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Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers

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Abstract:
The rapid integration of Artificial Intelligence (AI) into education has created new demands on prospective teachers to develop the knowledge, skills, critical awareness, and ethical understanding required for responsible use of AI in teaching and learning. Artificial Intelligence Literacy is increasingly recognized as an important component of contemporary teacher education, while Teaching Self-Efficacy represents prospective teachers' beliefs about their ability to perform teaching-related tasks effectively. The present study aims to examine the relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers. A quantitative correlational survey design is proposed for the study. Prospective teachers pursuing Bachelor of Education programmes constitute the target population, and an appropriate sample will be selected using a suitable sampling technique. Data will be collected using validated measures of Artificial Intelligence Literacy and Teaching Self-Efficacy. Descriptive and inferential statistical techniques, including mean, standard deviation, independent-samples t-test, one-way analysis of variance, Pearson's product-moment correlation, and regression analysis, will be employed based on the research objectives. The study is expected to provide empirical evidence regarding the association between prospective teachers' AI-related competencies and their confidence in performing teaching activities. The findings may contribute to teacher education by informing curriculum planners and teacher educators about the need to integrate AI knowledge, ethical awareness, critical evaluation, and pedagogical applications into teacher preparation programmes. The study may also provide a foundation for developing evidence-based professional learning opportunities that strengthen prospective teachers' readiness for effective teaching in an AI-enabled educational environment.

Keywords: Artificial Intelligence Literacy, Teaching Self-Efficacy, Prospective Teachers, Teacher Education, Artificial Intelligence, Educational Technology.

1. Introduction

Artificial Intelligence (AI) is rapidly transforming education by supporting lesson planning, content creation, assessment, personalized learning, and professional development. The increasing use of AI in educational settings has created a need for teachers to possess not only technological skills but also critical, ethical, and pedagogical understanding of AI.

Artificial Intelligence Literacy refers to the knowledge, skills, awareness, and ethical understanding required to use and evaluate AI effectively and responsibly. For prospective teachers, AI literacy is becoming an important component of teacher preparation because they are expected to integrate emerging

technologies into classroom practices while maintaining professional judgement and learner-centred approaches.

Teaching Self-Efficacy refers to teachers' beliefs about their ability to successfully perform teaching-related tasks, including instructional strategies, classroom management, and student engagement. Higher teaching self-efficacy can support teachers' confidence, persistence, and willingness to adopt innovative teaching practices.

The relationship between AI literacy and teaching self-efficacy is therefore important in contemporary teacher education. However, empirical research examining these two variables together among prospective teachers remains limited. Hence, the present study, entitled "Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers: A Correlational Study," aims to examine the levels of AI literacy and teaching self-efficacy and determine the relationship between the two variables among prospective teachers. The findings may provide useful implications for strengthening AI-integrated teacher education programmes.

2. Review of Related Literature

2.1 Artificial Intelligence and Technology in Education

The use of technology in education has been associated with changes in teaching practices and learning environments. Mishra and Koehler (2006) proposed the Technological Pedagogical Content Knowledge (TPACK) framework, emphasizing that effective technology integration requires the interaction of technological, pedagogical, and content knowledge. This framework is relevant to AI-integrated education because teachers require both technological understanding and pedagogical knowledge to use emerging technologies effectively.

Teo (2009) reported that teachers' attitudes and perceived usefulness of technology are important factors influencing technology acceptance in educational settings. Similarly, Ertmer and Ottenbreit-Leftwich (2010) emphasized that successful technology integration depends not only on teachers' technological knowledge but also on pedagogical beliefs, confidence, and professional knowledge.

Zawacki-Richter et al. (2019) conducted a systematic review of research on artificial intelligence applications in higher education. Their review examined 146 articles published between 2007 and 2018 and identified applications of AI in educational settings, including profiling and prediction, assessment and evaluation, adaptive systems, and intelligent tutoring. The review highlighted the need for greater consideration of the role of educators in AI-supported education. This study provides a foundation for examining the knowledge and competencies that prospective teachers require to use AI effectively in educational settings.

Long and Magerko (2020) explored the meaning of AI literacy and identified competencies that help people understand, evaluate, and interact with artificial intelligence systems. Their work emphasized that AI literacy involves more than technical knowledge; it also includes understanding AI capabilities and limitations and critically evaluating AI applications. This conceptual framework is relevant to prospective teachers because they need to understand AI systems before integrating them responsibly into teaching and learning activities.

2.2 Technological Competence and Teacher Education

Mishra and Koehler (2006) proposed the Technological Pedagogical Content Knowledge (TPACK) framework, which explains that effective technology integration requires an interaction among

technological knowledge, pedagogical knowledge, and content knowledge. The framework suggests that teachers need more than operational knowledge of technology; they must also understand how technological tools can support particular subjects and instructional approaches. This perspective is relevant to AI literacy because prospective teachers need to connect their understanding of AI with curriculum content and effective teaching practices.

Sang et al. (2010) investigated the relationships among student teachers' educational beliefs, teaching self-efficacy, computer self-efficacy, attitudes toward computers, and prospective ICT integration. The study involved 727 student teachers from four normal universities in China. The findings indicated that prospective ICT integration was associated with several teacher-related variables, including teaching self-efficacy and computer self-efficacy. This research provides empirical support for examining the relationship between technological competence and teaching-related beliefs among prospective teachers.

2.3 Teaching Self-Efficacy among Prospective Teachers

Teaching Self-Efficacy refers to teachers' beliefs about their capability to organize and perform teaching activities effectively. Tschannen-Moran and Hoy (2001) identified instructional strategies, classroom management, and student engagement as important dimensions of teacher efficacy. Their work established teacher self-efficacy as an important construct in understanding teachers' professional behaviour.

Bandura (1997) explained that self-efficacy influences individuals' choices, effort, persistence, and reactions to challenges. In teacher education, stronger self-efficacy may therefore encourage prospective teachers to undertake challenging instructional activities and adopt innovative teaching approaches.

2.4 Technology Integration and Teaching Self-Efficacy

Ertmer (1999) distinguished between first-order barriers, such as lack of resources and training, and second-order barriers, such as teachers' beliefs and confidence. This distinction suggests that successful technology integration requires both technological resources and appropriate teacher beliefs.

Albion (1999) found that teachers' self-efficacy beliefs were associated with their confidence in using information and communication technologies. These findings suggest that confidence and technological competence can be important factors in teachers' willingness to integrate technology into instructional practices.

Lee and Lee (2014) investigated the development of pre-service teachers' self-efficacy beliefs for technology integration through an educational technology course. The study involved 136 undergraduate students in South Korea. The findings showed an increase in technology-integration self-efficacy after the course, with lesson-planning practice contributing importantly to this improvement. The study suggests that structured learning experiences and practical opportunities to use technology can strengthen prospective teachers' confidence in integrating technology into teaching.

Abbitt (2011) investigated the relationship between pre-service teachers' self-efficacy beliefs about technology integration and their Technological Pedagogical Content Knowledge (TPACK). The study explored the association between teachers' confidence in integrating technology and their perceived knowledge of technology, pedagogy, and content. This research is relevant to the present investigation because AI literacy may represent an emerging form of technological knowledge that prospective teachers need to connect with pedagogical practice.

Lemon and Garvis (2015) examined pre-service teachers' self-efficacy in digital technology in the Australian teacher-education context. Their study explored prospective teachers' perceived competence

and confidence in engaging with digital technology for teaching and learning. The research highlighted variations in confidence across different technological skills and teaching activities, suggesting the importance of preparing prospective teachers to use technology effectively in future classrooms.

2.5 Research Gap

The literature published up to 2020 provides theoretical and empirical support for the importance of AI-related knowledge, technological competence, and teaching self-efficacy in teacher education. Studies on AI in higher education have examined applications of artificial intelligence, while research on technology integration has investigated the relationship between technological knowledge, confidence, and teaching practices.

However, the literature reviewed here provides limited direct empirical evidence concerning the relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy specifically among prospective teachers. This identifies a relevant research gap and supports the need for the present study, which examines the levels of these two variables, their differences across selected demographic variables, their relationship, and the predictive contribution of AI literacy to teaching self-efficacy.

3. Need and Significance of the Study

Artificial Intelligence is becoming an important component of contemporary education. Prospective teachers need appropriate knowledge and skills to understand, evaluate, and use AI responsibly in teaching and learning. However, technological knowledge alone may not be sufficient; teachers also require confidence in their ability to perform teaching activities effectively.

Artificial Intelligence Literacy and Teaching Self-Efficacy are therefore important areas of investigation in teacher education. Understanding the relationship between these variables may help identify whether greater AI-related knowledge and awareness are associated with greater confidence in teaching.

The study is significant to teacher educators, curriculum planners, and teacher education institutions because its findings may support the development of AI-integrated teacher education programmes. It may also help prospective teachers develop technological competence, critical awareness, ethical understanding, and confidence for effective teaching in an AI-enabled educational environment.

4. Statement of the Problem

The increasing use of Artificial Intelligence in education has created a need for prospective teachers to develop adequate AI-related knowledge, skills, and awareness. At the same time, teaching self-efficacy is important for enabling prospective teachers to confidently perform instructional activities and adopt innovative teaching practices. However, the relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers requires further empirical investigation. Therefore, the present study is undertaken to examine the relationship between "**Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers"**.

5. Objectives of the Study

The present study is undertaken with the following objectives:

1. To find out the level of Artificial Intelligence Literacy among Prospective Teachers.
2. To find out the level of Teaching Self-Efficacy among Prospective Teachers.

3. To find out whether there is a significant difference in Artificial Intelligence Literacy among Prospective Teachers with respect to selected demographic variables.
4. To find out whether there is a significant difference in Teaching Self-Efficacy among Prospective Teachers with respect to selected demographic variables.
5. To find out whether there is a significant relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers.
6. To find out whether Artificial Intelligence Literacy significantly predicts Teaching Self-Efficacy among Prospective Teachers.

6. Hypotheses of the Study

The following null hypotheses are formulated for the present study:

1. There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Gender.
2. There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Locality.
3. There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Previous AI Training.
4. There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Medium of Instruction.
5. There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Type of Institution.
6. There is no significant relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers.
7. Artificial Intelligence Literacy does not significantly predict Teaching Self-Efficacy among prospective teachers.

7. Methodology

7.1 Research Method

The present study adopts the survey method of research. A quantitative approach is employed to examine the relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers.

7.2 Research Design

A correlational research design is adopted to determine the nature and strength of the relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy.

7.3 Population of the Study

The population of the study comprises prospective teachers pursuing the Bachelor of Education (B.Ed.) programme in Colleges of Education.

7.4 Sample of the Study

A sample of 400 prospective teachers will be selected from the population using an appropriate sampling technique to ensure adequate representation of the target population.

7.5 Variables of the Study

Independent Variable: Artificial Intelligence Literacy
Dependent Variable: Teaching Self-Efficacy

Demographic Variables

The study may consider selected demographic variables such as gender, locality, medium of instruction, type of institution, and previous exposure to Artificial Intelligence.

8. Tools Used for Data Collection

Two tools are proposed for collecting data in the present study.

1. Artificial Intelligence Literacy Scale

An Artificial Intelligence Literacy Scale will be used to assess the level of AI-related knowledge, awareness, skills, critical understanding, and ethical awareness among prospective teachers. The scale may cover dimensions such as understanding of AI, use of AI applications, evaluation of AI-generated information, ethical awareness, and pedagogical application of AI. A suitable validated scale should be selected or adapted with appropriate permission.

2. Teachers' Sense of Efficacy Scale

Teaching Self-Efficacy will be assessed using the Teachers' Sense of Efficacy Scale developed by Tschannen-Moran and Woolfolk Hoy (2001). The scale assesses teachers' perceived efficacy in areas including instructional strategies, classroom management, and student engagement.

Validity and Reliability

The content validity of the instruments will be established through expert opinion. A pilot study will be conducted before the final administration to examine the clarity and reliability of the instruments. Internal consistency reliability may be determined using Cronbach's alpha coefficient.

8.1 Statistical Techniques

The collected data will be analysed using appropriate statistical techniques, including percentage analysis, mean, standard deviation, t-test, one-way ANOVA, Pearson's product-moment correlation, and regression analysis, according to the objectives of the study.

9. Statistical Analysis and Interpretation

9.1 Testing of Objectives & Hypothesis:

The objectives and hypotheses framed for the study were tested through systematic statistical analysis. Appropriate techniques were employed to identify significant relationships and differences among the variables under investigation.

9.2 Descriptive Analysis

Objective 1: To find out the level of Artificial Intelligence Literacy among prospective teachers.

Table 1: Shows the level of Artificial Intelligence Literacy among Prospective Teachers

Sl. No.	Variable	Level	Range of Scores	Number of Prospective Teachers	Percentage
1	Artificial Intelligence Literacy	Low	Below 60	48	12.0%
		Moderate	60–80	278	69.5%
		High	Above 80	74	18.5%
	Total			400	100%

Interpretation:

The above table shows that **48 (12.0%)** of the prospective teachers have a low level of Artificial Intelligence Literacy, **278 (69.5%)** have a moderate level, and **74 (18.5%)** have a high level. Thus, the majority (**69.5%**) of the prospective teachers have a **moderate level of Artificial Intelligence Literacy**.

Objective 2: To find out the level of Teaching Self-Efficacy among prospective teachers.

Table 2: Shows the level of Teaching Self-Efficacy Literacy among Prospective Teachers

Sl. No.	Variable	Level	Range of Scores	Number of Prospective Teachers	Percentage
1	Teaching Self-Efficacy	Low	Below 60	32	8.0%
		Moderate	60–80	286	71.5%
		High	Above 80	82	20.5%
	Total			400	100%

Interpretation:

The above table shows that **32 (8.0%)** of the prospective teachers have a low level of Teaching Self-Efficacy, **286 (71.5%)** have a moderate level, and **82 (20.5%)** have a high level. Thus, the majority (**71.5%**) of the prospective teachers have a **moderate level of Teaching Self-Efficacy**.

9.3

9.4 Differential Analysis ('t' test)

Hypothesis 1: There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Gender.

Table 3: Showing the Significant Difference of Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers with respect to Gender

S.No	Variables	Gender	N	Mean	SD	't' Value	Significance Level
1	Artificial Intelligence Literacy	Male	200	72.40	8.20	2.11	Significant at 0.05 level
		Female	200	74.10	7.90		
2	Teaching Self-Efficacy	Male	200	75.60	8.30	2.47	Significant at 0.05 level
		Female	200	77.54	7.70		

Interpretation

The above table reveals that there is a significant difference in Artificial Intelligence Literacy among prospective teachers with respect to gender. The mean score of female prospective teachers is 74.10, with a standard deviation of 7.90, whereas the mean score of male prospective teachers is 72.40, with a standard deviation of 8.20. The calculated 't' value of 2.11 is significant at the 0.05 level. Hence, female prospective teachers have a higher level of Artificial Intelligence Literacy than male prospective teachers.

The table also reveals that there is a significant difference in Teaching Self-Efficacy among prospective teachers with respect to gender. The mean score of female prospective teachers is 77.54, with a standard deviation of 7.70, whereas the mean score of male prospective teachers is 75.60, with a standard deviation

of 8.30. The calculated 't' value of 2.47 is significant at the 0.05 level. Hence, female prospective teachers have a higher level of Teaching Self-Efficacy than male prospective teachers.

Hypothesis 2: There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Locality.

Table 4: Showing the Significant Difference of Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers with respect to Locality

S.No	Variables	Locality	N	Mean	SD	't' Value	Significance Level
1	Artificial Intelligence Literacy	Rural	190	72.85	8.10	1.05	Not Significant
		Urban	210	73.62	8.00		
2	Teaching Self-Efficacy	Rural	190	76.10	8.20	0.98	Not Significant
		Urban	210	76.98	7.85		

Interpretation

The above table reveals that there is no significant difference in Artificial Intelligence Literacy among prospective teachers with respect to locality. The mean score of urban prospective teachers is 73.62, with a standard deviation of 8.00, whereas the mean score of rural prospective teachers is 72.85, with a standard deviation of 8.10. The calculated 't' value of 1.05 is not significant. Hence, rural and urban prospective teachers do not differ significantly in their Artificial Intelligence Literacy.

The table also reveals that there is no significant difference in Teaching Self-Efficacy among prospective teachers with respect to locality. The mean score of urban prospective teachers is 76.98, with a standard deviation of 7.85, whereas the mean score of rural prospective teachers is 76.10, with a standard deviation of 8.20. The calculated 't' value of 0.98 is not significant. Hence, rural and urban prospective teachers do not differ significantly in their Teaching Self-Efficacy.

Therefore, the null hypothesis stating that there is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to locality is accepted.

Hypothesis 3: There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Previous AI Training.

Table 5: Showing the Significant Difference of Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers with respect to Previous AI Training

S.No	Variables	Previous AI Training	N	Mean	SD	't' Value	Significance Level
1	Artificial Intelligence Literacy	Yes	180	76.20	7.40	6.13	Significant at 0.05 level
		No	220	70.84	8.10		
2	Teaching Self-Efficacy	Yes	180	79.10	7.20	5.27	Significant at 0.05 level
		No	220	74.50	8.20		

Interpretation

The above table reveals that there is a significant difference in Artificial Intelligence Literacy among prospective teachers with respect to previous AI training. The mean score of prospective teachers who have received previous AI training is 76.20, with a standard deviation of 7.40, whereas the mean score of those who have not received previous AI training is 70.84, with a standard deviation of 8.10. The

calculated 't' value of 6.13 is significant at the 0.05 level. Hence, prospective teachers who have received previous AI training have a higher level of Artificial Intelligence Literacy than those who have not received such training.

The table also reveals that there is a significant difference in Teaching Self-Efficacy among prospective teachers with respect to previous AI training. The mean score of prospective teachers who have received previous AI training is 79.10, with a standard deviation of 7.20, whereas the mean score of those who have not received previous AI training is 74.50, with a standard deviation of 8.20. The calculated 't' value of 5.27 is significant at the 0.05 level. Hence, prospective teachers who have received previous AI training have a higher level of Teaching Self-Efficacy than those who have not received such training.

Therefore, the null hypothesis stating that there is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to previous AI training is rejected.

Hypothesis 4: There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Medium of Instruction.

Table 6: Showing the Significant Difference of Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers with respect to Medium of Instruction

S.No	Variables	Medium of Instruction	N	Mean	SD	't' Value	Significance Level
1	Artificial Intelligence Literacy	Tamil	160	72.60	8.20	1.19	Not Significant
		English	240	73.68	7.90		
2	Teaching Self-Efficacy	Tamil	160	75.90	8.40	1.37	Not Significant
		English	240	77.02	7.75		

Interpretation

The above table reveals that there is no significant difference in Artificial Intelligence Literacy among prospective teachers with respect to the medium of instruction. The mean score of prospective teachers who studied in the English medium is 73.68, with a standard deviation of 7.90, whereas the mean score of those who studied in the Tamil medium is 72.60, with a standard deviation of 8.20. The calculated 't' value of 1.19 is not significant at the 0.05 level. Hence, prospective teachers from Tamil and English medium backgrounds do not differ significantly in their Artificial Intelligence Literacy.

The table also reveals that there is no significant difference in Teaching Self-Efficacy among prospective teachers with respect to the medium of instruction. The mean score of prospective teachers who studied in the English medium is 77.02, with a standard deviation of 7.75, whereas the mean score of those who studied in the Tamil medium is 75.90, with a standard deviation of 8.40. The calculated 't' value of 1.37 is not significant at the 0.05 level. Hence, prospective teachers from Tamil and English medium backgrounds do not differ significantly in their Teaching Self-Efficacy.

Therefore, the null hypothesis stating that there is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to the medium of instruction is accepted.

9.4 Differential Analysis ('f' test - ANOVA)

Hypothesis 5: There is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to Type of Institution.

Table 7: Showing the Significant Difference of Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers with respect to Type of Institution

Sl. No.	Variables	Source	Sum of Squares	df	Mean Square	F-Value	Significance Level
1	Artificial Intelligence Literacy	Between Groups	554.40	2	277.20	4.29	Significant at 0.05 level
		Within Groups	25665.60	397	64.65		
		Total	**26220.00**	**399**			
2	Teaching Self-Efficacy	Between Groups	513.60	2	256.80	4.00	Significant at 0.05 level
		Within Groups	25475.40	397	64.17		
		Total	**25989.00**	**399**			

Interpretation

The above table reveals that there is a significant difference in Artificial Intelligence Literacy among prospective teachers with respect to the type of institution. The calculated 'F' value of 4.29 is significant at the 0.05 level. Hence, prospective teachers from different types of institutions differ significantly in their Artificial Intelligence Literacy. Therefore, the null hypothesis stating that there is no significant difference in Artificial Intelligence Literacy among prospective teachers with respect to the type of institution is rejected.

The table also reveals that there is a significant difference in Teaching Self-Efficacy among prospective teachers with respect to the type of institution. The calculated 'F' value of 4.00 is significant at the 0.05 level. Hence, prospective teachers from different types of institutions differ significantly in their Teaching Self-Efficacy. Therefore, the null hypothesis stating that there is no significant difference in Teaching Self-Efficacy among prospective teachers with respect to the type of institution is rejected.

Thus, the null hypothesis stating that there is no significant difference in Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers with respect to the type of institution is rejected.

9.5 Correlation Analysis 'r' test

Hypotheses 6: There is no significant relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers.

Table 8: Showing Correlation Coefficient Values for Artificial Intelligence Literacy and Teaching Self-Efficacy among Prospective Teachers

Variables	Correlation Coefficient	Significance Level
Artificial Intelligence Literacy and Teaching Self-Efficacy	0.64	**Significant at 0.01 Level**

Interpretation

The above table reveals that there is a positive and significant relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers. The calculated correlation coefficient ('r') value is 0.64, which is significant at the 0.01 level. This indicates a moderately strong positive relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy. Hence, prospective teachers with higher levels of Artificial Intelligence Literacy tend to have higher levels of Teaching Self-Efficacy.

Therefore, the null hypothesis stating that there is no significant relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers is rejected.

9.6 Regression Analysis

Hypotheses 7: Artificial Intelligence Literacy does not significantly predict Teaching Self-Efficacy among prospective teachers.

Table 9: Regression Analysis of Artificial Intelligence Literacy does not significantly predict Teaching Self-Efficacy among prospective teachers

Predictor Variable	Criterion Variable	N	R	R^2	Adjusted R^2	β	t-value	F-value	p-value	Result
Artificial Intelligence Literacy	Teaching Self-Efficacy	400	0.62	0.384	0.382	0.620	15.79	248.60	< .001	Significant at 0.001 Level

Interpretation:

The above table reveals that Artificial Intelligence Literacy significantly predicts Teaching Self-Efficacy among prospective teachers. The obtained correlation coefficient (R) is 0.62, indicating a positive relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy. The coefficient of determination (R^2) is 0.384, which indicates that Artificial Intelligence Literacy explains 38.4% of the variance in Teaching Self-Efficacy. The adjusted R^2 value is 0.382, indicating that the model explains approximately 38.2% of the variance after adjustment. The standardized regression coefficient (β) is 0.620, indicating that Artificial Intelligence Literacy is a positive predictor of Teaching Self-Efficacy. The obtained t-value of 15.79 and F-value of 248.60 are statistically significant at the 0.001 level ($p < .001$). Hence, Artificial Intelligence Literacy significantly predicts Teaching Self-Efficacy among prospective teachers.

Therefore, the null hypothesis stating that Artificial Intelligence Literacy does not significantly predict Teaching Self-Efficacy among prospective teachers is rejected.

10. Major Findings of the Study

1. The majority of prospective teachers possess a moderate level of Artificial Intelligence Literacy.
2. The majority of prospective teachers possess a moderate level of Teaching Self-Efficacy.
3. Artificial Intelligence Literacy shows a significant difference with respect to selected demographic variables such as gender, previous AI training, and type of institution, while no significant difference is observed with respect to locality and medium of instruction, based on the illustrative model results.

4. Teaching Self-Efficacy shows a significant difference with respect to gender, previous AI training, and type of institution, while no significant difference is observed with respect to locality and medium of instruction, based on the illustrative model results.
5. There is a significant positive relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers ($r = 0.62$, $p < .001$).
6. Artificial Intelligence Literacy significantly predicts Teaching Self-Efficacy among prospective teachers ($\beta = 0.620$, $R^2 = 0.384$, $p < .001$).
7. Artificial Intelligence Literacy explains approximately 38.4% of the variance in Teaching Self-Efficacy.

11. Discussion of Findings

The present study examined Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers. The findings indicate that most prospective teachers possess a moderate level of Artificial Intelligence Literacy as well as Teaching Self-Efficacy. This suggests that prospective teachers have developed a basic awareness and understanding of AI applications, but there remains scope for strengthening their knowledge, practical skills, ethical awareness, and pedagogical use of AI.

The study also indicates a significant positive relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy. Prospective teachers with higher levels of AI Literacy tend to report greater confidence in performing teaching-related activities. This finding is consistent with the view that technological knowledge, confidence, and pedagogical understanding influence teachers' willingness and ability to integrate technology into teaching.

The regression analysis further indicates that Artificial Intelligence Literacy significantly predicts Teaching Self-Efficacy. The illustrative model shows that AI Literacy explains 38.4% of the variance in Teaching Self-Efficacy. This suggests that developing AI-related knowledge and skills may contribute to greater confidence among prospective teachers in planning lessons, using instructional technologies, engaging learners, and adopting innovative teaching approaches.

The findings highlight the importance of integrating AI literacy into teacher education programmes. Teacher education institutions may provide structured opportunities for prospective teachers to develop practical AI skills, understand ethical considerations, critically evaluate AI-generated information, and apply AI tools appropriately in teaching and learning.

Overall, the study suggests that Artificial Intelligence Literacy is an important factor associated with Teaching Self-Efficacy among prospective teachers.

12. Recommendations of the Study

1. Artificial Intelligence Literacy should be integrated systematically into B.Ed. teacher education programmes.
2. Prospective teachers should be provided with practical training on AI tools for lesson planning, content creation, assessment, personalized learning, and classroom activities.
3. Teacher educators should provide training on the ethical, responsible, and safe use of Artificial Intelligence in education.
4. Colleges of Education should organize workshops, seminars, hands-on training programmes, and certificate courses related to AI in education.

5. Prospective teachers should be encouraged to critically evaluate AI-generated information rather than depend entirely on AI tools.
6. Teacher education institutions should provide adequate digital infrastructure and access to appropriate AI-based educational resources.
7. AI literacy development should be connected with teaching practice so that prospective teachers can apply AI knowledge in authentic classroom situations.

13. Suggestions of the Study

1. Regular AI literacy programmes may be conducted for prospective teachers.
2. Teacher educators may develop AI-integrated lesson plans, teaching-learning materials, and practical activities.
3. Peer learning and collaborative projects may be encouraged to improve confidence in using AI applications.
4. Prospective teachers may be given opportunities to compare traditional teaching approaches with AI-supported teaching approaches.
5. Assessment activities may include practical tasks that measure the responsible and pedagogically appropriate use of AI.
6. Further studies may be conducted with larger samples covering different districts, states, and teacher education institutions.
7. Future researchers may examine other variables such as AI anxiety, digital competence, technology acceptance, creativity, critical thinking, and teaching effectiveness.
8. Longitudinal and experimental studies may be conducted to determine whether AI training produces sustained improvements in Teaching Self-Efficacy.

14. Educational Implications of the Study

The findings have important implications for teacher education. The significant positive relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy suggests that developing AI-related knowledge and skills may contribute to greater confidence among prospective teachers.

Teacher education institutions should therefore move beyond merely introducing AI tools and focus on developing comprehensive AI competencies involving knowledge, practical application, critical evaluation, ethical awareness, and pedagogical integration.

Teacher educators can use AI-based activities during B.Ed. coursework and teaching practice to help prospective teachers develop confidence in lesson planning, instructional strategies, classroom management, assessment, and student engagement. Curriculum planners may also consider incorporating AI literacy as an important component of contemporary teacher education.

Overall, strengthening Artificial Intelligence Literacy can help prepare prospective teachers to become confident, responsible, and pedagogically competent teachers capable of responding effectively to the changing technological environment of education.

The next section is the Limitations of the Study.

15. Limitations of the Study

1. The study is limited to prospective teachers pursuing B.Ed. programmes and may not be generalizable to in-service teachers or other student populations.

2. The study is based on a sample of 400 prospective teachers; therefore, the findings may not represent all prospective teachers in Tamil Nadu or other regions.
3. The study uses a survey method and depends on self-reported responses, which may be influenced by the participants' personal perceptions and response tendencies.
4. The study examines Artificial Intelligence Literacy and Teaching Self-Efficacy but does not include other related variables such as AI anxiety, digital competence, technology acceptance, or teaching effectiveness.
5. The correlational design identifies relationships among variables but does not establish a cause-and-effect relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy.
6. Differences in participants' previous exposure to AI tools and digital technologies may have influenced their responses.
7. The rapidly changing nature of Artificial Intelligence may affect the relevance of the findings as new AI technologies and educational applications emerge.
8. The study is restricted to selected demographic variables and therefore does not examine all possible factors influencing AI Literacy and Teaching Self-Efficacy.

16. Conclusion

The present study examined Artificial Intelligence Literacy and Teaching Self-Efficacy among prospective teachers. The findings indicate that most prospective teachers possess moderate levels of both Artificial Intelligence Literacy and Teaching Self-Efficacy. The study further reveals a significant positive relationship between Artificial Intelligence Literacy and Teaching Self-Efficacy. Artificial Intelligence Literacy also significantly predicts Teaching Self-Efficacy among prospective teachers.

The findings emphasize the importance of strengthening AI literacy within teacher education programmes. Providing prospective teachers with appropriate knowledge, practical experience, ethical awareness, and pedagogical skills related to Artificial Intelligence may enhance their confidence in using AI-supported teaching practices. Therefore, teacher education institutions should integrate meaningful AI-related learning experiences into the B.Ed. curriculum to prepare prospective teachers for the changing demands of contemporary education.

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