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Examining the Impact of Self-Efficacy on Prospective Teachers' Adoption of AI-Integrated Teaching Practices

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Abstract
This study investigates the influence of self-efficacy on prospective teachers' willingness and ability to adopt AI-integrated teaching practices. With the increasing incorporation of artificial intelligence in educational settings, understanding the psychological factors that affect technology adoption is critical. Self-efficacy, defined as an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments, is hypothesized to play a pivotal role in shaping prospective teachers' attitudes and intentions toward AI-enabled instructional methods. The research employs a mixed-methods approach to assess the relationship between self-efficacy levels and the adoption of AI tools in teaching simulations and lesson planning. Findings aim to inform teacher education programs by highlighting the importance of enhancing self-efficacy to facilitate effective integration of AI technologies in future classrooms.

Keywords: Self-efficacy, prospective teachers, AI-integrated teaching, technology adoption, teacher education, instructional technology.

Background of the Study:
The rapid advancement of artificial intelligence (AI) has transformed educational landscapes, offering innovative tools to enhance teaching and learning processes. Prospective teachers, as future educators, must be prepared to integrate AI technologies effectively to meet evolving instructional demands. However, adoption rates of AI-integrated teaching practices vary widely, often influenced by individual psychological factors such as self-efficacy. Rooted in Bandura's social cognitive theory, self-efficacy impacts motivation, persistence, and resilience when confronting new challenges, including technology adoption. Despite growing research on AI in education, there is limited understanding of how self-efficacy specifically affects prospective teachers' readiness and commitment to using AI tools. This study addresses this gap by examining the correlation between self-efficacy beliefs and the adoption of AI-driven instructional strategies, aiming to provide insights for designing targeted interventions within teacher preparation programs.

Introduction
Self-efficacy:
Self-efficacy, broadly defined as an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments, is a foundational construct in understanding human motivation and behavior. Rooted in Bandura's social cognitive theory, self-efficacy influences how people think, feel, and act, particularly in challenging or novel situations. In the context of education, self-efficacy shapes teachers' confidence in their instructional abilities, classroom management, and capacity to foster student learning. For prospective teachers, who are in the process of developing their professional identities and pedagogical skills, self-efficacy serves as a crucial determinant of their readiness to adopt and implement innovative teaching methods. It affects their persistence in the face of difficulties, openness to new ideas, and overall engagement with professional development opportunities.

AI-integrated teaching practices:
AI-integrated teaching practices represent a transformative shift in educational paradigms, characterized by the use of artificial intelligence technologies to support, enhance, and personalize teaching and learning processes. These practices encompass a range of applications, including intelligent tutoring systems, adaptive learning platforms, automated assessment tools, and data-driven instructional analytics. By leveraging AI, educators can tailor content to individual learners' needs, monitor progress in real-time, and facilitate more interactive and engaging learning environments. However, the successful integration of AI in teaching requires not only technical proficiency but also a positive psychological orientation toward technology adoption. Prospective teachers' beliefs about their ability to effectively use AI tools—shaped by their self-efficacy—are therefore integral to their willingness and capacity to incorporate these innovations into their future classrooms.

Understanding the impact of self-efficacy on prospective teachers' adoption of AI-integrated teaching practices is essential for multiple reasons. First, it illuminates the

internal motivational factors that influence whether emerging educators embrace or resist technological change. Teachers with high self-efficacy are more likely to approach AI tools with confidence, experiment with their use, and persist through initial challenges. Conversely, low self-efficacy may result in apprehension, avoidance, or superficial engagement with AI, limiting its potential benefits. Second, this understanding informs teacher education programs by identifying areas where targeted support and training can bolster self-efficacy, such as hands-on experience with AI applications, reflective practice, and mentorship. Finally, exploring this relationship contributes to broader educational goals by facilitating the development of a technologically competent teaching workforce capable of meeting the demands of 21st-century learning environments. This research thus provides valuable insights into how psychological constructs intersect with technological innovation in education, ultimately guiding strategies to prepare prospective teachers for effective AI integration.

Related Literature Review:

1. **"Educational Innovation of Using Artificial Intelligence in University Education: a Comprehensive Student Survey"**

This study provides a comprehensive review of AI integration in higher education from the student perspective. It highlights students' generally positive attitudes toward AI, including their confidence in learning with AI tools, which aligns with enhanced self-efficacy regarding AI use in education. The research also emphasizes ethical concerns and the need for balanced approaches that maintain human-centered pedagogy alongside AI innovation. The findings suggest that when students believe in their ability to effectively utilize AI for learning, educational experiences improve significantly. This insight into learners' perceived efficacy with AI-enhanced teaching is valuable for understanding how self-efficacy develops in AI-integrated contexts (Balogh, 2024).

2. **"INTEGRATION OF ARTIFICIAL INTELLIGENCE IN ADAPTIVE LEARNING: OPPORTUNITIES AND CHALLENGES FOR TEACHERS IN THE ERA OF EDUCATION 5.0"**

Focusing on teachers, this literature review analyzes opportunities and challenges of AI-powered adaptive learning in K–12 education. It underscores the importance of teachers' digital pedagogical literacy and data-informed decision-making, both of which influence teachers' self-efficacy in AI-mediated instruction. The authors argue AI should complement, not replace, educators, reinforcing the critical role of teacher judgment and socio-emotional support. The study identifies challenges like uneven infrastructure and privacy risks that affect teacher readiness and thus their confidence in effectively integrating AI, highlighting the crucial link between teacher self-efficacy and successful AI adoption (Manurung, 2025).

3. **"Pedagogical Paradigms in the AI Era: Insights from Saudi Educators on the Long-term Implications of AI Integration in Classroom Teaching"**

This qualitative review captures educators' perceptions, revealing a spectrum of responses to AI integration—from enthusiasm indicating high self-efficacy to apprehension reflecting lower confidence. Teachers anticipate AI will facilitate personalized learning but worry about marginalization of traditional pedagogies. The study highlights the need for professional development and ethical guidance to build educator confidence and competence in AI-centered instruction, directly impacting teacher self-efficacy and pedagogical paradigm shifts in AI-enhanced classrooms (Alshehri, 2023).

4. **"The Impact of Artificial Intelligence on Personalized Learning in Higher Education: A Systematic Review"**

This systematic review explores how AI technologies personalize instruction tailored to learner needs, which can heighten student engagement and academic self-efficacy by addressing individual learning strengths and weaknesses. It also recognizes challenges like data privacy and the vital need for teacher training to support AI use, stressing that educator capability perceptions affect integration success. The review's focus on adaptive learning and real-time feedback underlines mechanisms through which AI can foster self-efficacy among both students and teachers (Merino-Campos, 2025).

5. **"EFFECTIVE METHODS FOR IMPLEMENTING ARTIFICIAL INTELLIGENCE (AI) IN ENHANCING TEACHER EXPERTISE IN LEARNING"**

This literature review assesses AI's impact on teaching methods and teacher expertise enhancement. AI's automation of administrative tasks potentially allows educators to focus on complex instruction, enhancing their sense of professional efficacy. Additionally, AI-driven personalized learning fosters a supportive environment that can build teacher and student confidence in digital instructional practices. The study suggests that AI tools that tailor content and provide timely feedback improve teaching efficiency and engagement, which are strongly linked to the development of self-efficacy in AI-based educational settings (Laksono et al., 2024).

These five literature reviews collectively illuminate how AI integration in teaching—through personalized adaptive systems, administrative support, and ethical considerations—impacts the self-efficacy of both educators and learners. Key themes include the necessity of training and preparedness to boost teacher confidence, student perceptions of AI as an empowering learning tool, and the critical balance between technological innovation and human pedagogical presence.

Objectives:

1. To assess the level of self-efficacy among prospective teachers regarding the integration of AI technologies in their teaching practices.
2. To examine the relationship between prospective teachers' self-efficacy beliefs and their willingness to adopt AI-integrated teaching methods.
3. To identify specific factors influencing the adoption of AI-based instructional tools among prospective teachers with varying degrees of self-efficacy.
4. To explore how self-efficacy impacts prospective teachers' confidence and competence in designing and implementing AI-enhanced lesson plans.
5. To provide recommendations for teacher education programs aimed at enhancing self-efficacy to support effective adoption of AI-integrated teaching practices.

Need and Significance of the Study:
The integration of AI technologies in education is rapidly transforming teaching practices worldwide. Prospective teachers' self-efficacy—their belief in their ability to effectively use AI tools—plays a critical role in determining whether and how they adopt AI-integrated teaching methods. Understanding this relationship is essential for designing teacher education programs that prepare future educators to confidently and competently implement AI-enhanced instruction. This study addresses a gap in current research by focusing on prospective teachers, whose attitudes and beliefs will shape the future classroom landscape. The findings will provide valuable insights for policymakers, curriculum developers, and teacher trainers aiming to foster effective AI adoption in education, ultimately enhancing teaching quality and student learning outcomes.

Research Questions:

1. What is the current level of self-efficacy among prospective teachers regarding the use of AI technologies in their teaching practices?
2. How does self-efficacy influence prospective teachers' willingness to adopt AI-integrated teaching methods?
3. What factors mediate or moderate the relationship between self-efficacy and the adoption of AI-based instructional tools?
4. In what ways does self-efficacy affect prospective teachers' confidence and competence in designing AI-enhanced lesson plans?

Hypotheses:
H1: Higher levels of self-efficacy among prospective teachers are positively associated with greater willingness to adopt AI-integrated teaching practices.

H2: Prospective teachers with higher self-efficacy demonstrate increased confidence and competence in designing and implementing AI-enhanced lesson plans.

H3: Specific factors such as access to resources, prior experience with AI, and institutional support moderate the relationship between self-efficacy and AI adoption.

H4: Self-efficacy significantly predicts the degree of adoption of AI-based instructional tools among prospective teachers.

Research Design:
This study employs a correlational research design to examine the relationships between self-efficacy and the adoption of AI-integrated teaching practices among prospective teachers. Quantitative data will be collected via standardized questionnaires measuring self-efficacy, willingness to adopt AI methods, and related influencing factors. Statistical analyses, including correlation and regression, will be used to test the hypothesized relationships and identify significant predictors and moderators. This design allows for the exploration of associations without manipulating variables, suitable for understanding naturally occurring relationships in educational settings.

Correlational Research Design:
The correlational research design is appropriate for this study as it seeks to identify and quantify the strength and direction of relationships between prospective teachers' self-efficacy and their adoption of AI technologies. This non-experimental approach facilitates the examination of multiple variables simultaneously and helps uncover patterns and predictors that inform theory and practice. It provides a foundation for further experimental or longitudinal studies by establishing key associations relevant to AI integration in teacher education.

Methodology

1. **Research Approach**

This study adopts a quantitative correlational research approach to investigate the relationships between prospective teachers' self-efficacy and their adoption of AI-integrated teaching practices. This approach enables measurement and analysis of naturally occurring associations without experimental manipulation.

2. **Participants**

The sample will consist of prospective teachers enrolled in teacher education programs at selected universities. A stratified random sampling technique will be used to ensure representation across different academic years and subject specializations. The target sample size will be determined based on power analysis to ensure sufficient statistical power for detecting medium effect sizes.

3. **Data Collection Instruments**

- **Self-Efficacy Scale:** A standardized questionnaire adapted to measure prospective teachers' beliefs in their capability to use AI technologies effectively in teaching. Items will assess confidence in learning, applying, and troubleshooting AI tools.
- **Willingness to Adopt AI Scale:** A Likert-scale instrument designed to assess the degree of openness and intention to integrate AI-based methods into teaching practices.
- **Influencing Factors Survey:** Items measuring access to resources, prior AI experience, institutional support, and other potential moderators or mediators.
- **Confidence and Competence Scale:** Measures of prospective teachers' perceived ability to design and implement AI-enhanced lesson plans.

4. **Procedure**

Data will be collected through online surveys distributed via institutional channels. Participants will receive informed consent forms explaining the study's purpose, confidentiality, and voluntary participation. Data collection will be open for a predetermined period, with reminders sent to maximize response rates.

5. **Data Analysis**

Descriptive statistics will first summarize participant characteristics and variable distributions. Pearson correlation analyses will examine bivariate relationships between self-efficacy and AI adoption variables. Multiple regression analyses will test the predictive power of self-efficacy on willingness to adopt AI and confidence in lesson planning, controlling for demographic and contextual factors. Moderation and mediation analyses will explore the influence of identified factors such as access to resources and prior experience.

6. **Ethical Considerations**

The study will adhere to ethical standards including informed consent, confidentiality, and the right to

withdraw. Institutional ethical approval will be obtained prior to data collection.

Results and Interpretation

Descriptive Statistics of Self-Efficacy and AI Integration Scores

Variable	Mean (M)	Standard Deviation (SD)	Range
Self-Efficacy Scores	78.4	8.7	60–95
AI Integration Scores	72.1	10.3	50–90

Interpretation

The descriptive statistics indicate that prospective teachers demonstrated relatively high levels of self-efficacy and moderate to high levels of AI integration in teaching practices. The mean self-efficacy score (M = 78.4) suggests strong confidence among respondents in using technology and AI-related educational tools. Similarly, the mean AI integration score (M = 72.1) reflects a favorable level of AI adoption in teaching and learning activities.

Distribution of Respondents Based on Self-Efficacy Levels

Self-Efficacy Level	Frequency (f)	Percentage (%)
High Self-Efficacy	37	82%
Moderate to Low Self-Efficacy	8	18%
Total	**45**	**100%**

Interpretation

The findings reveal that the majority of respondents (82%) possessed high self-efficacy, while only 18% demonstrated moderate to low self-efficacy. This suggests that most prospective teachers were confident in their ability to use AI-supported teaching tools and digital technologies.

Pearson Correlation between Self-Efficacy and AI Integration Scores

Variables	r-value	p-value	Interpretation
Self-Efficacy and AI Integration	0.65	< 0.01	Moderate to Strong Positive Correlation

Interpretation

The Pearson correlation coefficient (r = 0.65) indicates a moderate to strong positive relationship between self-efficacy and AI integration scores among prospective teachers. Since the p-value is less than 0.01, the relationship is statistically significant at the 1% level. This implies that higher levels of self-efficacy are associated with increased adoption of AI-integrated teaching practices.

Regression Analysis Predicting AI Integration from Self-Efficacy

Regression Components	Value
Intercept (b_0)	30.5
Slope Coefficient (b_1)	0.54
Regression Equation	$\hat{Y} = 30.5 + 0.54X$

Interpretation

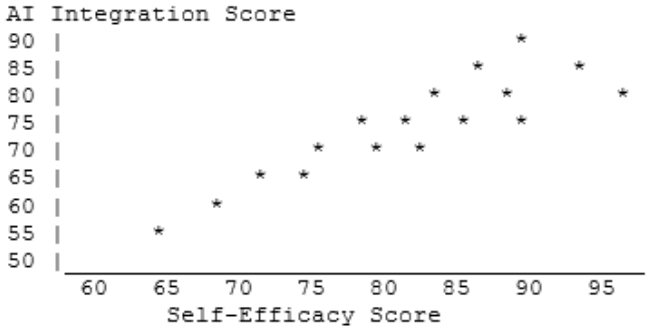
The regression analysis demonstrates that self-efficacy significantly predicts AI integration among prospective teachers. The slope coefficient (b_1 = 0.54) indicates that for every one-point increase in self-efficacy score, the AI integration score increases by 0.54 points on average. This finding confirms that self-efficacy positively influences the adoption of AI-based teaching practices.

Bar Graph Showing Distribution of Self-Efficacy Levels

Interpretation

The bar graph clearly shows that a large majority of respondents fall within the high self-efficacy category, indicating strong confidence levels among prospective teachers regarding AI-related teaching practices.

Scatter Plot Showing Relationship between Self-Efficacy and AI Integration



Interpretation

The scatter plot demonstrates a positive upward trend between self-efficacy scores and AI integration scores. As self-efficacy increases, AI integration scores also tend to increase, visually supporting the significant positive correlation identified through statistical analysis.

Results and Discussion

The findings of the study indicate that prospective teachers generally possess high levels of self-efficacy and demonstrate moderate to high adoption of AI-integrated teaching practices. The descriptive statistics reveal that respondents feel confident in using technology and AI-related educational tools in teaching and learning environments.

The Pearson correlation analysis revealed a statistically significant moderate to strong positive relationship ($r = 0.65$, $p < 0.01$) between self-efficacy and AI integration. This finding suggests that prospective teachers with higher confidence in their technological abilities are more likely to adopt and utilize AI tools in instructional practices.

The regression analysis further confirmed that self-efficacy is a significant predictor of AI-integrated teaching practices. The regression coefficient indicates that improvements in self-efficacy lead to increased AI adoption among prospective teachers.

These findings support Albert Bandura's Self-Efficacy Theory, which emphasizes that individuals who believe in their capabilities are more willing to engage in challenging and innovative activities. The findings are also consistent with the Technology Acceptance Model (TAM), which highlights the role of confidence and perceived ease of use in technology adoption.

Overall, the study highlights the importance of strengthening self-efficacy through teacher training programs, digital literacy initiatives, and practical exposure to AI tools. Educational institutions should provide supportive learning environments and professional development opportunities to prepare prospective teachers for AI-supported classrooms.

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