



INFLUENCE OF AI-ASSISTED PEDAGOGICAL SKILLS AND INSTRUCTIONAL ADAPTABILITY OF PRE-SERVICE TEACHERS' INSTRUCTIONAL PERFORMANCE

Janine L. Lagura ¹, Miguela B. Napiere ²

¹ College of Education, PHINMA Cagayan de Oro College, Cagayan de Oro City, Philippines

² Graduate School. Lourdes College, Inc., Cagayan de Oro City, Philippines

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ABSTRACT

Effective teacher preparation requires both technological competence and the capacity to respond flexibly to classroom demands. Although artificial intelligence is increasingly integrated into education, limited studies have examined how AI-assisted pedagogical skills and instructional adaptability jointly influence the instructional performance of pre-service elementary teachers, particularly in the Philippine context. This study addressed this gap by determining whether AI-assisted pedagogical skills and instructional adaptability significantly predict instructional performance. Anchored in the Technological Pedagogical Content Knowledge framework, the study employed a quantitative descriptive-correlational design. The participants were 145 fourth-year regular Bachelor of Elementary Education students enrolled in Professional Internship during the second semester of Academic Year 2025–2026 at a private institution in Cagayan de Oro City, selected through total enumeration. Data were gathered through a researcher-made self-assessment questionnaire and a performance evaluation rubric. Expert validation, pilot testing, reliability analysis, and confirmatory factor analysis were conducted to establish instrument quality. Data were analyzed using descriptive statistics and multiple regression analysis. Findings showed high AI-assisted pedagogical skills, very high instructional adaptability, and high instructional performance among the participants. The regression results further showed that the overall model significantly predicted instructional performance. However, only instructional adaptability emerged as a significant predictor, indicating that it remains the stronger and more immediate determinant of instructional performance, while AI-assisted pedagogical skills may serve more as a supportive resource in instructional preparation and assessment. Based on these findings, teacher

education institutions are encouraged to strengthen adaptive teaching experiences and provide structured opportunities for pre-service teachers to apply AI-assisted pedagogical skills meaningfully in authentic classroom contexts.

Keywords: *AI-assisted pedagogical skills, instructional adaptability, internship performance, pre-service teachers, instructional performance, teacher education*

INTRODUCTION

Education becomes meaningful when teachers are competent and classroom instruction is effective. For this reason, developing teacher competence remains central to improving learner outcomes and preparing future educators for the demands of the profession (UNESCO, 2023; Darling-Hammond et al., 2020). In the Philippines, this issue has become increasingly urgent as the education system continues to face serious learning challenges. The Second Congressional Commission on Education reported a sharp decline in learners' mastery of foundational skills, with proficiency decreasing from 30.5% in Grade 3 to only 0.4% in Grade 12 (EDCOM 2, 2025). This trend raises serious concerns about instructional quality and about whether essential skills are being sustained and strengthened as learners move across grade levels. These conditions highlight the pressing need to examine factors that may improve the quality of teaching, particularly in the preparation of future teachers.

Global literature further reinforces this concern. The World Bank (2023) defines learning poverty as the inability of learners to read and understand a simple text, a condition that restricts the development of higher-order thinking skills. In the Philippine setting, results from international large-scale assessments such as the Programme for International Student Assessment continue to reveal persistent gaps in learner achievement, particularly in Mathematics and Science (OECD, 2023). These findings suggest that improving educational outcomes requires strong instructional practices, including effective pedagogy, responsive teaching, and meaningful assessment (UNESCO, 2023). In this regard, teachers play a decisive role in addressing the ongoing learning crisis.

Because of these challenges, strengthening teacher education has become a timely priority. Teachers' competence and preparedness strongly shape instructional quality and learners' academic performance (Darling-Hammond et al., 2021; UNESCO, 2023). For pre-service teachers, the teaching internship is a critical period of professional formation because it allows them to translate educational theory into actual classroom practice (Flores & Gago, 2020). Their instructional performance during internship is often reflected in how they manage classroom environments and implement assessment practices, both of which are key dimensions of effective teaching (König et al., 2021; Lachner et al., 2021). Examining the competencies that contribute to instructional performance is therefore important for improving teacher preparation programs.

Within this context, two competencies appear particularly relevant: AI-assisted pedagogical skills and instructional adaptability. Artificial intelligence has increasingly been recognized as a promising support for teaching and learning because it can assist in lesson preparation, assessment design, and the development of more personalized instruction (Ouyang & Jiao, 2021; Holmes et al., 2022; UNESCO, 2023). At the same time, scholars emphasize that the use of AI in education must remain guided by teachers' professional judgment, ethical responsibility, and pedagogical decision-making (Luckin et al., 2022; Miao & Cukurova, 2024). These perspectives suggest that AI-assisted pedagogical skills may enhance how pre-service teachers plan instruction, develop assessments, and respond to classroom needs.

Instructional adaptability is likewise essential because pre-service teachers work in authentic classroom settings where they must address learner diversity, adjust teaching strategies, and respond to varied classroom demands. Research has shown that adaptive instruction and strong classroom interactions are associated with higher levels of teaching competence (OECD, 2025). This is also consistent with the Philippine Professional Standards for Teachers, which emphasize the integration of ICT resources, effective classroom management, and appropriate assessment practices in classroom instruction (DepEd Teacher Education Council, 2022a, 2022b, 2022c). These standards affirm that effective teaching requires not only subject knowledge, but also flexibility and responsiveness in practice.

Although recent studies recognize the value of both AI-assisted pedagogy and instructional adaptability, these variables are often examined separately. Existing research has discussed instructional performance, classroom management, assessment, AI-assisted pedagogy, and adaptability as distinct areas of inquiry (Oo et al., 2021; Han, 2025). However, limited studies have directly explored the combined influence of AI-assisted pedagogical skills and instructional adaptability on the instructional performance of pre-service teachers, particularly in terms of classroom management and assessment (Shi et al., 2025). This gap is especially evident in the Philippine context, where the integration of emerging technologies in teacher preparation is still developing. Addressing this gap is timely because it responds to current educational demands and to the growing need for innovation in teacher preparation.

Grounded in the Technological Pedagogical Content Knowledge framework of Mishra and Koehler (2006), this study assumes that effective teaching depends on the meaningful integration of technology, pedagogy, and content knowledge. From this perspective, AI-assisted pedagogical skills and instructional adaptability may function as interrelated competencies that shape pre-service teachers' instructional performance in internship settings. Thus, this study examined whether these variables significantly predict the instructional performance of pre-service elementary teachers in the Philippines. By doing so, it seeks to contribute evidence-based insights that may strengthen teacher preparation, improve internship support, and enhance instructional quality in contemporary classrooms.

Research Questions

This study intended to examine the relationship among pre-service teachers' AI-assisted pedagogical skills, instructional adaptability, and instructional performance. Specifically, it sought to answer the following questions:

1. What is the participants' assessment of their AI-assisted pedagogical skills?
2. What is the participants' assessment of their instructional adaptability?
3. What is the level of pre-service teachers' instructional performance?
4. Do the participants' AI-assisted pedagogical skills and instructional adaptability significantly influence their instructional performance?

Hypotheses

This study explored how AI-assisted pedagogical skills, instructional adaptability, classroom management, and assessment influence pre-service teaching instructional performance. Problems 1–3 are descriptive, while null hypotheses for Problem 4 were tested at the 0.05 significance level.

Ho1: AI-assisted pedagogical skills and instructional adaptability collectively do not significantly influence pre-service instructional performance.

Ho2: AI-assisted pedagogical skills do not influence pre-service instructional performance.

Ho3: Instructional adaptability does not influence pre-service instructional performance.

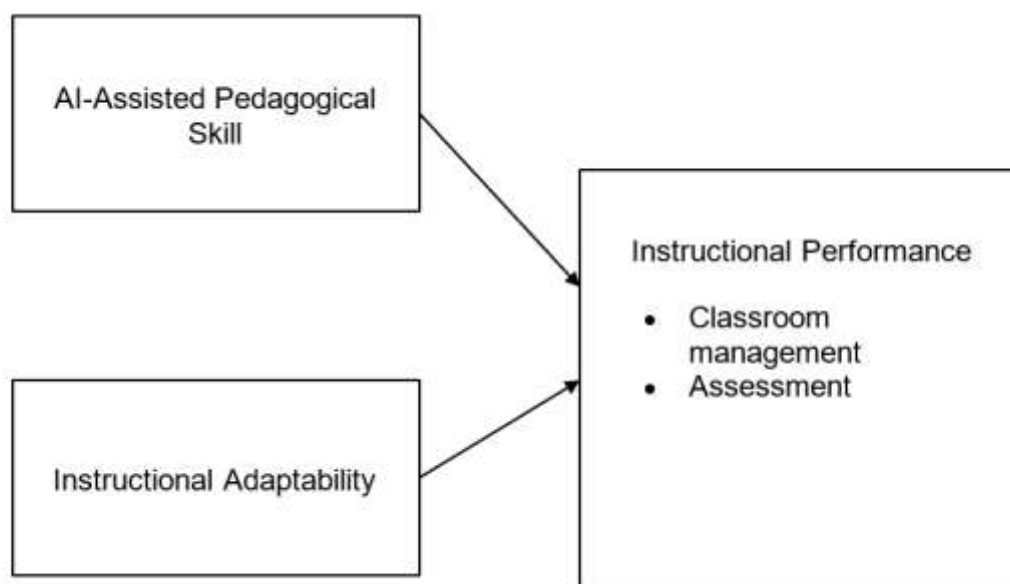


Figure 1. Schematic Presentation of the Study

METHODOLOGY

This study employed a quantitative descriptive-correlational design to determine the influence of AI-assisted pedagogical skills and instructional adaptability on pre-service teachers' instructional performance during internship. The descriptive component was used to describe the participants' self-assessment of AI-assisted pedagogical skills and instructional adaptability, while the correlational component examined the relationship of these variables with instructional performance. This design was appropriate because it allowed the researcher to investigate naturally occurring conditions without manipulating the variables (Creswell & Creswell, 2018; Fraenkel et al., 2019).

The study was conducted in a private institution in Cagayan de Oro City. The participants were 145 fourth-year Bachelor of Elementary Education pre-service teachers enrolled in the professional internship course during the second semester of academic year 2025–2026. Total enumeration sampling was employed because the entire population of eligible pre-service teachers was included in the study.

Data were gathered using researcher-made instruments. The first instrument was a self-assessment questionnaire that measured AI-assisted pedagogical skills and instructional adaptability using a five-point frequency scale: Never (1), Rarely (2), Sometimes (3), Often (4), and Always (5). The second instrument was a performance evaluation rubric completed by cooperating teachers or critique mentors to assess instructional performance in terms of classroom management and assessment using a five-point scale ranging from Needs Improvement (1) to Exemplary (5). The instruments underwent expert review, pilot testing, confirmatory factor analysis, and reliability testing. Pilot testing involved 53 pre-service teachers from Bachelor of Secondary Education programs who were not part of the main study. Cronbach's alpha and McDonald's omega were used to examine internal consistency, while confirmatory factor analysis was used to assess construct validity. After model refinement, four items were retained for AI-assisted pedagogical skills, five items for instructional adaptability, and four items for instructional performance.

For data gathering, ethics clearance and institutional permission were first secured. Consent forms were distributed, and participants were informed of the purpose of the study, the voluntary nature of participation, their right to withdraw at any time, and the confidentiality of their responses. To minimize bias, instructional performance ratings were completed solely by the assigned cooperating teachers. Data were analyzed using frequency, percentage, mean, and standard deviation for the descriptive questions, and multiple regression analysis for the predictive question.

The study was limited to pre-service elementary teachers in one private institution during the second semester of academic year 2025–2026. Since the study relied on self-reported assessments and internship performance ratings, some responses may have been influenced by personal reflection and contextual internship procedures. In addition, the removal of several items during confirmatory factor analysis indicates that the final instrument measured the constructs using a reduced set of indicators.

RESULTS

Research Question 1. What is the participants' assessment of their AI-assisted pedagogical skills?

Table 1 presents the frequency, percentage, and mean distribution of the participants' assessment of their AI-assisted pedagogical skills.

Table 1
Frequency, Percentage, and Mean Distribution of the Participants' Assessment of AI-assisted Pedagogical Skills

Range	Description	Interpretation	F	%
4.51 to 5.00	Always	Very high	70	48.3
3.51 to 4.50	Often	High	67	46.2
2.51 to 3.50	Sometimes	Moderate	8	5.5
1.51 to 2.50	Rarely	Low	0	0.0
1.00 to 1.50	Never	Very low	0	0.0
Total			145	100.0
	Overall Mean			4.30
	Interpretation			High
	Std. Deviation			0.595

No	Indicators	Mean	SD	Description
1	I regularly use AI platforms (ChatGPT, Copilot) to improve my professional knowledge and teaching effectiveness.	4.26	0.734	Often
2	AI helps me organize lesson flow to minimize classroom disruptions	4.18	0.814	Often
3	I can create quizzes, performance tasks, and tests using AI applications.	4.40	0.749	Often
4	I can utilize AI tools to create assessments	4.38	0.657	Often

aligned with learning objectives.

Research Question 2. What is the participants' assessment of their instructional adaptability?

Table 2 presents the percentage and mean distribution of the participants' assessment of their instructional adaptability.

Table 2
Frequency, Percentage, and Mean Distribution of the Participants' Assessment of Instructional Adaptability

Range	Description	Interpretation	F	%
4.51 to 5.00	Always	Very high	97	66.9%
3.51 to 4.50	Often	High	48	33.1%
2.51 to 3.50	Sometimes	Moderate	0	0
1.51 to 2.50	Rarely	Low	0	0
1.00 to 1.50	Never	Very low	0	0
Total			145	100%
	Overall Mean Interpretation			4.63
	Std. Deviation			Very High
				.426

No	Indicators	Mean	SD	Description
1	I design lesson plans that consider the diverse learning needs and prior knowledge of my students.	4.70	0.502	Always
2	I adjust my teaching strategies to match students' prior knowledge and learning abilities.	4.64	0.509	Always
3	I use different instructional methods and scaffolds to ensure all students	4.66	0.519	Always

4	understand key concepts. I incorporate a variety of learning activities and teaching strategies to engage all learners.	4.57	0.587	Always
5	I use ongoing formative assessments to inform instructional decisions and lesson adjustments.	4.70	0.502	Always

Research Question 3. What is the level of pre-service teachers' instructional performance in terms of classroom management and assessment?

Table 3 presents the percentage and mean distribution of the participants' level of pre-service teachers' instructional performance in terms of classroom management and assessment.

Table 3
Frequency, Percentage, and Mean Distribution of the Participants' Level of Pre-Service Teachers' Instructional Performance

Range	Interpretation	F	%
4.51 to 5.00	Exemplary	66	50.8%
3.51 to 4.50	Proficient	55	42.3%
2.51 to 3.50	Developing	9	6.9%
1.51 to 2.50	Beginning	0	0
1.00 to 1.50	Needs Improvement	0	0
Total		145	100%
	Overall Mean		4.39
	Interpretation		High
	Std. Deviation		.508

No	Indicators	SD	Description
	<i>The pre-service teacher...</i>		

1	Creates a safe, inclusive, and motivating classroom environment and maintains high learner engagement at all times.	0.634	Exemplary
2	Provides prompt, constructive, and individualized feedback to learners, while accurately recording and reporting their performance.	0.805	Proficient
3	Uses assessment results to adjust instruction and provide remediation or enrichment.	0.537	Proficient
4	Clearly communicates rules and procedures; routines are well-established. consistently applied and understood by all learners.	0.687	Proficient

Research Question 4. Do the participants' AI-assisted pedagogical skills and instructional adaptability significantly influence their internship performance?

Table 4 presents the multiple regression analysis testing the influence of *AI-assisted pedagogical skills and instructional adaptability* in terms of classroom management and assessment on the participants' *instructional performance*.

Table 4

Multiple Regression Analysis on the Influence of AI-assisted pedagogical skills and Instructional Adaptability on the Pre-service Teachers' Instructional Performance

	Unstandardized Coefficients		Standardized Coefficients	T	p-Value
	B	Std. Error	Beta		
(Constant)	0.214	0.2434		0.879	.381

AI-assisted pedagogical skills	0.046	0.0389	0.051	1.188	.237
Instructional Adaptability	0.908	0.0456	0.854	19.894	<.001
Model Summary					
R = .862	R² = .744	Adjusted R² = .740	F = 206	p <.01	

DISCUSSION

Research Question 1. What is the participants' assessment of their AI-assisted pedagogical skills?

Table 1 presents the frequency, percentage, and mean distribution of the participants' assessment of their AI-assisted pedagogical skills.

The table shows that the participants' AI-assisted pedagogical skills were generally high, as reflected in the overall mean of 4.30 and standard deviation of 0.595, indicating that the respondents rated themselves as competent in using AI-assisted pedagogy to support teaching-related tasks, especially in creating learning assessments like quizzes and other tests.

The frequency and percentage distribution based on the table further support this result. Out of 145 participants, 70 or 48.3% rated themselves in the very high category, while 67 or 46.2% fell under the high category. Only 8 participants, or 5.5%, were in the moderate category, and none of the participants rated themselves as low or very low. This suggests that most of the respondents' self-assessments showed that they are capable of using AI in ways that support their instructional practice.

This finding suggests that participants are no longer merely aware of AI-assisted pedagogy tools but are already using them in practical pedagogical functions such as professional learning and assessment preparation. In this regard, the result supports the claim of Chiu et al. (2025) and Collie et al. (2024) that pre-service teachers increasingly assess AI as a usable and relevant tool in their daily instructional work, especially in creating learning assessments, rather than as an unfamiliar or purely technological tool.

The indicator-level results provide a clearer picture of how AI was used in teaching-related tasks. All four indicators were interpreted as "Often," which suggests that the participants regularly practiced these AI-assisted pedagogical skills.

Among all the indicators, the highest mean was recorded for the statement on creating quizzes, performance tasks, and tests using AI applications, which indicates that

AI was most evident in assessment-related tasks. A similarly high result was found for the use of AI tools in developing assessments aligned with learning objectives. These findings suggest that AI was commonly used in designing and preparing assessment materials, and it helped the pre-service teachers make their teaching tasks easier and more efficient. This result is supported by the findings of Kohnke et al. (2025) and Tran et al. (2025), who suggested that pre-service teachers used generative AI in instructional preparation and assessment-related work as part of their instructional practice.

The statement on regularly using AI platforms such as ChatGPT and Copilot to improve professional knowledge and teaching effectiveness also obtained a high mean, which suggests that AI was not limited to assessment tasks alone. It was also used to support professional learning and improve teaching practice for the participants. This result is also supported by the findings of Kohnke et al. (2025), who suggested that purposive use of generative AI helped pre-service teachers strengthen their pedagogical knowledge and learning assessments for their teaching practice.

On the other hand, the statement on using AI to organize lesson flow and lessen classroom disruptions had the lowest mean among all the indicators, although it was still rated as "Often" by the participants. The result suggests that the participants still rated AI as a useful tool for organizing their lesson flow, managing their classroom activities, and making instruction more efficient (Memarian & Doleck, 2024). This result is also supported by Celik et al. (2022), who suggest that AI can assist pre-service teachers in planning, delivering, and assessing instruction in ways that better address diverse learners' needs. Similarly, the U.S. Department of Education (2023) suggested that AI-assisted pedagogy can support personalized learning and guide instructional decisions, which may contribute to a more organized and responsive classroom environment. UNESCO (2023) also suggested that AI is increasingly used in assessment through testing and monitoring learner progress, helping pre-service teachers adjust their instruction and improve their overall teaching and learning process.

In summary, the findings show that AI-assisted pedagogical skills were most evident in assessment-related tasks like creating tests and quizzes, while also being used for professional learning and lesson planning. Overall, the results indicate that AI had already become an important part of the participants' teaching preparation during the internship, especially in developing learning assessments and supporting their everyday instructional tasks. This result is supported by Kohnke et al. (2025), Tran et al. (2025), and, who argued that pre-service teachers increasingly use AI as a practical pedagogical resource rather than merely as a technical tool.

Research Question 2. What is the participants' assessment of their instructional adaptability?

Table 2 presents the percentage and mean distribution of the participants' assessment of their instructional adaptability.

The table indicates that the participants' instructional adaptability was very high, with an overall mean of 4.63 and a standard deviation of 0.426, indicating that the respondents strongly assessed themselves as capable of adjusting instruction to meet learners' needs. This finding suggests that the participants demonstrate strong preparedness to address learner diversity through flexible differentiated teaching strategies and instructional adjustments guided by assessment results. This result is also supported by Pozas & Letzel (2021), and Hu (2024) suggests that teachers are expected to respond to instructional adaptability in teaching approaches that accommodate learners' diverse abilities, prior knowledge, and learning preferences.

The frequency and percentage distribution further support this result. Out of 145 participants, 97 or 66.9% fell under the very high category, while 48 or 33.1% were in the high category. No participant rated themselves under the moderate, low, or very low categories. This shows that all participants were within the high to very high levels of instructional adaptability, which suggests that adaptability was a strong characteristic among the participants.

Based on the results, two indicators obtained the highest mean scores: "I design lesson plans that consider the diverse learning needs and prior knowledge of my students" and "I use ongoing formative assessments to inform instructional decisions and lesson adjustments," both with a mean of 4.70 and a standard deviation of 0.502. These results suggest that the participants acknowledge the importance of identifying their students' diverse learning needs and use ongoing assessment when making adjustments in instruction. This means that the participants not only prepare lessons based on content requirements but also take into account learners' diverse needs and abilities and use assessment evidence to refine instruction. This result is also supported by van der Steen et al. (2023) and Veugen et al. (2024), who suggest the important role of formative assessment in adaptive teaching, since formative assessment allows teachers to monitor learners' understanding, identify learning gaps, and modify their teaching strategies in response to learner progress.

Meanwhile, the high ratings for adjusting teaching strategies based on students' prior knowledge and learning abilities, with a mean of 4.64 and a standard deviation of 0.0509, and for using varied instructional methods and scaffolds to support understanding, with a mean of 4.66 and a standard deviation of 0.519, suggest that respondents rated their instructional adaptability as a key element of effective teaching.

These results suggest that participants acknowledge the diversity of learners and the need to provide different and developmentally appropriate support, pacing, and instructional strategies to meet their learners' diverse needs. This result is also supported by the view of Tomlinson (2021) and Hu (2024), which suggests the principle of differentiated instruction, which highlights the importance of modifying teaching methods, tasks, and scaffolds according to students' readiness, abilities, and learning needs

Additionally, the high mean for incorporating a variety of learning activities and teaching strategies to engage all learners, with a mean of 4.57 and a standard deviation

of 0.587, suggests that the respondents associate instructional adaptability with promoting inclusive participation in the classroom. This suggests that the participants understand the importance of using varied teaching approaches so that all students remain actively involved in the learning process. This result is supported by the adaptive teaching literature by Pozas and Letzel (2021), which argues that the use of varied instructional strategies helps teachers address diverse learner needs and provide meaningful learning opportunities for all that align with their developmental capabilities.

In summary, the consistently high results across all indicators suggest that the participants highly value responsive and flexible teaching. This reflects the importance of instructional adaptability in effective teaching, as it allows pre-service teachers to adjust their lessons and support according to learners' diverse needs, levels of understanding, and learning progress (Hardy et al., 2022; Hu, 2024). By using adaptive teaching practices, pre-service teachers can provide more suitable support, maintain student engagement, and improve learning outcomes in different classroom tasks and learning assessments (Sortwell et al., 2024).

These findings further suggest that the respondents are developing a learner-centered and flexible approach to instruction, which is especially important in contemporary classrooms where students differ in background, ability, readiness, and learning preferences (Pozas & Letzel, 2021; Sibley et al., 2025). In particular, their strong performance in lesson preparation, differentiated instruction, scaffolding, and formative assessment reflects an important instructional adaptability. Both adaptive teaching and formative assessment have been linked to more responsive classroom practice and better learning outcomes (van der Steen et al., 2023; Sortwell et al., 2024).

Overall, the results indicate that the participants are well prepared to address learner diversity and foster inclusive, responsive, and effective teaching and learning environments.

Research Question 3. What is the level of pre-service teachers' instructional performance in terms of classroom management and assessment?

Table 3 presents the percentage and mean distribution of the participants' level of pre-service teachers' instructional performance in terms of classroom management and assessment.

The table shows that the participants' level of teaching instructional performance was generally proficient, as reflected in the overall mean of 4.39 and a standard deviation of 0.508. This means that, in general, the participants demonstrated a proficient level of their instructional performance during their internships.

As the table indicates, the frequency and percentage distribution further support this result. Out of 145 participants, 66 or 50.8% were classified under the Exemplary level, while 55 or 42.3% fell under the Proficient level. Only 9 participants, or 6.9%, were in the Developing category, and none were classified under Beginning or Needs Improvement.

These results show that most of the participants performed well during their internship, with many already demonstrating exemplary performance and the rest generally functioning at a proficient level.

Overall, the findings suggest that the participants were able to meet the expected standards of their teaching instructional performance. Since most of them fell under the exemplary and proficient categories, the results indicate that they were generally capable of carrying out key teaching responsibilities in actual classroom settings. Since no participant was classified under the beginning or needs improvement categories, the results suggest that the group generally showed a proficient level of preparedness for classroom instructional practice. This finding is also supported by Fitzsimons et al. (2024) and Abraham & Sickel (2025), who argued that the pre-service teachers tend to improve in professional practice during their internship, particularly in areas such as classroom management and assessment.

Based on the indicators, one clear strength of the participants was in creating a safe, inclusive, and motivating classroom environment while maintaining high learner engagement, which was described as "exemplary." This suggests that the participants were particularly strong in establishing a positive classroom atmosphere and encouraging active participation among learners. This is an important aspect of teaching performance because a supportive and engaging classroom environment helps learners participate more meaningfully in class activities. This result is supported by Watson et al. (2023), who argued that pre-service teachers' culturally responsive classroom management in areas such as applying strategies to minimize classroom management issues and managing learner interactions more effectively are crucial. It is also supported by Abraham & Sickel (2025), who argue that preparedness for managing the learning environment is a key part of developing readiness for the teaching profession.

Taken together, the findings show that the participants' internship performance was overall at a level of proficient, with classroom environment and learner engagement emerging as a notable area of strength. At the same time, the results also suggest that assessment-related practices and classroom routines were competently carried out, although these may still benefit from further development and experience. In the context of a teaching internship, this is significant because it shows that the participants were already demonstrating the core skills expected of future teachers in actual classroom situations, especially in their instructional performance. This result is further supported by Mok and Staub (2021), who argued that coaching, mentoring, and supervision during practicum have a positive effect on pre-service teachers' instructional skills, particularly in classroom management and assessment, which are important foundations of effective instructional performance during internships.

Research Question 4. Do the participants' AI-assisted pedagogical skills and instructional adaptability significantly influence their internship performance?

Ho1: AI-assisted pedagogical skills and instructional adaptability collectively do not significantly influence their internship performance.

Ho2: AI-assisted pedagogical skills do not significantly influence their internship performance.

Ho3: Instructional adaptability does not significantly influence their internship performance.

Table 4 presents the multiple regression analysis testing the influence of AI-assisted pedagogical skills and instructional adaptability in terms of classroom management and assessment on the participants' instructional performance.

The table presents the results of the multiple regression analysis on the influence of AI-assisted pedagogical skills and instructional adaptability on the pre-service teachers' instructional performance. The results show that the regression model was statistically significant, as indicated by $F = 206$ and $p < .01$. This means that, when taken together, the two predictor variables significantly predict the instructional performance of the pre-service teachers.

The model produced an R value of $.862$, which indicates a strong relationship between the combined predictors and instructional performance. The R^2 value of $.744$ means that 74.4% of the variance in pre-service teachers' instructional performance was explained by AI-assisted pedagogical skills and instructional adaptability. In other words, these two variables accounted for a large portion of the differences observed in the participants' instructional performance. The Adjusted R^2 value of $.740$ further shows that even after considering the number of predictors included in the model, 74.0% of the variance in instructional performance was still explained by the two variables. Since the difference between ($R^2 .744$) and Adjusted ($R^2 .740$) is very small, this suggests that the model is stable and that the predictors meaningfully contributed to explaining instructional performance. Meanwhile, the remaining 25.6% of the variance may be attributed to other factors not included in the study, such as mentor support, classroom environment, teaching experience during practicum, communication skills, or other personal and contextual factors.

Examining the individual predictors, AI-assisted pedagogical skills did not significantly influence instructional performance, as shown by its p -value of $.237$, which is greater than the $.05$ level of significance. Although its coefficient was positive ($B = 0.046$), the effect was very small and not statistically significant. In contrast, instructional adaptability had a significant positive influence on instructional performance, with $B = 0.908$, $Beta = 0.854$, $t = 19.894$, and $p < .001$. This means that instructional adaptability emerged as the stronger predictor of pre-service teachers' instructional performance. In relation to the hypothesis, $Ho1$ can be rejected because the model as a whole significantly influenced instructional performance. $Ho2$ was not rejected because AI-assisted pedagogical skills did not significantly influence instructional performance when tested individually. $Ho3$ can be rejected because instructional adaptability significantly influenced instructional performance. As for the constant ($B = 0.214$, $p = .381$), this refers to the intercept of the regression model, or the estimated instructional performance when the predictor variables are held at zero. Since it was not significant, it is not usually given substantive interpretation as a predictor.

Overall, the findings suggest that the two variables, when taken together, were useful in explaining pre-service teachers' instructional performance, but instructional adaptability accounted for most of that explanatory power. This means that the participants' ability to adjust instruction, respond to classroom conditions, and make appropriate teaching decisions appeared to matter more to their actual instructional performance than their AI-assisted pedagogical skills alone. The findings show that AI-assisted pedagogical skills and instructional adaptability, when taken together, significantly predicted pre-service teachers' instructional performance.

However, when the two variables were examined individually, instructional adaptability emerged as the stronger and significant predictor, while AI-assisted pedagogical skills did not show a significant direct influence. This suggests that actual instructional performance during the internship depended more on the participants' ability to adjust instruction, respond to classroom situations, and make appropriate teaching decisions than on their AI-related pedagogical skills alone.

The strong influence of instructional adaptability based on the result is supported by recent literature on practicum and teacher development. Shi et al. (2025) suggest that professional practice was significantly associated with practicum outcomes and that its influence became more prominent as pre-service teachers moved through later stages of practicum. Similarly, Moran (2023) argue that teacher education experiences that provide opportunities for both routine teaching and flexible responses help develop adaptive expertise among pre-service teachers. Prilop et al. (2025) also found that targeted expert feedback improved classroom management knowledge, professional vision, and self-efficacy, all of which are closely related to adaptable teaching in real classroom situations. Taken together, these studies support the present finding that instructional performance is strongly shaped by how well pre-service teachers adapt their teaching to classroom realities.

On the other hand, the non-significant direct effect of AI-assisted pedagogical skills suggests that AI-related competence may support teaching but may not automatically translate into stronger instructional performance during an internship. Recent studies show that AI is helpful in areas closely related to teaching preparation. Kohnke et al. (2025) reported that structured microlearning helped pre-service teachers develop the ability to use GenAI tools for differentiated instruction, formative assessment, culturally responsive teaching, and lesson planning. Likewise, Celik et al. (2025) found that GenAI-specific technological and pedagogical knowledge was crucial in producing higher-quality prompts and had an indirect effect on adaptive lesson plans. Han (2025) also found that well-structured AI courses significantly improved overall AI competency and AI teaching practice, although teaching practice remained one of the relatively weaker areas compared with awareness and knowledge. These findings suggest that AI-assisted pedagogical skills are valuable, but their effect on instructional performance may depend on whether they are translated into actual classroom decision-making and teaching practice.

This interpretation is further supported by Guan et al. (2024), who found that pre-service teachers often use AI only when needed and still tend to view it more as a tool than as a dynamic instructional partner. In this sense, AI-assisted pedagogical skills may still function more as a supportive resource for lesson preparation, assessment design, and instructional planning rather than as a direct determinant of classroom performance. This helps explain why AI-assisted pedagogical skills, although useful, did not significantly predict instructional performance in the present study when instructional adaptability was included in the model.

In summary, the findings indicate that instructional adaptability had a stronger and more direct influence on pre-service teachers' instructional performance, while AI-assisted pedagogical skills did not show a significant direct effect when tested individually. Although AI-related skills appear to support lesson planning, assessment development, and professional preparation. What mattered most in actual instructional performance during the internship was the participants' ability to respond flexibly to learners' needs and classroom demands. This highlights the importance of strengthening adaptive teaching skills in teacher education while also giving pre-service teachers more structured opportunities to apply AI in authentic classroom practice.

Conclusions

This study intended to examine the influence of AI-assisted pedagogical skills and instructional adaptability in shaping the instructional performance of pre-service teachers during their practicum. Based on the research findings, it may be inferred that the objectives of this study were attained.

The findings revealed that although pre-service teachers demonstrated a high level of competence in AI-assisted pedagogical skills, these did not significantly translate into instructional performance when treated as an independent predictor. This implies that AI serves more as a support mechanism in lesson preparation and creating learning assessments rather than a direct contributor to effective classroom teaching.

In contrast, instructional adaptability emerged as a significant predictor of participants' instructional performance. This suggests that the ability of the participants to adjust their instruction, respond to learner diversity, and make appropriate pedagogical decisions plays a more essential role in achieving effective teaching performance.

These research findings are supported by the principles of the TPACK framework, which argues that effective teaching goes beyond the mere use of technology. The framework highlights that teaching becomes more meaningful when technology, pedagogy, and content are properly integrated, rather than relying on technology alone. In line with this, the results indicate that AI-assisted pedagogical skills alone were not sufficient to directly enhance instructional performance unless they were meaningfully applied in actual classroom contexts and a balanced integration of pedagogy, technology, and knowledge in teaching.

Overall, these findings imply that instructional adaptability was a key factor in improving the instructional performance of pre-service teachers, while AI-assisted pedagogical skills served as an important but indirect support in the teaching-learning process.

Recommendations

Based on the findings of the study, the following recommendations are presented:

1. Teacher education institutions may further improve their programs by focusing on developing pre-service teachers' instructional adaptability through incorporating more practicum-based, reflective, and scenario-based learning experiences that may give them opportunities to respond to authentic classroom situations.
2. Curriculum developers and program designers may integrate more structured opportunities for pre-service teachers to use AI tools like ChatGPT in authentic teaching situations, such as in designing classroom assessments. This may help bridge the gap between their use of AI during preparation and their actual performance in the classroom.
3. Pre-service teachers may strengthen their teaching skills by adjusting their teaching strategies. They may do this by regularly reflecting on their teaching approach and using simple assessments such as formative or other learning checks to see how their students are progressing during the teaching-learning process, and they may also try to use different teaching approaches that suit their learners' needs and unique learning styles.
4. Cooperating teachers and mentors may give guided support and feedback that focuses on helping pre-service teachers adjust their teaching strategies. This may help them turn what they know about teaching, along with their use of AI tools, to enhance their effective classroom practices.
5. This study may serve as a reference for future researchers who plan to further examine the influence of AI-assisted pedagogical skills and instructional adaptability on the instructional performance of pre-service teachers. It may also guide them in exploring related areas of the teaching and learning process. Future researchers may look into other factors such as teaching self-confidence, mentor support, or the classroom environment to better understand instructional performance.

Compliance with Ethical Standards

This study was conducted in full compliance with ethical standards for research involving human participants. Prior to data gathering, ethics clearance was secured from the Lourdes College Research Ethics Committee, and formal permission was obtained from the concerned institutional authorities. The study was guided by the Belmont

Principles of respect for persons, beneficence, and justice. In observance of respect for persons, informed consent was obtained from all participants after the purpose, procedures, and voluntary nature of the study were clearly explained.

The participants were informed that they had the freedom to withdraw from the study at any time without any penalty or consequence. In line with beneficence, the well-being of the participants was safeguarded throughout the research process, and all collected data were used solely for academic and research purposes. In observance of justice, only the appropriate participants were included based on the objectives of the study, and fair treatment was ensured throughout the conduct of the research. Anonymity and confidentiality were strictly maintained through the use of identification codes, and no personally identifiable information was included in the analysis and reporting of the findings.

The study also complied with the provisions of the Data Privacy Act of 2012 to ensure the lawful, secure, and confidential handling, storage, and disposal of research data. No conflict of interest existed in the conduct of the study. Plagiarism was strictly avoided, all sources were properly cited, and the interpretation of the findings was carried out objectively and without bias. Artificial intelligence was used only as a language support tool in refining the manuscript, while all interpretations, analyses, and final decisions remained the sole responsibility of the researcher.

REFERENCES

- Abraham, J., & Sickel, A. J. (2025). Testing the associations among pre-service teachers' sense of preparation, readiness to engage in the profession, and self-efficacy for teaching: Validation of a causal framework. *Education Sciences*, 15(9), Article 1215. <https://doi.org/10.3390/educsci15091215>
- Bach, K. M., Hofer, S. I., & Bichler, S. (2025). Adaptive learning, instruction, and teaching in schools: Unraveling context, sources, implementation, and goals in a systematic review. *Learning and Individual Differences*, 124, 102781. <https://doi.org/10.1016/j.lindif.2025.102781>
- Cai, Z., Zhu, J., & Tian, S. (2022). Preservice teachers' teaching internship affects professional identity: Self-efficacy and learning engagement as mediators. *Frontiers in Psychology*, 13, 1070763. <https://doi.org/10.3389/fpsyg.2022.1070763>
- 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>
- Chiu, T. K. F., Ahmad, Z., & Çoban, M. (2024). Development and validation of teacher artificial intelligence (AI) competence self-efficacy (TAICS) scale. *Education and Information Technologies*, 30(5), 6667–6685. <https://doi.org/10.1007/s10639-024-13094-z>
- Collie, R. J., Granziera, H., Martin, A. J., Morris, D. B., Calvo, R. A., & Gasevic, D. (2024). Teachers' generative AI self-efficacy, valuing, and integration at work: Examining job resources and demands. *Computers and Education: Artificial Intelligence*, 7, 100333. <https://doi.org/10.1016/j.caeai.2024.100333>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

- Darling-Hammond, L., & Hyler, M. E. (2020). Preparing educators for the time of COVID ... and beyond. *European Journal of Teacher Education*, 43(4), 457–465.
<https://doi.org/10.1080/02619768.2020.1816961>
- Department of Education. (2023). General Shaping Paper 2023. <https://www.deped.gov.ph/matatag-curriculum/general-shaping-paper-2023/>
- Department of Education–Teacher Education Council. (2022a). Implementation of the RPMS-PPST for School Year 2021–2022 (DM No. 004, s. 2022). Department of Education. https://www.deped.gov.ph/wpcontent/uploads/2022/02/DM_s2022_004.pdf
- Fitzsimons, S., Sexton, P. J., Lehane, P., Donlon, E., McDonald, E., Karakolidis, A., & McKeever, C. (2024). Understanding pre-service teachers' improvement in professional practice: A quantitative perspective. *Irish Educational Studies*. Advance online publication. <https://doi.org/10.1080/03323315.2024.2330883>
- Flores, M. A., & Gago, M. (2020). Teacher education in times of COVID-19 pandemic in Portugal: National, institutional and pedagogical responses. *Journal of Education for Teaching*, 46(4), 507–516. <https://doi.org/10.1080/02607476.2020.1799709>
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.
- Guan, L., Zhang, Y. E., & Gu, M. Y. M. (2025). Pre-service teachers' preparedness for AI-integrated education: An investigation from perceptions, capabilities, and teachers' identity changes. *Computers and Education: Artificial Intelligence*, 8, 100341. <https://doi.org/10.1016/j.caeai.2024.10034>
- Han, X. (2025). Improving pre-service teachers' AI competencies: a quasi-experimental study. *Frontiers in Psychology*, 16, 1642465. <https://doi.org/10.3389/fpsyg.2025.1642465>
- Hardy, I., Meschede, N., & Mannel, S. (2022). Measuring adaptive teaching in classroom discourse: Effects on student learning in elementary science education. *Frontiers in Education*, 7. <https://doi.org/10.3389/educ.2022.1041316>
- Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications for teaching and learning* (2nd ed.). Center for Curriculum Redesign.
- Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications for teaching and learning*. *Computers and Education: Artificial Intelligence*.
- Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education. *European Journal of Education*, 57(4), 542–570. <https://doi.org/10.1111/ejed.12533>
- Huling, H. M., & Crawford, K. (2025). Smart tools, smarter teachers. In *Advances in computational intelligence and robotics book series* (pp. 187–216). <https://doi.org/10.4018/979-8-3373-1122-7.ch007>
- Hu, L. (2024). Utilization of differentiated instruction in K-12 classrooms: a systematic literature review (2000–2022). *Asia Pacific Education Review*, 25(2), 507–525. <https://doi.org/10.1007/s12564-024-09931-y>
- Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? *Journal of Education*, 193(3), 13–19. <https://doi.org/10.1177/002205741319300303>
- Kohnke, L., Zou, D., & Xie, H. (2025). Microlearning and generative AI for pre-service teacher education: A qualitative case study. *Education and Information Technologies*, 30, 21221–21248. <https://doi.org/10.1007/s10639-025-13606-5>
- König, J., Krepf, M., Bremerich-Vos, A., & Buchholtz, C. (2021). Meeting cognitive demands of lesson planning: Introducing the CODE-PLAN model to describe and analyze teachers' planning competence. *The Teacher Educator*, 56(4), 466–487. <https://doi.org/10.1080/08878730.2021.1938324>
- Lachner, A., Fabian, A., Franke, U., Preiß, J., Jacob, L., Führer, C., Küchler, U., Paravicini, W., Randler, C., & Thomas, P. (2021). Fostering pre-service teachers' technological

- pedagogical content knowledge (TPACK): A quasi-experimental field study. *Computers & Education*, 174, Article 104304. <https://doi.org/10.1016/j.compedu.2021.104304>
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2022). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
- Memarian, B., & Doleck, T. (2023). A review of assessment for learning with artificial intelligence. *Computers in Human Behavior Artificial Humans*, 2(1), 100040. <https://doi.org/10.1016/j.chbah.2023.100040>
- Miao, F., & Cukurova, M. (2024). AI competency framework for teachers. UNESCO. <https://doi.org/10.54675/ZJTE2084>
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Mishra, P., et al. (2025). Mapping the emerging research landscape on applications of ChatGPT in language teacher education: A systematic narrative literature review. *Discover Artificial Intelligence*, 5, 349. <https://doi.org/10.1007/s44163-025-00631-z>
- Mishra, P., Warr, M., & Islam, R. (2023). TPACK in the age of ChatGPT and Generative AI. *Journal of Digital Learning in Teacher Education*, 39(4), 235–251. <https://doi.org/10.1080/21532974.2023.2247480>
- Mok, S. Y., & Staub, F. C. (2021). Does coaching, mentoring, and supervision matter for pre-service teachers' planning skills and clarity of instruction? A meta-analysis of (quasi-)experimental studies. *Teaching and Teacher Education*, 107, 103484. <https://doi.org/10.1016/j.tate.2021.103484>
- Moran, R. M. R., Robertson, L., Tai, C., Ward, N. A., & Price, J. (2023). Developing pre-service teachers' adaptive expertise through STEM-CT integration in professional development and residency placements. *Frontiers in Education*, 8, Article 1267459. <https://doi.org/10.3389/educ.2023.1267459>
- Oo, C. Z., Alonzo, D., & Davison, C. (2021b). Pre-service teachers' decision-making and classroom assessment practices. *Frontiers in Education*, 6. <https://doi.org/10.3389/educ.2021.628100>
- Organisation for Economic Co-operation and Development. (2023). *OECD digital education outlook 2023*. OECD Publishing. <https://doi.org/10.1787/c74f03de-en>
- Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence*, 2, 100020. <https://doi.org/10.1016/j.caeai.2021.100020>
- Pelila, M., et al. (2022). Factors influencing technology integration in Philippine classrooms: Teacher attitudes, experience, and access to training. *Journal of Educational Technology Research*, 15(1), 34–49. <https://doi.org/10.1080/15393101.2022.2088888>
- Pelila, J. R. O., Bag-Ongan, Q. F. L., Talania, J. L. P., & Wakat, G. S. (2022). Factors and barriers influencing technology integration in the classroom. *Journal of Language Education and Educational Technology (JLEET)*, 7(1), 1. <https://doi.org/10.33772/jleet.v7i1.18704>
- Pozas, M., Trujillo, C. J. G., & Letzel, V. (2021). A change of perspective – Exploring Mexican primary and secondary school students' perceptions of their teachers differentiated instructional practice. *Journal of Research in Special Educational Needs*, 21(3), 222–232. <https://doi.org/10.1111/1471-3802.12514>
- Prilop, C. N., Rotsaert, T., & Vanderlinde, R. (2025). Fostering pre-service teachers' classroom management knowledge, self-efficacy, and professional vision: The effect of different expert feedback and pre-service teachers' feedback perceptions during online video analysis. *Teaching and Teacher Education*, 157, 104949. <https://doi.org/10.1016/j.tate.2025.104949>

- Pozas, M., & Letzel, V. (2021). "Do you think you have what it takes?" – Exploring predictors of preservice teachers' prospective ICT use for inclusive education. *Computers & Education*, 173, 104273. <https://doi.org/10.1016/j.compedu.2021.104273>
- Second Congressional Commission on Education (EDCOM 2). (2024). *Miseducation: The failed system of Philippine education (Year 1 report)*. Republic of the Philippines. <https://edcom2.gov.ph/reports/year-1>
- Second Congressional Commission on Education (EDCOM 2). (2025). *Fixing the foundations: A matter of national survival (Year 2 report)*. Republic of the Philippines. <https://edcom2.gov.ph/reports/year-2>
- Second Congressional Commission on Education (EDCOM 2). (2026). *The turning point: A decade of necessary reforms, 2026–2035 (Final report)*. Republic of the Philippines. <https://edcom2.gov.ph/reports/final-reportexplained/>
- Shi, W., Barthakur, A., Kovanović, V., Stephenson, H., Siemens, G., & Han, X. (2025). Examining practicums within initial teacher education programs: Understanding the dimensions of professional development of pre-service teachers. *Studies in Educational Evaluation*, 85, 101461. <https://doi.org/10.1016/j.stueduc.2025.101461>
- Sibley, L., Fabian, A., Plicht, C., Pagano, L., Ehrhardt, N., Wellert, L., Bohl, T., & Lachner, A. (2025). Adaptive teaching with technology enhances lasting learning. *Learning and Instruction*, 99, 102141. <https://doi.org/10.1016/j.learninstruc.2025.102141>
- Sibley, L., Lachner, A., & Bohl, T. (2025). Technology-enhanced adaptive teaching and student learning outcomes. *Learning and Instruction*.
- Sortwell, A., Trimble, K., Ferraz, R., Geelan, D. R., Hine, G., Ramirez-Campillo, R., Carter-Thuiller, B., Gkintoni, E., & Xuan, Q. (2024). A Systematic Review of Meta-Analyses on the Impact of Formative Assessment on K-12 Students' Learning: Toward Sustainable Quality Education. *Sustainability*, 16(17), 7826. <https://doi.org/10.3390/su16177826>
- Tan, S., et al. (2024). Artificial intelligence and the TPACK framework: A systematic review of technology-integrated pedagogy.
- Tan, X., Cheng, G., & Ling, M. H. (2024). Artificial intelligence in teaching and teacher professional development: A systematic review. *Computers and Education Artificial Intelligence*, 8, 100355. <https://doi.org/10.1016/j.caeai.2024.100355>
- Tran, P. T. H., Lin, P.-Y., & Jong, M. S.-Y. (2025). A process mining study of AI mindset and tool-only training. *Journal of Digital Learning in Teacher Education*. Advance online publication. <https://doi.org/10.1080/21532974.2025.2583516>
- Tomlinson, C. A. (2021). *The differentiated classroom: Responding to the needs of all learners (2nd ed.)*. ASCD.
- Unesco, G. R. (2023). 2023 GEM Report Summary: Technology in education: A tool on whose terms? <https://doi.org/10.54676/habj1624>
- UNESCO. (2025, October 15). Artificial intelligence in education. <https://www.unesco.org/en/digital-education/artificial-intelligence>
- Van Der Steen, J., Van Schilt-Mol, T., Van Der Vleuten, C., & Brinke, D. J. (2022). Supporting teachers in improving formative decision-making: Design Principles for Formative Assessment plans. *Frontiers in Education*, 7. <https://doi.org/10.3389/feduc.2022.925352>
- van der Steen, J., van Schilt-Mol, T., van der Vleuten, C., & Joosten-ten Brinke, D. (2023). Designing formative assessment that improves teaching and learning: What can be learned from the design stories of experienced teachers. *Journal of Formative Design in Learning*, 7, 182–194. <https://doi.org/10.1007/s41686-023-00080>
- Veugen, M. J., Gulikers, J. T. M., & den Brok, P. (2024). Secondary school teachers' use of formative assessment practice to create co-regulated learning. *Journal of Formative Design in Learning*, 8, 15–32. <https://doi.org/10.1007/s41686-024-00089-9>
- Watson, C., Teele, M., Raymond, B., Cole, S., & Harvey, M. (2023). Student and faculty perceptions of effectiveness of online teaching methods in nursing education: A mixed-

- method study. *Nurse Education Today*, 120, 105609.
<https://doi.org/10.1016/j.nedt.2022.105609>
- World Bank. (2023, March 14). The state of learning poverty: 2023 update.
<https://thedocs.worldbank.org/en/doc/34035a49acb5700ce8b118aeda81a5cb-0510022023/the-state-of-learning-poverty-february-2023-update>
- Xu, Y. (2024). AI-TPACK: Integrating artificial intelligence into teacher knowledge frameworks. *Journal of Educational Technology Research*, 12(2), 45–62.
- Xu, Z. (2024). AI in education: Enhancing learning experiences and student outcomes. *Applied and Computational Engineering*, 51(1), 104–111. <https://doi.org/10.54254/2755-2721/51/20241187>
- Yan, L., Sha, L., Zhao, L., Li, Y., Martinez-Maldonado, R., Chen, G., Li, X., Jin, Y., & Gašević, D. (2023). Practical and ethical challenges of large language models in education: A systematic scoping review. *British Journal of Educational Technology*, 55(1), 90–112.
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Corresponding author: jllagura.coc@phinmaed.com