International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

AI Readiness and Integration in Teaching Practices as Predictors of Teaching Effectiveness of Elementary Teachers in Mamburao District

Ms. Jessica G. Rosales[1], Dr. Joanne D. Gorospe[2]

ABSTRACT

The implementation of the artificial intelligence (AI) in learning has gained more significance in improving the instructional practices and increase the effectiveness of teaching. The issue is that many educators continue to have difficulties with the integration of AI because of insufficient preparedness and the lack of technological equipment. It has explored the level of AI readiness and AI integration in teaching practices as predictors of effectiveness in teaching among elementary teachers in the Mamburao District. A quantitative, predictive-correlational research design was used in the study. The survey questionnaire used a four-point Likert scale that was validated to collect data on 254 elementary teachers in 24 public elementary schools. The levels of AI readiness, AI integration in teaching practices, and teaching effectiveness were determined by the descriptive statistics, and the relations between them, and their predictive power were studied with the help of inferential statistical methods. Findings indicated the level of AI readiness of teachers was in general low, technological competence and attitudes to AI integration, whereas they were willing to change with technological advancement. AI integration into the teaching practices was minimal, particularly regarding technological infrastructure and application of AI-based tools in classroom. The effectiveness of teaching was also evaluated as low, and teachers were found to show better results in the classroom management through technology support and little in the AI-assisted instructional strategies. Additional results showed that AI readiness and AI integration had a strong relationship with teaching effectiveness. Major predictors comprised enrolment in the AI-based training, the attitude of the teachers to the AI implementation, technological proficiency, the usage frequency of the AI-based tools, as well as the presence of technological infrastructure. The results present the necessity to enhance AI-oriented professional growth and enhance technological tools in order to facilitate successful implementation of AI in elementary education.

Keywords: Artificial Intelligence Readiness, AI Integration In Teaching, Teaching Effectiveness, Educational Technology, Elementary Teachers

INTRODUCTION

Artificial Intelligence (AI) is becoming more widespread in the educational industry, changing the pattern of teaching and presenting new concepts (Aoun, 2018). The technologies are greatly transforming the teaching and learning activities in various education environments. A portion of educational institutions in the world have introduced the use of AI in the curriculum (Pham & Sampson, 2022). Nonetheless, although AI has a significant potential as a way of enhancing the teaching practice, its successful application requires the willingness of the teachers and the introduction of AI tools into the teaching pra-

ctice (Ayanwale et al, 2022).

In the Philippines, the Department of Education has partnered with Microsoft and other organizations to introduce AI-based applications such as Reading Progress, Reading Coach, and Virtual Labs (DepEd, 2022). However, these initiatives do not stop elementary teachers to experience difficulties with AI integration because of the lack of training, insufficient technological infrastructure, and exposure (UNESCO, 2023). There are also institutional issues, whereby most schools are restricting AI tools (Co, 2025) thus, these barriers influence the classroom management, teaching methods, and student engagement (Dionisio et al., 2024).

Since the majority of studies have been conducted on secondary and higher education (Zawacki-Richter et al., 2019), it creates a gap in AI readiness and integration among elementary school teachers, especially in rural areas. This study aims to determine the level of AI readiness and extent of AI integration in teaching practices among elementary school teachers in the Mamburao District and investigates how the variables predict teaching effectiveness.

METHODOLOGY

Study Design

A quantitative, correlational-predictive research design was used to identify the level of AI readiness, extent of AI integration in teaching practices, and the level of effectiveness of teaching of the respondents and the correlation between the variables. It was also used to predict the teaching effectiveness of the respondents.

Study Setting

The study was carried out in 24 elementary schools of the Mamburao District, Division of Occidental Mindoro, Philippines which offered a holistic coverage of the basic education situation in the district.

Unit of Analysis and Sampling

This was done with 154 elementary school teachers selected out of the 24 elementary schools in the public elementary school district of Mamburao District, Division of Occidental Mindoro. The proportionate random sampling method was applied in selecting the sample size as the Raosoft Sample Size Calculator was used to ensure that there was fair representation of both smaller and larger schools. This method increased the validity and applicability of the results.

Research Instrument

The primary instrument in this research was a survey in the form of questionnaires that were based on other tested instruments. The items were modified to determine the AI readiness, AI integration in teaching practices, and the teaching effectiveness of elementary school teachers in Mamburao District. Specifically, TPACK questionnaire by Schmid et al. (2020), along with the instruments used by Pampel et al. (2019), Darling-Hammond et al., 2017), Simonsen and Meyers (2015), and Christenson et al. (2015) were used as references for the development of the survey questionnaires. The instruments were validated by experts of the fields of education, research methodology and instructional technology. Cronbach alpha reliability testing was performed and all the scales had an acceptable level of 0.70 which confirmed the high level of internal consistency.

Data Collection

The researcher obtained the consent of the Public Schools District Supervisor and the Department of Education, Division of Occidental Mindoro, by way of official request letters before obtaining the required data. After the approval, the survey questionnaire was sent online (via Google Forms). The survey link

was sent using Facebook Messenger and with the agreement of the respondents and the data was collected within two to three weeks. To be complete, the researcher was able to track the responses to achieve the necessary sample size. All the responses were arranged in a systematic manner and kept under lock and key to be analyzed.

Data Processing and Analysis

Descriptive and inferential statistics were used to analyze the collected data. The mean and standard deviation were calculated in order to identify the level of AI readiness, extent of AI integration in teaching practices and level of teaching effectiveness. The relationship between these variables was investigated by Pearson correlation, and multiple regression analysis was carried out to determine important predictors of teaching effectiveness.

Ethical Considerations

The research was performed in accordance with the accepted ethical standards that would help to maintain integrity and accountability. The confidentiality and anonymity of participants were ensured and all personal identifiers were deleted or coded in accordance with the Data Privacy Act of 2012. The informed consent was obtained before the distribution of the survey. The researcher was the only person who had access to the collected data and responded to them with honesty, accuracy and professionalism. These were measures that guaranteed transparency, ethical standards and protection of the subjects in the course of the research.

RESULTS

Level of AI Readiness

The overall level of AI readiness among elementary teachers in the Mamburao District was low, with a grand mean of 2.30 (SD=0.37). Non-Resistance to Technological Change received the highest mean score (2.58, SD=0.61), and then AI-Related Training and Professional Development (2.48, SD=0.75) was the next indicator with the highest score. Conversely, Attitude Towards AI Integration (1.94, SD=0.60) and Technological Competence (2.18, SD=0.58) had the lowest mean scores indicating that they were not well prepared in these domains [Table 1].

Table 1. Level of AI readiness.

Indicators	Mean	SD	Description
Resistance to Technological Change (R)	2.58	.61	High
AI-Related Training and Professional Development	2.48	.75	Low
Technological Competence	2.18	.58	Low
Attitude Toward AI Integration	1.94	.60	Low
AI Readiness	**2.30**	**.37**	**Low**

Scale: 1.00-1.50 Very Low; 1.51-2.50 Low; 2.51-3.50 High; 3.51-4.00 Very High

Level of AI Integration in Teaching Practices

The weighted mean scores show that the level of AI integration in the teaching practice of elementary school teachers in the Mamburao District is low with the mean of 2.38 (SD=0.54). Familiarity and Proficiency with AI Technologies (mean=2.43, SD=0.60) and Frequency of AI Tool Usage in Teaching (mean=2.39, SD=0.64) gave the highest scores. Conversely, the least scores were obtained in Technological Infrastructures (mean=2.34, SD=0.62) and Use of AI Technological Tools (mean=2.35,

SD=0.59). The standard deviations are relatively low indicating consistency in the responses of the teachers [Table 2].

Table 2. Extent of AI integration in teaching practices.

Indicators	Mean	SD	Description
Familiarity and Proficiency with AI Technologies	2.43	.60	Less
Frequency of AI Tool Usage in Teaching	2.39	.64	Less
Use of AI Technological Tools	2.35	.59	Less
Technological Infrastructures	2.34	.62	Less
AI Integration in Teaching Practices	**2.38**	**.54**	**Less**

Scale: 1.00-1.50 Least; 1.51-2.50 Less; 2.51-3.50 Much; 3.51-4.00 Great

Level of Teaching Effectiveness

The weighted mean scores reveal that there is low teaching effectiveness among the elementary school teachers in the Mamburao District with the mean of 2.32 and a standard deviation of 0.60. The most significant score was in classroom management efficiency through AI tools (mean=2.35, SD=0.62), and the least in the area of instructional strategies supported by AI (mean=2.28, SD=0.61). The standard deviations are also low implying that teachers were consistent in their answers [Table 3].

Table 3. Level of teaching effectiveness.

Indicators	Mean	SD	Description
Classroom Management Efficiency Through AI Tools	2.35	.62	Low
Student Engagement in AI-Assisted Lessons	2.34	.67	Low
Instructional Strategies Supported by AI	2.28	.61	Low
Teaching Effectiveness	**2.32**	**.60**	**Low**

Scale: 1.00-1.50 Very Low; 1.51-2.50 Low; 2.51-3.50 High; 3.51-4.00 Very High

Relationship Between AI Readiness and Teaching Effectiveness

The correlation analysis showed that AI readiness of elementary teachers in the Mamburao District was directly related and moderately related to teaching effectiveness ($r=.605$, $p < .001$), and the findings indicated that the greater AI readiness, the greater the teaching effectiveness [Table 4].

Table 4. Relationship between AI readiness and teaching effectiveness.

AI Readiness	Teaching Effectiveness	Correlation Coefficient	p-value	Description
AI-Related Training and Professional Development	Instructional Strategies Supported by AI	.555**	.000	Moderate, Direct
	Classroom Management Efficiency Through AI Tools	.544**	.000	Moderate, Direct
	Student Engagement in AI-Assisted Lessons	.506**	.000	Moderate, Direct

Attitude Toward AI Integration	Instructional Strategies Supported by AI	.512**	.000	Moderate, Direct
	Classroom Management Efficiency Through AI Tools	.476**	.000	Moderate, Direct
	Student Engagement in AI-Assisted Lessons	.421**	.000	Moderate, Direct
Technological Competence	Instructional Strategies Supported by AI	.614**	.000	Moderate, Direct
	Classroom Management Efficiency Through AI Tools	.569**	.000	Moderate, Direct
	Student Engagement in AI-Assisted Lessons	.579**	.000	Moderate, Direct
Resistance To Technological Change	Instructional Strategies Supported by AI	-.224**	.000	Weak, Inverse
	Classroom Management Efficiency Through AI Tools	-.239**	.000	Weak, Inverse
	Student Engagement in AI-Assisted Lessons	-.158*	.014	Weak, Inverse
Overall	**Overall**	**.605****	**.000**	**Moderate, Direct**

Scale: .000-.150 Negligible; .151-.400 Weak; .401-.650 Moderate; .651-.900 Strong; .901-1.000 Perfect

Relationship between AI integration in teaching practices and teaching effectiveness

The correlation analysis revealed that the extent of AI integration in teaching practices was strongly and directly related to teaching effectiveness among elementary school teachers in the Mamburao District ($r=.716$, $p < .001$), indicating that greater integration of AI tools is associated with higher teaching effectiveness [Table 5].

Table 5. Relationship between AI integration in teaching practices and teaching effectiveness.

AI Integration in Teaching Practices	Teaching Effectiveness	Correlation Coefficient	p - value	Description
Use of AI Technological Tools	Instructional Strategies Supported by AI	.701**	.000	Strong, Direct
	Classroom Management Efficiency Through AI Tools	.649**	.000	Moderate, Direct
	Student Engagement in AI-Assisted Lessons	.617**	.000	Moderate, Direct
Frequency Of AI Tool Usage in Teaching	Instructional Strategies Supported by AI	.783**	.000	Strong, Direct
	Classroom Management Efficiency Through AI Tools	.714**	.000	Strong, Direct

	Student Engagement in AI-Assisted Lessons	.735**	.000	Strong, Direct
Technological Infrastructures	Instructional Strategies Supported by AI	.476**	.000	Moderate, Direct
	Classroom Management Efficiency Through AI Tools	.495**	.000	Moderate, Direct
	Student Engagement in AI-Assisted Lessons	.345**	.000	Weak, Direct
Familiarity And Proficiency with AI Technologies	Instructional Strategies Supported by AI	.675**	.000	Strong, Direct
	Classroom Management Efficiency Through AI Tools	.610**	.000	Moderate, Direct
	Student Engagement in AI-Assisted Lessons	.595**	.000	Moderate, Direct
Overall	**Overall**	**.716****	**.000**	**Strong, Direct**

Scale: .000-.150 Negligible; .151-.400 Weak; .401-.650 Moderate; .651-.900 Strong; .901-1.000 Perfect

AI Readiness Predicting Teaching Effectiveness

The regression analysis showed that indicators of AI readiness significantly predicted teaching effectiveness among elementary school teachers in the Mamburao District. Specifically, AI-related training and professional development (β=.242), attitude toward AI integration (β=.207), and technological competence (β=.444) were significant positive predictors ($p < .05$), indicating that improvements in these areas are associated with higher teaching effectiveness. In contrast, resistance to technological change (β=–.004) was not a significant predictor [Table 6].

Table 6. AI readiness predicting teaching effectiveness.

Model	**Beta Coefficient**	**p-value**	**Description**
AI-Related Training and Professional Development	.242	.000	Significant
Attitude Toward AI Integration	.207	.002	Significant
Technological Competence	.444	.000	Significant
Resistance to Technological Change	-.004	.945	Not Significant

R^2 - .669; F – 74.139; Sig - .000

AI Integration in Teaching Practices Predicts Teaching Effectiveness

The regression analysis revealed that indicators of AI integration in teaching practices significantly predicted teaching effectiveness among elementary school teachers in the Mamburao District. Specifically, the use of AI technological tools (β=.185), frequency of AI tool usage in teaching (β=.653), and technological infrastructures (β=.119) were significant positive predictors ($p < .05$), indicating that improvements in these areas are associated with higher teaching effectiveness. In contrast, familiarity and proficiency with AI technologies (β=–.030) did not significantly predict teaching effectiveness [Table 7].

Table 7. AI integration in teaching practices predicts teaching effectiveness.

Model	Beta Coefficient	p-value	Description
Use of AI Technological Tools	.185	.012	Significant
Frequency of AI Tool Usage in Teaching	.653	.000	Significant
Technological Infrastructures	.119	.016	Significant
Familiarity and Proficiency with AI Technologies	-.030	.688	Not Significant

R^2 - .811; F – 154.231; Sig - .000

DISCUSSION

The results revealed that the level of AI readiness, AI integration in teaching practices, and teaching effectiveness among elementary teachers in Mamburao District is generally low. This suggests that elementary teachers are facing challenges in adopting AI tools. Despite their non-resistance to technological change, their preparedness in using AI tools is still limited. In the study by Ertmer and Ottehbreit-Leftwich (2020), they pointed out that the attitudes of teachers towards technologies are important in their readiness to change to new tools. When teachers embrace technology as a tool to make students more engaged and instructed, they are unlikely to oppose it. Similarly, Teo (2019) asserts that the attitudes of teachers toward new technology are crucial factor in their desire to learn how to use AI-based tools in their teaching. He discovered that teachers are more willing to use AI tools when they believe that they are simple to use and helpful. On the contrary, when they perceive AI tools as being complicated, they will not use them.

Elementary teachers in Mamburao District are shown to be proficient in using AI tools but their extent in integrating these tools is influenced by the availability of technological infrastructures. UNESCO (2023) claims that when teachers are employed at well-equipped schools, they tend to acquire positive attitudes towards using technology, which will increase their willingness to adopt AI in their instruction. On the other hand, insufficient infrastructure will create resistance or fear, and teachers may avoid using AI tools as they tend to discourage its use (Mackey & Evans, 2022). This has made it clear why it is essential to make sure that technological infrastructure corresponds to the needs and institutional aims of teachers so that they can build a more AI-ready educational environment.

Based on the study of Miao et al. (2020), AI tools are not fully utilized by the elementary teachers due to lack of knowledge and proper training. Additionally, Hinojo-Lucena et al. (2019) state that AI tools are not used well in the educational field because of the limited training and knowledge of teachers on the pedagogical uses of AI. Most teachers are using conventional methods of teaching because they are more accustomed to and need not make much technological adjustment.

The findings showed that the level of AI readiness and extent of AI integration have significant relationship with the teaching effectiveness of elementary teachers in Mamburao District. Wang and Woo (2021) noted that AI-ready teachers can personalize learning which can result to a better student engagement and outcomes. Furthermore, Holstein et al. (2019) highlight that the integration of AI tools in their teaching practices can also personalize learning materials which allows teachers to deal with the needs of individual students more efficiently, thus enhancing their teaching effectiveness.

The results further revealed the indicators of AI readiness can predict teaching effectiveness of the elementary teachers. AI-related trainings can boost teachers' competence to fully utilize the power of AI

in the classroom (Zawacki-Richter & Qayyum, 2024), positive attitude toward AI can attribute to the development of teaching practices (Foster, 2025), and technology competent teachers are in better position to use AI tools to promote better student learning outcomes and higher teaching effectiveness (Luan & Xie, 2023). In addition, indicators of AI integration can also predict their teaching effectiveness.

Overall, the study shows that elementary teachers of Mamburao district have a low positive attitude towards AI tools, limited technological infrastructures, and a lack of proper training in adopting AI tools in the teaching-learning process. The level of AI readiness can directly contribute to the teaching effectiveness of the teachers, but the extent of AI integration in teaching practices can exert more. It implies that teachers require more AI-related training for continuous exposure in AI tools to build positive attitudes towards and technological competence. Schools and educational leaders, like DepEd, must invest in technological infrastructures and provide seminars, trainings, and workshops related to integrating AI tools in teaching for the elementary teachers to boost their confidence and competence in using AI tools in teaching practices. This will not only strengthen the level of AI readiness and extent of AI integration of the elementary teachers, but also to enhance their teaching effectiveness.

CONCLUSIONS

The study investigates the level of AI readiness and the extent of AI integration in teaching practices as predictors of teaching effectiveness of elementary teachers in the Mamburao district. The findings revealed that the level of AI readiness and the extent of AI integration are both generally low. In addition, attitudes towards AI, technological infrastructure, and technological competence are predictors of teaching effectiveness. Elementary teachers need assistance and support from educational institutions and authorities by exposing them to AI-related training and workshops, and by providing better technological infrastructure. These methods will strengthen the level of AI readiness and extent of AI integration in the teaching practices of elementary teachers. Furthermore, these factors will enhance teaching effectiveness as the basis for quality education.

REFERENCES

1. Aoun, J. E. (2018). Robot-proof: Higher education in the age of artificial intelligence. MIT Press. https://doi.org/10.7551/mitpress/11456.001.0001
2. Ayanwale, M. A., Sanusi, I. T., Adelana, O. P., Aruleba, K., & Oyelere, S. S. (2022). Teachers' readiness and intention to teach artificial intelligence in schools. *Computers & Education: Artificial Intelligence*, 4, 100099. https://doi.org/10.1016/j.caeai.2022.100099
3. Co, S. J. (2025). Artificial intelligence in Philippine education: A narrative review of applications, perceptions, and challenges. *International Research Journal of Science, Technology, Education, and Management,* 14(2), 1–14. https://doi.org/10.5281/zenodo.15902950
4. Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute. https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report
5. DepEd. (2022, June 17). *DepEd partners with CloudSwyft, Microsoft for the successful pilot of Virtual Labs for SHS*. Department of Education. https://www.deped.gov.ph/2022/06/20/deped-partners-with-cloudswyft-microsoft-for-successful-pilot-of-virtual-labs-for-shs/
6. Dionisio, C. L. B. A., Aguirre, M. C. F., Carpio, M. A. S., Supian, A. Q., & Jocson, J. C. (2024). Revolutionizing education: A study on AI integration in teaching practices at Good Samaritan Colleges

Senior High School. *International Journal of Progressive Research in Science and Engineering, 5*(05), 88–92. https://doi.org/10.5281/zenodo.10967891

7. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2020). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 52*(3), 255–271. https://doi.org/10.1080/15391523.2020.1764176
8. Miao, F., Holmes, W., Huang, R., & Zhang, H. (2020). *AI and education: Guidance for policymakers*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000370705
9. Mukherjee, S., & Dasgupta, S. (2024). Development and validation of the scale for attitude toward artificial intelligence. *The International Journal of Indian Psychology, 12*(1), 160–201. https://ijip.in/wp-content/uploads/2024/03/18.01.160.20241201.pdf
10. Nueva, M. G. C. (2019). Filipino teachers' attitude towards technology—Its determinants and association with technology integration practice. *Asia-Pacific Social Science Review, 19*(3), 45–62. Retrieved from https://animorepository.dlsu.edu.ph/apssr/vol19/iss3/5
11. Pham, S., & Sampson, P. M. (2022). The development of artificial intelligence in education: A review in context. *Journal of Computer Assisted Learning, 38*(5), 1210–1225. https://doi.org/10.1111/jcal.12687
12. UNESCO. (2023). *Ensuring the right to equitable and inclusive education in the digital age: A policy review on education and technology infrastructure*. UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000387744
13. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education, 16,* 39. https://doi.org/10.1186/s41239-019-0171-0