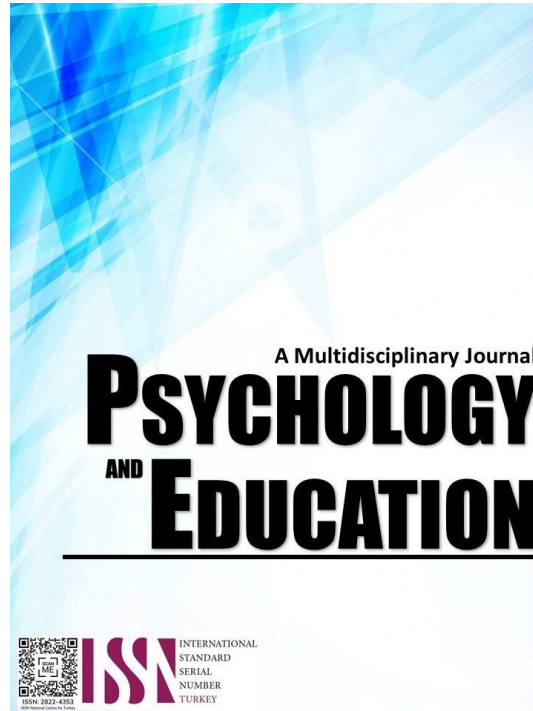


# AI-ASSISTED EDUCATION: AN INVESTIGATION INTO ITS PERCEIVED EFFECTS ON TEACHER EFFICIENCY AND STUDENT PERFORMANCE



**PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL**

Volume: 35

Issue 2

Pages: 103-109

Document ID: 2025PEMJ3347

DOI: 10.70838/pemj.350201

Manuscript Accepted: 03-21-2025

# AI-Assisted Education: An Investigation into its Perceived Effects on Teacher Efficiency and Student Performance

Roland S. Leonillo\*

For affiliations and correspondence, see the last page.

## Abstract

There has been a rapid increase in the use of artificial intelligence (AI) in our educational system. This descriptive, comparative, and correlational study investigated the use of AI-powered tools and examined 86 teachers' efficiency and 274 students' performance in a private Catholic school in Bacolod City, Philippines. The researcher developed a researcher-made questionnaire to gather the data. Major findings revealed that teachers used AI less frequently, often used it for tutoring, with ChatGPT being a popular choice. Students, on the other hand, reported using AI weekly, primarily for tutoring. While AI integration seemed to enhance teacher efficiency, male teachers perceived themselves as more efficient than females. Generally, the results show that AI contributes to an efficient teaching process with a mean score of 3.60, verbally interpreted as somewhat efficient. The results revealed that AI had a significant improvement on both male and female students. Interestingly, no significant differences were found in teacher efficiency and student performance when grouped according to sex using Mann-Whitney U-test. Using Spearman's rank correlation coefficient, the data revealed no correlation between the student performance in AI and the teachers' efficiency in AI. In light of these findings, the study recommends implementing programs and training to help teachers use AI more effectively and engage students. Additionally, it emphasizes the need to address any barriers educators may face in adopting AI, create supportive environments with equitable access to AI resources, and implement strategies to address potential gender biases in AI adoption.

**Keywords:** *AI-assisted education, AI-powered teaching tools, AI-powered learning tools, teachers' efficiency, student performance, Philippines*

## Introduction

In recent years, there has been a rapid increase in the use of artificial intelligence in our educational system. The integration of artificial intelligence (AI) in the classroom has ushered in a new era of innovative teaching and learning methods. Rapid advancements in AI technology have become essential for educators and students to further enhance teaching and learning experiences (Seo et al., 2021).

AI refers to the field of computer science that involves creating computer programs capable of imitating intelligent behavior and ideally enhancing human-like abilities (Naqvi, 2020). The rapidly growing field of AI involves the creation of intelligent robots that can mimic human thinking and behavior, with applications spanning a wide range of fields such as healthcare diagnostics, autonomous vehicles, and education (Wardat et al., 2023).

In an international setting, AI has been transforming education in recent years. UNESCO (2023) published reports that AI has the potential to address some of the biggest challenges in education nowadays, innovate teaching and learning practices, and accelerate progress towards Sustainable Development Goal 4: Education. This increasing significance of AI has garnered the interest of numerous scholars actively exploring diverse methods to incorporate various AI tools within the classroom environment (Halaweh, 2023; Mena-Guacas et al., 2023). AI-powered tools and applications had the capacity to improve educational measurement, including testing, assessment, and evaluation. These tools provided educators with valuable insights into student performance, learning outcomes, and instructional effectiveness. For example, AI-powered assessment tools analyzed student responses to assignments and provided personalized feedback to help students identify areas of strength and weakness (Nazaretsky et al., 2022). AI tools like chatbots helped boost worker productivity at one tech company by 14%, according to new research reported by Bloomberg (Brynjolfsson et al., 2023). The study, conducted at Stanford and the Massachusetts Institute of Technology, measured the productivity of more than 5,000 customer support agents, primarily based in the Philippines, at a Fortune 500 enterprise software firm over the course of a year. Al-Samarraie et al., (2024), found out that male and female users have varied perspectives on the use of generative AI in education, emphasizing the need for gender-specific learning and teaching practice, which supports the findings of the study.

The integration of AI in the Philippine educational context offered a multitude of opportunities for enhancing the overall learning experience. Among these precursor factors were the development of new assessment methods, new upskilling, and the intensification of assessment software, which provided more precise and timely feedback to both students and educators (Estrellado & Miranda, 2023). There was a lack of research on the effects of AI-assisted education on teacher and student performance in the Philippines. Despite the growing interest in AI-assisted education and its potential benefits, there were still research gaps that need to be addressed. Specifically, there was a need for more research on the effects of AI systems on learner-instructor interaction in online learning environments (Seo et al., 2021). Moreover, there was a need for more research on the influence of AI systems on the level of teacher efficiency. While some studies have shown that AI can reduce the amount of time teachers spend on tasks, more research is needed to fully understand the impact of AI on teacher workload and efficiency (Celik et al., 2022).

Department of Education has also recognized the importance of educational technology, including AI, in teacher professional development research. The report emphasized the need for effective use and further development of educational technology to improve teaching and learning outcomes (Cardona et al., 2023). The public and private schools in Bacolod City, Philippines strived to cope up with the challenges posed by technological advancements. The school continued to enrich teachers and students by equipping them with proper training and seminars related to technology integration in the classroom and the emerging field of artificial intelligence. This study aimed to determine the extent of use of AI-powered teaching and learning tools such as ChatGPT, Gemini, Turnitin, and identify the teachers' efficiency and students' performance in the school year 2023-2024 in a private Catholic academic institution, Bacolod City, Philippines. The findings of this study were used as a baseline for the school's strategic planning and development of technology integrations for the teachers and senior high students.

## Research Questions

This study primarily aimed to determine the extent of use of AI-powered teaching and learning tools and identify the teachers' efficiency and students' performance in the school year 2023-2024 in a private Catholic academic institution, Bacolod City, Philippines. Specifically, this study answers the following questions:

1. What is the extent of AI usage among teachers and students in education when grouped to sex?
2. What is the level of efficiency among teachers when using AI in teaching when grouped as a whole and sex?
3. What is the level of student performance when using AI in learning when grouped as a whole and sex?
4. Is there a significant difference in the level of efficiency among teachers when using AI in teaching when grouped to sex?
5. Is there a significant difference in the level of student performance when using AI in learning when grouped to sex?
6. Is there a significant relationship between students' performance and teachers' efficiency?

## Methodology

### Research Design

This study used the quantitative research approach and utilized the descriptive comparative and correlation design to determine the extent of use of AI-powered teaching and learning tools and identify the 86 teachers' efficiency and 274 students' performance in the school year 2023-2024 in a private Catholic academic institution, Bacolod City, Philippines. Meanwhile, a descriptive comparative used to gather data and test null hypotheses on the significant difference in the extent of use of AI tools, efficiency of teachers and performance of learners. Also, descriptive comparatives were used to gather data because comparative designs usually have a few categories of the independent variable and make comparisons between groups (Gliner et al, 2017). In the case of the study, descriptive-correlational will be used in the association of the assessed students' performance and teachers' efficiency as influenced by AI. The design was deemed appropriate because it attempts to establish relationships between two or more key variables identified by the researchers (Padua, 2000, cited by Amaro, 2018).

### Instrument

Due to the novelty of this study, the researcher utilized a researcher-made questionnaire that suited the research problems and objectives. There were two types of questionnaires that were utilized: one for students' use and another one is for teachers' use. The first questionnaire for teachers was the extent of use of AI-powered teaching tools by teachers. It consisted of 3 questions that asked about usage patterns, frequency and utilization of artificial intelligence in the classroom. Part two of the questionnaire was a 20-item survey on the level of efficiency of teachers when they employ the use of AI in their teaching using these major indicators: AI integration and teaching efficiency, AI in classroom management, AI in personalized learning and training for AI use. For the questionnaire for students, part one was a 3-item survey assessing the extent of use of AI-powered learning tools, specifically the usage patterns, frequency and utilization of artificial intelligence in the classroom. Part 2 was a 20-item questionnaire evaluating the performance of students when using AI-powered tools and it has the following indicators: learning engagement and motivation, learning effectiveness and skills enhancement, personalized learning and user experience, and ease of use. The instrument underwent validity testing using the Good and Scates rating scale. The mean score of the survey questionnaire validity test for teachers was 4.63, and for students 4.57, both verbally interpreted as "Very High." Meanwhile, the questionnaire for teachers and students was pilot tested with 30 teachers and 30 students and garnered Cronbach's alpha scores of 0.953 and 0.923, interpreted as Very Good for reliability.

### Procedure

During the data collection process, the researcher adhered to several ethical protocols to ensure the study's integrity and respect for participants. These included obtaining informed consent, safeguarding respondents' anonymity and data confidentiality, granting participants the right to withdraw at any stage, and avoiding any deceptive practices. The research employed both traditional and modern data collection methods, utilizing printed surveys and Google Forms to distribute the research instrument.

The questionnaires were disseminated to Science, Technology, Engineering, and Mathematics (STEM) students and teachers following approval from the University Academic Principal and School Research Office, which was secured through a formal letter of permission submitted by the researchers. Participants were assured that their responses would remain strictly confidential. Prior to administering

the questionnaire, respondents were briefed on the study's purpose, scope, the structure of the questionnaire, and their voluntary participation in the research.

### Data Analysis

The data were analyzed using descriptive, inferential, and correlational statistical methods. Descriptive analysis, including frequency and percentage calculations, identified the extent to which teachers used AI-powered teaching tools and students used AI-powered learning tools, categorized by sex. The researcher calculated mean scores to assess (1) teachers' efficiency in employing AI for instruction and (2) students' performance in learning with AI, both segmented by sex. Comparative analysis, using Independent-Sample T-Test, determined significant differences in teachers' efficiency and students' performance when grouped by sex. Pearson correlation coefficient evaluated whether a statistically significant relationship existed between students' performance and teachers' efficiency, following Creswell & Clark's (2011) correlation framework.

## Results and Discussion

### Extent of Use of AI usage among Teachers and Students in Education

Table 1. *Frequency of AI use of teachers when grouped into sex*

Variables		Sex	Frequency	Percentage
Frequency of AI Use	Daily	Male	10	11.6%
		Female	10	11.6%
	Weekly	Male	9	10.5%
		Female	13	15.1%
	Monthly	Male	5	5.8%
		Female	5	5.8%
	Rarely	Male	13	15.1%
		Female	13	15.1%
	Never	Male	6	7.0%
		Female	2	2.3%
Extent of AI Tools	AI Tutoring System	Male	37	43.0%
		Female	28	32.6%
	AI Grading Systems	Male	0	0.0%
		Female	2	2.3%
	Others	Male	6	7.0%
		Female	13	15.1%

Table 1 shows AI use frequency among teachers reveals notable patterns when grouped by sex. Daily use shows no sex disparity, with both males and females reporting identical rates of 11.6% (10 teachers each). Similarly, monthly use is equally low at 5.8% for both sexes, suggesting minimal engagement with AI tools for occasional tasks. However, weekly use demonstrates a slight sex gap: females (15.1%) employ AI more frequently than males (10.5%), indicating potential differences in how consistently each group integrates AI into their routines.

In terms of extent of use of AI-powered teaching tools, the results showed that male teachers dominate the use of AI Tutoring Systems (43.0%), while female teachers use them less (32.6%). Female teachers are the only ones using AI Grading Systems (2.3%), with no male teachers reporting this. For Other AI Tools, female teachers use them more (15.1%) than males (7.0%).

According to the study by Nyaaba et al. (2024), pre-service teachers are familiar with generative AI tools, particularly ChatGPT and Google Bard, and utilize them in research projects. However, there is a gender disparity in their usage, though both genders display positive attitudes towards these tools. Additionally, a study by Al-Samarraie et al. (2024) reveals that male and female users have different perspectives on the application of generative AI in education, highlighting the importance of gender-specific teaching and learning approaches, which aligns with the findings of the study.

Table 2. *Frequency of AI use of students when grouped into sex*

Variables		Sex	Frequency	Percentage
Frequency of AI Use	Daily	Male	14	5.1%
		Female	24	8.7%
	Weekly	Male	65	23.6%
		Female	52	18.9%
	Monthly	Male	13	4.7%
		Female	17	6.2%
	Rarely	Male	46	16.7%
		Female	37	13.5%
	Never	Male	3	1.1%
		Female	4	1.5%
Extent of AI Tools	AI Tutoring Systems	Male	99	36.0%



AI Grading Systems	Female	103	37.5%
	Male	2	0.7%
Learning Analytic Tools	Female	0	0.0%
	Male	7	2.5%
Adaptive Learning Software	Female	7	2.5%
	Male	2	0.7%
Others	Female	1	0.4%
	Male	33	11.3%
	Female	23	8.4%

Table 2 presents AI use frequency among students when grouped by sex. Daily use shows a notable gender gap, with females (8.7%) employing AI daily more than twice as often as males (5.1%). Conversely, weekly use is more prevalent among males (23.6%) compared to females (18.9%), suggesting males may rely on AI tools for regular academic or personal tasks. Monthly use remains low for both sexes, with males at 4.7% and females at 6.2%, indicating minimal engagement with AI for occasional purposes.

In terms of extent of use of AI-powered learning tools, the data shows that Tutoring Systems is the most utilized, with female teachers using them slightly more (37.5%) than males (36.0%). Other AI Tools (e.g., unspecified tools) are also widely used, particularly by males (11.3%) compared to females (8.4%). Adaptive Learning Software and AI Grading Systems are rarely used. Adaptive tools see minimal adoption, with males (0.7%) and females (0.4%) using them the least. Grading systems are used only by males (0.7%), while females avoid them entirely (0.0%).

A study at the University for Development Studies revealed that 76.9% of students reported using AI tools, with 31.6% using them on a daily basis (Iddrisu et al., 2025). This aligns with the findings of Jiang et al. (2024), which indicate that marginalized female students perform better in machine learning and artificial intelligence tasks when incorporating diverse cultural perspectives and holistic language analysis.

Table 3. *Level of efficiency among teachers when using AI-powered teaching tools when grouped to sex*

<i>Teachers' Efficiency</i>	<i>Sex</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Interpretation</i>
AI Integration and Teaching Productivity	Male	43	4.26	0.543	Highly Efficient
	Female	43	3.69	0.925	Somewhat Efficient
AI in Classroom Management	Male	43	3.98	0.686	Somewhat Efficient
	Female	43	3.32	0.934	Neutral
AI in Personalized Learning	Male	43	4.16	0.586	Somewhat Efficient
	Female	43	3.32	1.127	Neutral
Training for AI Use	Male	43	3.51	0.879	Somewhat Efficient
	Female	43	2.66	0.876	Neutral
Overall Mean	Male	43	3.99	0.557	Somewhat Efficient
	Female	43	3.93	0.584	Somewhat Efficient

Table 3 presents the level of efficiency among teachers when using AI-powered teaching tools when grouped to sex.

The data show that male teachers have higher efficiency across all categories, with the highest efficiency in AI Integration and Teaching Productivity (mean = 4.26, SD = 0.543) and AI in Personalized Learning (mean = 4.16, SD = 0.586), both classified as "Somewhat Efficient." Female teachers scored lower in these areas (mean = 3.69 and 3.32, respectively), with the latter falling into the "Neutral" category.

The lowest efficiency scores for both groups were in Training for AI Use, where female teachers scored significantly lower (mean = 2.66, SD = 0.876) compared to males (mean = 3.51, SD = 0.879). Female teachers also showed the widest variability in AI in Personalized Learning (SD = 1.127), suggesting greater inconsistency in their adoption of this tool.

In line with Lin's (2022) findings, AI in education (AIED) assists teachers in recognizing and performing teaching tasks more accurately, thereby enhancing teaching effectiveness. Teachers' positive attitudes toward educational technology play a key role in this improvement, highlighting that familiarity and comfort with AI tools are essential for maximizing their benefits. Overall, Wang et al. (2023) suggest that teachers who are highly prepared for AI tend to perceive less threat from AI and exhibit greater AI-driven innovation and job satisfaction, regardless of their socio-economic background or gender.

Table 4 shows the level of student performance when using AI-powered learning tools when grouped to sex

Male obtained the highest mean score in four areas of AI improving student performance such as Learning Engagement and Motivation (M=3.42, SD=0.863), Learning Effectiveness and Skills Enhancement (M= 3.68, SD= 0.872), Personalization of Learning (M= 3.73, SD= 0.887), User Experience and Ease of Use (M= 3.77, SD= 0.849) verbally interpreted as "Significant improvement". Females showed positive agreement in three areas such as Learning Effectiveness and Skills Enhancement (M=3.64, SD=0.812), Personalization of Learning, User Experience and Ease of Use interpreted as "Significant improvement", however female students indicated neutral stance in Learning Engagement and Motivation with the mean score of 3.27, verbally interpreted as "Moderate improvement". When

grouped as a whole, the overall mean of the level of student performance when they use AI in learning was 3.62, verbally interpreted as “Significant improvement”.

Table 4. *Level of student performance when using AI-powered learning tools when grouped to sex*

<i>Student Performance</i>	<i>Sex</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Interpretation</i>
Learning Engagement and Motivation	Female	141	3.27	0.836	Moderate improvement
	Male	134	3.42	0.863	Significant improvement
Learning Effectiveness and Skills Enhancement	Female	141	3.64	0.812	Significant improvement
	Male	134	3.68	0.872	Significant improvement
Personalization of Learning	Female	141	3.62	0.853	Significant improvement
	Male	134	3.73	0.887	Significant improvement
User Experience and Ease of Use	Female	141	3.83	0.803	Significant improvement
	Male	134	3.77	0.849	Significant improvement
Overall Student	Female	141	3.59	0.725	Significant improvement
	Male	134	3.65	0.788	Significant improvement

A recent study by Boubker (2023) found that ChatGPT, an AI tool, has a positive impact on student learning outcomes and satisfaction by improving output quality, social influence, and perceived ease of use. Supporting these findings, Malik et al. (2023) concluded that AI-powered writing tools enhance academic writing by boosting students' writing abilities, self-efficacy, and understanding of academic integrity. However, they emphasize the need for a balanced integration to maintain human creativity and critical thinking.

Table 5. *Mann-Whitney U Results in the Significant Difference in the level of performance of students when AI-powered learning tools when grouped to sex*

<i>Level of Student Performance</i>	<i>p</i>	<i>Interpretation</i>	<i>Status of Hypothesis</i>
Learning Engagement and Motivation	0.084	Not Significant	Failed to reject
Learning Effectiveness and Skills Enhancement	0.444	Not Significant	Failed to reject
User Experience and Ease of Use	0.591	Not Significant	Failed to reject
Personalization of Learning	0.107	Not Significant	Failed to reject
Overall Student	0.307	Not Significant	Failed to reject

Using Mann-Whitney U Test, the data showed the computed p-value for each dimension when grouped according to sex, shows that it is statistically not significant in Learning Engagement and Motivation (0.084), Learning Effectiveness and Skills Enhancement (0.444), Personalization of Learning (0.107) and User Experience and Ease of Use (0.591) which indicated that the level of student performance when they use AI in learning in terms of sex was higher than the significance level of 0.05, therefore the null hypothesis is failed to reject.

In contrast, the study by Prestoza (2024) found a significant improvement in academic performance, especially among female students, when AI tools were integrated into educational settings. This indicates that AI tools may be particularly effective for female students in certain contexts.

Table 6. *Mann-Whitney U Results in the Significant Difference in the level of performance of students when AI-powered learning tools when grouped to sex*

<i>Level of Teachers' Efficiency</i>	<i>p</i>	<i>Interpretation</i>	<i>Status of the Hypothesis</i>
AI in Classroom Management	<.001	Significant	Reject the hypothesis
AI Integration and Teaching Productivity	0.002	Significant	Reject the hypothesis
AI in Personalized Learning	<.001	Significant	Reject the hypothesis
Training for AI Use	<.001	Significant	Reject the hypothesis
Overall Mean	0.481	Not Significant	Failed to reject

Using Mann-Whitney U test, the results show the significant difference in the level of efficiency of teachers when they employed AI in their teaching when grouped and compared and sex. The computed p-value shows that it is statistically significant in AI Integration and Teaching Productivity (0.002), AI in Classroom Management (0.001), AI in Personalized Learning (0.001) and Training for AI Use (0.001) which indicated that the level of efficiency of teachers when they employed AI in their teaching in terms of sex is lower than the significance level of .05. However, the computed p-value of the overall mean of four dimensions when grouped to sex was 0.481, therefore the null hypothesis is failed to reject.

The study by Wang et al. (2023) found no significant differences in AI readiness between male and female teachers. Both genders exhibit similar levels of cognition, ability, vision, and ethical considerations in the educational use of AI, all of which are essential for AI-driven innovation and job satisfaction. Furthermore, Lu et al. (2024) highlighted that generative AI-assisted preservice teaching skills training significantly enhances preservice teachers' self-efficacy and higher-order thinking skills compared to traditional methods.

Using Spearman's rank correlation coefficient, the results show the computed p-value (0.0170) for the level of students' performance versus the level of teachers' efficiency, it was statistically with no significant relationship between the variables, therefore the null hypothesis is failed to reject.

Table 7. Significant Relationship between students' performance and teachers' efficiency

Groupings	Computed p-value	Significance	Status of Hypothesis
Students Performance vs Teachers Efficiency	0.170	With No Significant Relationship	Failed to reject

The results indicate that there is no significant relationship between the level of student performance in AI and the level of teachers' efficiency in using AI. This suggests that the impact of AI on student performance is not solely reliant on teachers' proficiency with AI. Other factors, such as the quality of content, teaching approach, and the specific AI tools used, may also play a role in influencing student performance. A study by Nasser (2024) found that AI supports personalized learning experiences by adapting educational content to meet individual student needs, thereby enhancing engagement and academic performance. Additionally, Onesi-Ozigagun et al. (2024) emphasized that AI in education transforms learning experiences, teaching methodologies, and administrative processes by personalizing content, streamlining administrative tasks, and improving assessment methods.

## Conclusions

The study highlights a limited adoption of AI-powered teaching tools among educators, with AI tutoring systems like ChatGPT and Bard being more prevalent in personal use than in classroom integration. While teachers reported improved efficiency in tasks such as lesson planning and grading, male teachers perceived greater efficiency gains compared to female teachers. Students demonstrated significant performance improvements when using AI tools, though male students outperformed female peers in specific areas. Notably, no significant differences emerged in AI-driven teaching efficiency between sexes or in student performance outcomes tied to teacher proficiency.

The findings underscore AI's equitable potential to enhance learning engagement and effectiveness across genders, as demographic variations in perceived benefits did not translate into measurable disparities in outcomes. However, the underutilization of learning analytics tools and uneven AI adoption among teachers reveal critical training gaps, emphasizing the need for structured programs to bridge knowledge divides and optimize AI integration. Additionally, the decoupling of student performance from teacher AI proficiency suggests that student autonomy and tool accessibility may drive educational benefits more than educator expertise alone. These insights advocate for comprehensive frameworks to standardize AI integration, address ethical concerns (e.g., academic integrity), and ensure equitable access to AI resources. Moreover, the study emphasized AI's transformative potential while urging targeted interventions to maximize its educational value for all stakeholders.

## References

- Al Darayseh, A. (2023). Acceptance of artificial intelligence in teaching science: Science teachers' perspective. *Computers and Education: Artificial Intelligence*, 4, 100132. <https://doi.org/10.1016/J.CAEAI.2023.100132>
- Al-Samarraie, H., Sarsam, S., Alzahrani, A., Chatterjee, A., & Swinnerton, B. (2024). Gender perceptions of generative AI in higher education. *Journal of Applied Research in Higher Education*. <https://doi.org/10.1108/jarhe-02-2024-0109>
- Brynjolfsson, E., Li, D., Raymond, L. R., Acemoglu, D., Autor, D., Axelrod, A., Dillon, E., Enam, Z., Garicano, L., Frankel, A., Manning, S., Mullainathan, S., Pierson, E., Stern, S., Rambachan, A., Reenen, J. Van, Sadun, R., Shaw, K., Stanton, C., & Thrun, S. (2023). *Generative AI at Work*. National Bureau of Economic Research. <https://doi.org/10.3386/W31161>
- Boubker, O. (2023). From chatting to self-educating: Can AI tools boost student learning outcomes? *Expert Systems with Applications*, 238, 121820. <https://doi.org/10.1016/j.eswa.2023.121820>
- Cardona, M. A., Rodríguez, R. J., & Ishmael, K. (2023). *Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations*. <https://www.ed.gov/sites/ed/files/documents/ai-report/ai-report.pdf>
- Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The Promises and Challenges of Artificial Intelligence for Teachers: A Systematic Review of Research. *TechTrends*, 66(4), 616–630. <https://doi.org/10.1007/s11528-022-00715-y>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Estrellado, C. J. P., & Miranda, J. C. (2023). Artificial Intelligence in the Philippine Educational Context: Circumspection and Future Inquiries. *International Journal of Scientific and Research Publications*, 13(5), 16. ISSN 2250-3153
- Gliner, J. A., Morgan, G. A., & Leech, N. L. (2017). *Research Methods in Applied Settings: An Integrated Approach to Design and Analysis* (3rd ed.). Routledge. <https://doi.org/10.4324/9781315723082>
- Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation. *Contemporary Educational Technology*, 15(2). <https://doi.org/10.30935/cedtech/13036>
- Iddrisu, H., Iddrisu, S., & Aminu, B. (2025). Gender Differences in the Adoption, Usage, and Perceived Effectiveness of AI Writing Tools. *International Journal of Educational Innovation and Research*. <https://doi.org/10.31949/ijeir.v4i1.11717>

- Jiang, S., McClure, J., Tatar, C., Bickel, F., Rosé, C., & Chao, J. (2024). Towards inclusivity in AI: A comparative study of cognitive engagement between marginalized female students and peers. *British Journal of Educational Technology*, 55, 2557–2573. <https://doi.org/10.1111/bjet.13467>
- Koć-Januchta, M. M., Schönborn, K. J., Roehrig, C., Chaudhri, V. K., Tibell, L. A. E., & Heller, H. C. (2022). “Connecting concepts helps put main ideas together”: Cognitive load and usability in learning biology with an AI-enriched textbook. *International Journal of Educational Technology in Higher Education*, 19(1), 1–22. <https://doi.org/10.1186/s41239-021-00317-3>
- Lin, H. (2022). Influences of Artificial Intelligence in Education on Teaching Effectiveness: The Mediating Effect of Teachers' Perceptions of Educational Technology. *International Journal of Emerging Technologies in Learning*, 17, 144–156.
- Lu, J., Zheng, R., Gong, Z., & Xu, H. (2024). Supporting Teachers' Professional Development With Generative AI: The Effects on Higher Order Thinking and Self-Efficacy. *IEEE Transactions on Learning Technologies*, 17, 1279–1289. <https://doi.org/10.1109/TLT.2024.3369690>
- Mena-Guacas, A. F., Urueña Rodríguez, J. A., Santana Trujillo, D. M., Gómez-Galán, J., & López-Meneses, E. (2023). Collaborative learning and skill development for educational growth of artificial intelligence: A systematic review. *Contemporary Educational Technology*, 15(3). <https://doi.org/10.30935/cedtech/13123>
- Malik, A., Pratiwi, Y., Andajani, K., Numertayasa, I., Suharti, S., Darwis, A., & M. (2023). Exploring Artificial Intelligence in Academic Essay: Higher Education Student's Perspective. *International Journal of Educational Research Open*. <https://doi.org/10.1016/j.ijedro.2023.100296>
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teachers' knowledge. *Teachers College Record*, 108(6), 1017–1054
- Naqvi, A. (2020). *Artificial Intelligence for Audit, Forensic Accounting, and Valuation*. Wiley Online Library. <https://doi.org/10.1002/9781119601906>
- Nasser, M. (2024). Personalized Learning through AI: Enhancing Student Engagement and Teacher Effectiveness. *International Journal of Teaching, Learning and Education*. <https://doi.org/10.22161/ijtle.3.6.4>
- Nazaretsky, T., Ariely, M., Cukurova, M., & Alexandron, G. (2022). Teachers' trust in AI-powered educational technology and a professional development program to improve it. *British Journal of Educational Technology*, 53(4). <https://doi.org/10.1111/bjet.13232>
- Nyaaba, M., Kyeremeh, P., Majialuwe, E., Owusu-Fordjour, C., Asebiga, E., & A-Ingkong, B. (2024). Generative AI in Academic Research: A Descriptive Study on Awareness, Gender Usage, and Views among Pre-Service Teachers. *Journal of AI*.
- Ofosu-Ampong, K. (2023). Gender Differences in Perception of Artificial Intelligence-Based Tools. *Journal of Digital Art & Humanities*. [https://doi.org/10.33847/2712-8149.4.2\\_6](https://doi.org/10.33847/2712-8149.4.2_6).
- Onesi-Ozigagun, O., Ololade, Y., Eyo-Udo, N., & Ogundipe, D. (2024). Revolutionizing Education Through AI: A Comprehensive Review of Enhancing Learning Experiences. *International Journal of Applied Research in Social Sciences*. <https://doi.org/10.51594/ijarss.v6i4.1011>
- Prestoza, M. (2024). Exploring the Efficacy of AI Passion-Driven Pedagogy in Enhancing Student Engagement and Learning Outcomes: A Case Study in Philippines. *Asian Journal of Assessment in Teaching and Learning*. <https://doi.org/10.37134/ajatel.vol14.1.5.2024>
- Seo, K., Tang, J., Roll, I., Fels, S., & Yoon, D. (2021). The impact of artificial intelligence on learner–instructor interaction in online learning. *International Journal of Educational Technology in Higher Education*, 18(1), 1–23. <https://doi.org/10.1186/s41239>
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257–285. [https://doi.org/10.1207/s15516709cog1202\\_4](https://doi.org/10.1207/s15516709cog1202_4)
- Wardat, Y., Tashtoush, M. A., AlAli, R., & Jarrah, A. M. (2023). ChatGPT: A revolutionary tool for teaching and learning mathematics. *Eurasia Journal of Mathematics, Science and Technology Education*, 19(7). <https://doi.org/10.29333/ejmste/13272>
- Wang, X., Li, L., Tan, S., Yang, L., & Lei, J. (2023). Preparing for AI-enhanced education: Conceptualizing and empirically examining teachers' AI readiness. *Computers in Human Behavior*, 146, 107798. <https://doi.org/10.1016/j.chb.2023.107798>
- UNESCO (2023). *Artificial Intelligence in Education*. Retrieved December 10, 2023, from <https://www.unesco.org/en/digital-education/artificial-intelligence>

## Affiliations and Corresponding Information

**Roland S. Leonillo**

University of St. La Salle – Philippines