2.59 (A) | 2.77 (A) | 2.64 (Agree) |
| | ChatGPT's data could be accessed by unauthorized parties | 2.52 (A) | 2.53 (A) | 2.45 (A) | 2.59 (A) | 2.52 (Agree) |
| **Bias and Fairness** | ChatGPT may harbor potential bias and unfairness | 2.63 (A) | 2.62 (A) | 2.53 (A) | 2.57 (A) | 2.59 (Agree) |
| | ChatGPT could lead to unfair treatment of scientific perspectives | 2.71 (A) | 2.66 (A) | 2.53 (A) | 2.57 (A) | 2.62 (Agree) |
| | ChatGPT can influence understanding of scientific principles | 2.66 (A) | 2.71 (A) | 2.57 (A) | 2.68 (A) | 2.66 (Agree) |
| | ChatGPT can generate scientific concepts accurately | 2.74 (A) | 2.67 (A) | 2.66 (A) | 2.66 (A) | 2.68 (Agree) |
| **Transparency and Accountability** | ChatGPT can ensure fairness and minimize bias | 2.67 (A) | 2.63 (A) | 2.57 (A) | 2.68 (A) | 2.64 (Agree) |
| | ChatGPT should disclose limitations | 2.64 (A) | 2.60 (A) | 2.53 (A) | 2.57 (A) | 2.59 (Agree) |
| | ChatGPT needs a regulatory framework for ethical use | 2.78 (A) | 2.73 (A) | 2.53 (A) | 2.57 (A) | 2.65 (Agree) |
| | ChatGPT should explain decisions and recommendations | 2.82 (A) | 2.74 (A) | 2.66 (A) | 2.68 (A) | 2.73 (Agree) |
| | ChatGPT should be transparent in revealing answer derivations | 2.81 (A) | 2.71 (A) | 2.66 (A) | 2.68 (A) | 2.72 (Agree) |

Legend: 4.00- 3.00 Strongly Agree (SA), 2.99 - 2.00 Agree (A), 1.99-1.00 Disagree (D), 1.00-0.99 Strongly Disagree (SD)

**Teacher's Perspective of ChatGPT as to its Ethical Implications in Science Education**

Regarding the usage of ChatGPT and other AI technologies in science teaching, educators have serious ethical issues. These issues mostly center on the necessity for accountability and openness, the possibility of prejudice, and privacy. Teachers also want increased accountability and openness in the use of AI in the classroom. They stress how important it is for developers to provide clear rules that guarantee moral use and for AI tools like ChatGPT to be open and honest about their features and limits. Teachers think that upholding educational integrity and trust requires accountability in the way responses are produced, and AI is included into learning settings.

Table 6. Teachers' Perspective on Ethical Implications of Using AI in Science Education

| Ethical Aspect | Question | ABIS | AHIS | SPNAGIS | IBIS | Overall |
|---|---|---|---|---|---|---|
| **Privacy Concern** | ChatGPT raises privacy concerns | 2.66 (A) | 3.00 (SA) | 3.00 (SA) | 3.00 (SA) | 2.91 (Agree) |
| | ChatGPT can keep important personal info | 2.42 (A) | 2.25 (A) | 3.25 (SA) | 3.50 (SA) | 2.85 (Agree) |
| | ChatGPT's answers could accidentally share private information | 2.42 (A) | 2.25 (A) | 3.00 (SA) | 2.25 (A) | 2.48 (Agree) |
| | ChatGPT's data storage might raise privacy concerns | 2.75 (A) | 3.00 (SA) | 3.00 (SA) | 2.75 (A) | 2.88 (Agree) |
| | ChatGPT's data could be accessed by unauthorized parties | 2.33 (A) | 3.50 (SA) | 3.00 (SA) | 2.25 (A) | 2.77 (Agree) |
| **Bias and Fairness** | ChatGPT may harbor potential bias and unfairness | 2.58 (A) | 3.00 (SA) | 2.75 (A) | 2.00 (A) | 2.58 (Agree) |
| | ChatGPT could lead to unfair treatment of scientific perspectives | 2.58 (A) | 2.33 (A) | 2.75 (A) | 2.00 (A) | 2.42 (Agree) |
| | ChatGPT can influence understanding of scientific principles | 2.25 (A) | 2.25 (A) | 2.75 (A) | 2.00 (A) | 2.32 (Agree) |
| | ChatGPT can generate scientific concepts accurately | 2.42 (A) | 2.25 (A) | 3.00 (A) | 2.00 (A) | 2.42 (Agree) |
| | ChatGPT can ensure fairness and minimize bias | 2.67 (A) | 2.17 (A) | 2.75 (A) | 1.25 (D) | 2.21 (Agree) |
| **Transparency and Accountability** | ChatGPT should be transparent in its involvement | 2.33 (A) | 3.83 (SA) | 3.00 (SA) | 2.25 (A) | 2.85 (Agree) |
| | ChatGPT needs clear guidelines for ethical use | 2.25 (A) | 3.83 (SA) | 3.00 (SA) | 2.00 (A) | 2.77 (Agree) |
| | ChatGPT should be accountable in its development and use | 2.25 (A) | 3.66 (SA) | 3.00 (SA) | 1.50 (D) | 2.60 (Agree) |
| | ChatGPT should explain how it generates responses | 2.25 (D) | 3.83 (SA) | 3.00 (SA) | 2.75 (A) | 2.96 (Agree) |
| | ChatGPT can enhance learning environments | 2.58 (A) | 3.66 (SA) | 3.00 (SA) | 2.10 (A) | 2.84 (Agree) |

Legend: 4.00- 3.00 Strongly Agree (SA), 2.99 - 2.00 Agree (A), 1.99-1.00 Disagree (D), 1.00-0.99 Strongly Disagree (SD)

**Differences in Student's Perspectives on the Utilization of ChatGPT as a Supplemental Tool in Science Education**

According to the majority of the items, students' opinions regarding ChatGPT's use as an additional tool do not differ much. This implies that students typically agree or disagree with ChatGPT's effectiveness in the majority of teaching and learning domains.

Table 7. Differences in Students' Perspectives on the Utilization of ChatGPT as a Supplemental Tool in Science Education

| Item | F value | P-value | Interpretation |
|---|---|---|---|
| ChatGPT as an additional source | 1.24 | 0.27 | Not Significant |
| ChatGPT for brainstorming science projects | 0.98 | 0.32 | Not Significant |
| ChatGPT to increase learning efficiency | 2.81 | 0.09 | Not Significant |
| ChatGPT assists in understanding scientific terminology | 0.04 | 0.84 | Not Significant |
| ChatGPT as help in understanding science topics | 1.87 | 0.17 | Not Significant |
| ChatGPT explains connections across science branches | 1.50 | 0.22 | Not Significant |
| ChatGPT relates theories to real-world applications | 1.35 | 0.26 | Not Significant |
| ChatGPT enhances exploration of interdisciplinary topics | 5.93 | 0.01 | Significant |
| ChatGPT provides additional resources | 5.14 | 0.02 | Significant |
| ChatGPT adapts scientific concepts into accessible language | 0.88 | 0.35 | Not Significant |
| ChatGPT clarifies complex scientific concepts | 3.38 | 0.07 | Not Significant |
| ChatGPT encourages exploration of new science areas | 0.0003 | 0.99 | Not Significant |
| ChatGPT enhances engagement with interactive learning | 3.46 | 0.06 | Not Significant |
| ChatGPT improves communication of scientific ideas | 3.26 | 0.07 | Not Significant |
| ChatGPT provides personalized support in science | 0.92 | 0.34 | Not Significant |

Note: Statistical significance is determined by a p-value less than 0.05.

There are two noteworthy exceptions, though, where notable differences are noted: "ChatGPT enhances exploration of interdisciplinary topics within science education" and "ChatGPT provides additional resources and materials that complement our science curriculum." These noteworthy findings suggest that students believe ChatGPT to be especially effective in these areas, suggesting that educators should concentrate on using AI tools to promote interdisciplinary learning and provide more educational resources.

While ChatGPT's overall influence is typically not thought to vary much in most domains, its particular contributions to resource augmentation and interdisciplinary investigation highlight areas in which artificial intelligence (AI) tools can be especially helpful in science education. This realization points to a possible avenue for expanding ChatGPT's integration in ways that play to these advantages, increasing its overall efficacy as an additional teaching tool.

**Differences in Teacher's Perspectives on the Utilization of ChatGPT as a Supplemental Tool in Science Education**

Overall, the findings indicate that there is generally no significant difference in the extent to which teachers believe ChatGPT contributes to various educational activities, suggesting a uniform perception across most aspects. However, one significant finding is the enhancement of student engagement with science content. This item stood out with a p-value of 0.002, indicating that teachers see a substantial benefit from using ChatGPT to engage students. This suggests that while the impact of ChatGPT on other aspects of teaching and content delivery might not be distinctly recognized, its role in increasing student engagement is notably valued.

Table 8. Differences in Teachers' Perspectives on the Utilization of ChatGPT as a Supplemental Tool in Science Education

| Item | F value | P-value | Interpretation |
|---|---|---|---|
| ChatGPT as an additional resource in daily tasks | 2.76 | 0.11 | Not Significant |
| ChatGPT for generating scientific ideas | 0.02 | 0.89 | Not Significant |
| ChatGPT in lesson planning and content integration | 3.56 | 0.07 | Not Significant |
| ChatGPT for creative writing or content generation | 0.26 | 0.62 | Not Significant |
| ChatGPT assists in language translation and explanation | 1.27 | 0.27 | Not Significant |
| ChatGPT supports integration of diverse scientific concepts | 0.002 | 0.96 | Not Significant |
| ChatGPT facilitates incorporation of real-world examples | 0.04 | 0.85 | Not Significant |
| ChatGPT addresses cross-disciplinary topics | 1.18 | 0.29 | Not Significant |
| ChatGPT saves time in lesson planning | 0.40 | 0.53 | Not Significant |
| ChatGPT adapts complex concepts for easier comprehension | 2.01 | 0.17 | Not Significant |
| ChatGPT provides insights that enhance understanding | 0.13 | 0.72 | Not Significant |
| ChatGPT empowers focus on individualized student needs | 0.03 | 0.86 | Not Significant |
| ChatGPT tailors' content to student needs | 0.12 | 0.73 | Not Significant |
| ChatGPT enhances student engagement with science content | 12.29 | 0.002 | Significant |
| ChatGPT adapts to different learning styles | 0.38 | 0.54 | Not Significant |

Note: Statistical significance is determined by a p-value less than 0.05.

The lack of significant differences in other areas might reflect a consensus that while ChatGPT is a useful tool, its impact is not perceived as transformative across all teaching activities. The uniformity in responses may also suggest a need for more targeted training or examples to showcase how AI can effectively contribute to diverse teaching and learning scenarios beyond engagement. These insights highlight the importance of focusing on areas where AI tools like ChatGPT can make a meaningful difference, particularly in engaging students, and may guide future integration strategies and professional development efforts in educational technology.

**Differences in Students' Perspectives on Ethical Implications of Using AI in Science Education**

Table 9 summarizes students' assessments of the ethical use of AI technologies such as ChatGPT in science

teaching. While the majority of the problems analyzed revealed no significant disparities in student perceptions, indicating a general consensus or consistency in their views, there are notable outliers where considerable discrepancies were found.

Table 9. Differences in Students' Perspectives on Ethical Implications of Using AI in Science Education

| Ethical Concern | F Value | P-value | Interpretation |
|---|---|---|---|
| ChatGPT raises privacy concerns | 0.04 | 0.85 | Not Significant |
| ChatGPT can keep important personal info | 0.70 | 0.40 | Not Significant |
| ChatGPT's answers could accidentally share private information | 3.49 | 0.06 | Not Significant |
| ChatGPT's data storage might raise privacy concerns | 4.53 | 0.03 | Significant |
| ChatGPT's data could be accessed by unauthorized parties | 2.86 | 0.09 | Not Significant |
| ChatGPT may harbor potential bias and unfairness | 0.0003 | 0.99 | Not Significant |
| ChatGPT could lead to unfair treatment of scientific perspectives | 2.06 | 0.15 | Not Significant |
| ChatGPT can influence understanding of scientific principles | 3.72 | 0.05 | Significant |
| ChatGPT can accurately generate scientific concepts | 2.44 | 0.12 | Not Significant |
| ChatGPT can establish guidelines to minimize bias | 0.64 | 0.42 | Not Significant |
| ChatGPT should disclose limitations in science education | 0.20 | 0.66 | Not Significant |
| ChatGPT needs a regulatory framework for ethical use | 0.56 | 0.45 | Not Significant |
| ChatGPT should explain decisions and recommendations | 3.01 | 0.08 | Not Significant |
| ChatGPT's potential impact on privacy and data security | 5.28 | 0.02 | Significant |
| ChatGPT should be transparent in how answers are derived | 0.001 | 0.97 | Not Significant |

Note: Statistical significance is determined by a p-value less than 0.05.

Significant concerns were raised regarding how ChatGPT's data storage procedures may cause privacy difficulties, with students particularly concerned about how their data is stored and secured. Furthermore, the impact of AI on understanding scientific principles was seen as a serious issue, implying that some students perceive potential biases in how AI, such as ChatGPT, interprets and teaches scientific knowledge. Additionally, a great deal of concern was expressed regarding the possible effects of AI systems on data security and privacy, suggesting that students are quite concerned about the safety of their personal data when utilizing AI tools.

**Differences in Teachers' Perspectives on Ethical Implications of Using AI in Science Education**

The table offers a thorough summary of how the science teachers feel about the moral application of ChatGPT and other AI tools in science classes. The data indicates that there is generally no substantial variation in the opinions of teachers on a range of ethical dimensions, including privacy concerns, potential biases, and the need for transparency. This suggests that there is a consensus or common ground regarding these issues. The potential for unfair treatment of certain scientific perspectives and ChatGPT's ability to accurately generate scientific concepts (both p-values close to 0.07 and 0.08), for example, are items that are approaching significance even though there are no statistically significant differences. These items suggest areas where perceptions might be more varied or where opinions could be impacted by future developments in AI technology.

Table 10. Differences in Teachers' Perspectives on Ethical Implications of Using AI in Science Education

| Ethical Concern | F Value | P-value | Interpretation |
|---|---|---|---|
| ChatGPT raises privacy concerns | 1.83 | 0.19 | Not Significant |
| ChatGPT can keep important personal info | 1.79 | 0.19 | Not Significant |
| ChatGPT's answers could share private information | 1.77 | 0.19 | Not Significant |
| ChatGPT's data storage might raise privacy concerns | 0.42 | 0.52 | Not Significant |
| ChatGPT's data could be accessed by unauthorized parties | 2.16 | 0.15 | Not Significant |
| ChatGPT may harbor potential bias and unfairness | 0.31 | 0.58 | Not Significant |
| ChatGPT could lead to unfair treatment of scientific perspectives | 3.40 | 0.078 | Not Significant |
| ChatGPT can influence understanding of scientific principles | 0.38 | 0.55 | Not Significant |
| ChatGPT can accurately generate scientific concepts | 3.40 | 0.08 | Not Significant |
| ChatGPT can establish guidelines to minimize bias | 3.62 | 0.07 | Not Significant |
| ChatGPT should be transparent in its involvement | 0.17 | 0.68 | Not Significant |
| ChatGPT needs clear guidelines for ethical use | 0.99 | 0.33 | Not Significant |
| ChatGPT should hold developers accountable | 0.006 | 0.94 | Not Significant |
| ChatGPT should explain how it generates responses | 0.03 | 0.86 | Not Significant |
| ChatGPT can enhance learning environments | 0.06 | 0.82 | Not Significant |

Note: Statistical significance is determined by a p-value less than 0.05.

## Discussion

In recent years, the fast integration of artificial intelligence (AI) systems into educational environments has transformed teaching and learning processes. One such AI, ChatGPT, has been at the forefront of this technological innovation, bringing new potential and problems in a variety of educational settings. This study investigated ChatGPT's varied role as a supplemental tool in science education, including its impact on teacher and student experiences, views of its utility, and the ethical concerns of its use. This study provided an overview of the current state and potential future of artificial intelligence in education by evaluating demographic data from teachers and students as well as their thoughts on AI's educational contributions.

The demographic data of teacher responses show a considerable presence of early-career, mostly female teachers spread across a variety of educational institutions. This profile highlights possible changes in teaching approaches and adaptation to educational policy, notably in the use of modern technologies such as ChatGPT. Skavronskaya and Halaweh (2023) argue that such demographics may be more open to new technologies, perhaps speeding up the acceptance and integration of AI in education. This is consistent with the findings of Khonke et al. (2023), who identify a tendency toward using AI to shift from traditional teaching roles to more facilitative and supportive educational approaches.

Similarly, the profile of student respondents—primarily high school-aged with a relatively balanced gender distribution—indicates that the insights generated from this study may reflect diverse student experiences with AI tools such as ChatGPT. Limna et al. (2023) underline that AI tools can considerably improve student engagement

and motivation, which is crucial given our study's broad inclusion across multiple educational situations. Furthermore, Rahman and Watanobe (2023) demonstrate the potential of AI to give timely and individualized feedback, hence improving learning results across diverse student demographics. Students generally see ChatGPT positively, valuing its assistance across multiple dimensions of their learning, particularly in comprehending and engaging with complicated science topics. This remark is reinforced by Baidoo and Ansah (2023), who emphasize AI's function in increasing personalized learning and interactive training, implying that AI technologies can considerably improve learning experiences through tailored and instant feedback.

Teachers highly value ChatGPT's utility in educational activities, particularly its ability to adapt to diverse learning methods and assist with language translation. This validates the findings of Dwivedi et al. (2023), who described how AI, such as ChatGPT, is altering educational roles, shifting from content development to facilitation, and therefore improving pedagogical effectiveness. Lund and Wang (2023) show how such technologies can accommodate varied educational needs and increase student involvement, resulting in a more successful teaching environment. The study also revealed disparities in students' and teachers' perceptions on the use of ChatGPT.

While there are no substantial differences in the majority of areas, some, such as interdisciplinary investigation and resource augmentation for students and improving student engagement for teachers, stand out as noteworthy. These findings are consistent with Rahman and Watanobe's (2023) emphasis on ChatGPT's ability to support learning across multiple topic areas, as well as Firaina and Sulisworo's (2023) observation of AI technologies' potential to provide a more engaging and dynamic learning environment. The ethical issues are also an important component of this discussion.

Concerns regarding privacy and data security are shared by both students and teachers, emphasizing the importance of strong data protection measures. This issue is shared by Stockman & Nottingham et al. (2022), who advocate for strict data security measures in educational AI applications. Luckin et al. (2022) and Rudolph et al. (2023) emphasize the importance of understanding AI's pedagogical contributions and ethical dimensions in order to fully leverage its benefits in educational settings.

## Conclusion

The integration of AI in scientific education exposes a range of viewpoints and emphasizes both the possible benefits and ethical problems from the views of teachers and students. While there is widespread recognition of AI's promise to improve science education through better material delivery and increased student engagement, concerns about privacy, bias, and transparency remain. To solve these privacy concerns, it is widely acknowledged that strong security mechanisms and explicit data standards are necessary. Notwithstanding these reservations, AI is seen as a useful instrument that has the ability to completely transform science instruction by providing more individualized learning opportunities and supporting the development of dynamic, inclusive learning environments. The results highlight the significance of constant communication and cooperation between all parties involved in order to optimize AI's advantages while reducing its moral dilemmas.

## Recommendations

Several important suggestions are made in light of the study on the integration of AI in scientific education: AI developers should improve algorithms to lessen biases and guarantee fairness, as well as privacy controls and transparency in ChatGPT and similar systems to allay user concerns about data collection and storage. In science classes, teachers should concentrate on teaching students how to assess AI-generated content critically and use AI technologies to relate abstract ideas to real-world applications. Continuous evaluation and improvement of AI technologies should also be guided by user feedback, particularly that of students and teachers alike, in order to maximize their educational benefits and successfully handle any new problems.

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## Author Information

**Rizaldy Garcia**
https://orcid.org/0000-0001-9208-8975
Rizal Technological University
Philippines
Contact e-mail: *rizaldygarcia917@gmail.com*

**Julian Grace Fojas**
https://orcid.org/0009-0006-1189-5147
Rizal Technological University
Philippines

**Jeff Nicole Formanes**
https://orcid.org/0009-0002-9836-0647
Rizal Technological University
Philippines

**Danica Garcia**
https://orcid.org/0009-0001-9397-0959
Rizal Technological University
Philippines

**Charmanie Habol**
https://orcid.org/0009-0001-8700-6813
Rizal Technological University
Philippines

**Lodie Orapa**
https://orcid.org/0009-0001-8767-706X
Rizal Technological University
Philippines