A Study of the Awareness about Artificial Intelligence (AI) among Pre-service Teachers

A Dissertation Submitted to Barkatullah University, Bhopal in the partial fulfilment of the requirement for the degree of

Two-Year M.Ed. (R.I.E.)

Session 2023-25

Supervisor

Prof. I B Chughtai

Professor in Education,

Department of Education,

RIE, Bhopal

Research Scholar

Khatri Jayeshkumar

Student of Two-Year M.Ed. (R.I.E.)

RIE, Bhopal

Roll No. - 2406600313

REGIONAL INSTITUTE OF EDUCATION, BHOPAL

National Council of Educational Research and Training (NCERT)

Shyamala Hills, Bhopal -462002

Declaration

I hereby declare that this study entitled, **"A Study of the Awareness about Artificial Intelligence (AI) among Pre-service Teachers"** has been carried out by me during the academic years 2023-2025 in partial fulfilment of the requirement for the degree of Two-Year M.Ed. (R.I.E.) course of Barkatullah University, Bhopal (M.P).

This study has been conducted under the guidance and supervision of Prof. I. B. Chughtai, Professor in Education, Department of Education, Regional Institute of Education (NCERT), Bhopal (M.P.).

I hereby declare that the research work done by me is original. This dissertation has not been submitted by me for the award of any degree or diploma in any other Institute/University.

Date:

Place: Bhopal

Khatri Jayeshkumar
Student of Two-Year M.Ed. (RIE)
Regional Institute of Education, Bhopal

Certificate

This is to certify that **Khatri Jayeshkumar** student of Two-year M.Ed. (R.I.E.) course in the year 2023-2025 of Regional Institute of Education, Bhopal has worked under my guidance and supervision for his dissertation **"A Study of the Awareness about Artificial Intelligence (AI) among Pre-service Teachers".** This piece of research work is genuine and ready for submission and evaluation.

Date:

Place: Bhopal

Prof. I. B. Chughtai

Professor in Education

Department of Education, RIE, Bhopal

ACKNOWLEDGEMENT

I would like to express my deep sense of gratitude and admiration to my guide **Prof. I. B. Chughtai**, Professor in Education, Department of Education, Regional Institute of Education (NCERT), Bhopal (M.P.) for his constant encouragement, kind support, and invaluable guidance to carry out the work presented in this dissertation. He has been a great driving force and inspiration for me throughout the dissertation work.

I am indebted to **Prof. S. K. Gupta**, Principal, RIE, Bhopal, **Prof. J. Mandal**, ex-Principal, RIE, Bhopal, **Prof. Ayushman Goswami**, Head, Department of Education, for providing enough learning facilities and educational environment in the campus.

I am thankful to **Prof. Ratnamala Arya**, **Prof. N.C. Ojha**, **Dr. S. K. Pandagale**, **Dr. Saurabh Kumar**, as well as other faculty members of RIE, Bhopal for their advice and help for successful completion of the dissertation.

I am very thankful to **Dr. P.K. Tripathy**, Deputy Librarian and the staff of the library who rendered all kind of possible support by providing source material for completion of my dissertation work.

I would like to give my special thanks to the Principal and other faculties of IASE, Bhopal for granting me permission to collect the data from the students of their Institutes. Students selected in the sample deserve my sincere thanks for cooperating with me and for providing the required information regarding the present work.

I am also indebted to the authors and researchers whose studies have enriched my knowledge and was useful in my research work.

I would also like to extend my special heartfelt thanks to my classmate for providing me with their company and valuable inputs as when I needed.

Place:

Date:

Khatri Jayeshkumar

Student of Two-Year M.Ed. (RIE)

Regional Institute of Education, Bhopal

Contents

LIST OF TABLES

Chapter-I

Introduction

1.1 Introduction

In the modern era, Artificial Intelligence (AI) has become a defining feature of technological advancement and societal transformation. Originally developed to simulate human intelligence through machines, AI now permeates nearly every sphere of life, including healthcare, transportation, finance, and increasingly, education. In the field of education, AI has emerged as a powerful tool for enhancing teaching and learning processes through innovations such as adaptive learning platforms, intelligent tutoring systems, automated assessments, and virtual teaching assistants. These technologies provide real-time feedback, personalize learning pathways, and support teachers in curriculum planning and student evaluation.

The 21st-century education landscape is characterized by rapid digitalization, demanding a new set of competencies from both learners and educators. Teachers are no longer mere transmitters of knowledge but are facilitators and guides in complex, technology-rich environments. AI, in this regard, offers numerous benefits—it can analyse student data to provide individualized learning experiences, identify learning gaps, automate routine administrative tasks, and even suggest pedagogical strategies tailored to specific learner profiles. These capabilities hold immense promise for transforming conventional classrooms into inclusive, efficient, and personalized learning spaces.

However, the successful integration of AI into educational settings hinges upon teachers' awareness, understanding, and readiness to adopt such tools. Unfortunately, there is a growing concern that pre-service teachers—those currently undergoing formal teacher education—are not adequately prepared for this transformation. Studies across various countries have indicated a lack of awareness and training regarding AI applications among pre-service teachers, making it difficult for them to appreciate its significance or apply it in pedagogical contexts.

The COVID-19 pandemic brought these challenges into sharp focus. As schools and colleges transitioned abruptly to online platforms, the digital divide and gaps in teacher preparedness became evident. While many educators adapted to basic digital tools like Zoom or Google Meet, the utilization of advanced AI-driven educational technologies remained limited. This situation highlighted the critical need to reform teacher

education programs so that future educators are not only digitally literate but also AI-literate.

In light of this, the present study seeks to explore and evaluate the level of awareness among pre-service teachers regarding Artificial Intelligence in education. Understanding their current knowledge, perceptions, and readiness can serve as a foundational step in developing strategies for integrating AI content into teacher training programs. It also helps in identifying the barriers that prevent future teachers from adopting such emerging technologies.

1.2 Rationale of the Study

The rationale for this study stems from the increasing relevance of AI in educational reform and innovation. As AI-driven tools become more widespread and affordable, their adoption in school education is expected to rise. However, the successful implementation of these tools relies on the ability of teachers to understand and utilize them effectively. If pre-service teachers remain unaware or untrained in using AI, the potential benefits of these technologies will remain untapped.

Furthermore, India's National Education Policy (NEP) 2020 emphasizes the integration of digital technologies and 21st-century skills in school education and teacher training. In alignment with this vision, teacher education institutions must prepare future teachers to operate effectively in technology-enhanced learning environments. Despite this policy push, there exists limited research on the actual awareness and preparedness of Indian pre-service teachers regarding AI, particularly in regional or semi-urban contexts.

This study addresses this gap by investigating the awareness level of pre-service teachers studying in Bhopal city. The research findings will be instrumental in informing curriculum designers, policymakers, and teacher educators about the current state of AI awareness among future teachers, thereby providing a basis for curriculum reform and professional development programs.

1.3 Statement of the Problem

"A Study of the Awareness about Artificial Intelligence (AI) among Pre-service Teachers"

1.4 Objectives of the Study

This study aims to:

1. Assess the level of awareness of pre-service teachers regarding Artificial Intelligence (AI) and its educational applications.
2. Identify the key factors—such as previous exposure to AI, curriculum content, institutional support, and digital literacy—that influence pre-service teachers' awareness.
3. Provide suggestions and recommendations for improving AI-related content in teacher education programs to better prepare future educators for technology-integrated teaching.

1.5 Significance of the Study

This study is significant for several reasons:

- **For Pre-service Teachers:** It offers them a chance to reflect on their readiness to engage with future educational technologies and understand the expectations from 21st-century teaching roles.
- **For Teacher Educators and Institutions:** The findings will provide valuable data to enhance teacher education curricula by integrating AI-related modules, workshops, or projects.
- **For Policy Makers and Curriculum Developers:** The study can support data-driven decisions in shaping national-level teacher education reforms in line with NEP 2020 and international trends.
- **For Educational Researchers:** The study contributes to the academic discourse on digital pedagogy, emerging technologies, and teacher readiness for AI-based teaching practices.
- **For Developers of AI Tools:** The insights into user awareness can help developers create more intuitive, accessible, and educator-friendly AI solutions tailored to school environments.

1.6 Operational Definitions of Key Terms

- **Artificial Intelligence (AI):** Refers to computer systems or software that perform tasks typically requiring human intelligence, such as problem-solving,

pattern recognition, decision-making, and learning. In education, AI may include adaptive learning systems, intelligent tutoring systems, and automated grading.

- **Pre-service Teachers:** Individuals enrolled in a teacher education program who have not yet entered full-time teaching positions but are undergoing training to become professional educators.
- **Awareness:** In this study, awareness refers to the extent of knowledge, understanding, familiarity, and perceptions that pre-service teachers have about AI, its uses in education, potential benefits, challenges, and ethical considerations.

Chapter-II

Review Of Related Literature

2.1 Introduction

This chapter presents a comprehensive review of literature relevant to the awareness of Artificial Intelligence (AI) in education, particularly among pre-service teachers. The review covers global and Indian perspectives, theoretical underpinnings, empirical studies, and identifies existing research gaps. The aim is to provide a conceptual foundation for the study and justify the need for assessing AI awareness among future educators.

2.2 Concept and Evolution of Artificial Intelligence in Education

Artificial Intelligence, traditionally defined as the simulation of human intelligence by machines, has evolved from simple automation to complex learning systems capable of data analysis, decision-making, and personalized recommendations. In the educational context, AI is employed in a range of applications, including intelligent tutoring systems, predictive analytics, learning analytics, adaptive content delivery, chatbots, and automated grading systems (Murphy, 2019).

VanLehn (2011) demonstrated that intelligent tutoring systems can rival human tutors in effectiveness, particularly when tailored to students' needs. The evolution of AI in education has moved from supporting basic automation to playing a central role in pedagogy and curriculum design.

2.3 Global Research on AI Awareness Among Teachers

International research emphasizes the importance of equipping teachers with AI-related competencies. **Karsenti (2019)** argues that teacher education systems are not adequately preparing teachers to use AI tools in classrooms, which leads to low confidence and resistance toward adopting such technologies.

In Saudi Arabia, **Al-Ghamdi and Al-Frani (2020)** found that teachers had limited practical understanding of AI applications in education despite recognizing its potential. Similarly, **Mahmoud (2020)** highlighted the lack of structured training as a barrier to AI integration in educational systems in the Middle East and North Africa region.

In Canada, **Karsenti (2019)** reported that only a small fraction of teacher education programs includes AI literacy, despite the increasing demand for such knowledge in modern classrooms. These findings underline a global trend: while AI's importance in

education is widely acknowledged, there is a lack of systematic effort to prepare teachers for its implementation.

2.4 Indian Context of AI Awareness in Education

India's **National Education Policy (NEP) 2020** encourages the integration of digital and emerging technologies, including AI, into all levels of education. However, **Tripathi (2024)** found that undergraduate students in India displayed only moderate levels of awareness about AI, and the knowledge was often theoretical rather than practical.

There is a limited body of research focusing specifically on pre-service teachers in India. **AlKanaan (2022)**, although studying science education, found that many teacher trainees lacked a clear understanding of AI concepts and their classroom applications. This indicates a significant gap in teacher education curricula, where digital technologies are introduced, but AI is often left unexplored.

2.5 Factors Influencing AI Awareness Among Pre-Service Teachers

Several studies have explored the factors that influence awareness and readiness to adopt AI in educational settings. These include:

- **Curriculum Content**: The presence (or absence) of AI-related modules in teacher education programs has a strong impact on awareness levels **(Chen, 2024)**.
- **Digital Literacy**: Pre-service teachers with higher levels of general digital literacy tend to have greater awareness of AI tools and their applications **(Incerti, 2020)**.
- **Institutional Support**: Institutions that provide workshops, demonstrations, and access to AI tools foster higher levels of awareness and interest among trainees **(Mahmoud, 2020**).

2.6 Challenges in Integrating AI Into Teacher Education

While the benefits of AI in education are well-documented, the integration process faces several challenges:

- **Lack of Training**: Teachers often report a lack of formal training or guidance in using AI tools **(Aldosari, 2020)**.

- **Ethical Concerns**: Issues such as data privacy, algorithmic bias, and surveillance have emerged as concerns in the use of AI in classrooms **(Floridi et al., 2018)**.
- **Resource Inequality**: The digital divide remains a barrier, especially in under-resourced teacher education institutions **(Zarrouki & Falata, 2020)**.

These challenges emphasize the need for a robust policy and curriculum framework that balances innovation with ethical and practical considerations.

2.7 Theoretical and Conceptual Framework

This study draws on **Technological Pedagogical Content Knowledge (TPACK)** and **Diffusion of Innovations Theory** as its conceptual underpinnings.

- **TPACK Framework**: Introduced by Mishra and Koehler (2006), the TPACK model emphasizes the integration of technology, pedagogy, and content knowledge. For effective AI adoption, pre-service teachers must develop all three domains.
- **Diffusion of Innovations Theory** (Rogers, 2003): This theory explains how innovations spread through social systems over time. Teachers, particularly pre-service ones, fall into different adopter categories based on their awareness and openness to new technologies like AI.

These frameworks provide a lens to examine not only the level of AI awareness but also the readiness of pre-service teachers to adopt such innovations.

2.8 Research Gaps Identified

- There is a scarcity of Indian research that specifically targets AI awareness among **pre-service teachers** as opposed to in-service professionals or general students.
- Existing studies often lack a **mixed-method approach** to provide a comprehensive understanding of both quantitative awareness levels and qualitative insights.
- Few studies provide **practical recommendations** for integrating AI into teacher education curricula.

The current study seeks to bridge these gaps by focusing on pre-service teachers in Bhopal using both quantitative surveys and qualitative interviews.

2.9 Summary

The literature clearly shows that while AI is poised to transform education, the preparedness of teachers—especially pre-service teachers—remains a challenge. Awareness is the foundational step toward adoption, and without deliberate efforts in teacher education, the potential of AI in classrooms may remain underutilized. This review reinforces the need for the present study, which aims to assess the awareness of AI among pre-service teachers, identify influencing factors, and offer data-backed recommendations for curriculum development.

Chapter-III

Methodology

3.1 Introduction

This chapter outlines the methodology adopted to examine the awareness of Artificial Intelligence (AI) among pre-service teachers. Given the emerging role of AI in education and the need to assess the preparedness of future educators, the study adopts a quantitative approach based on survey research. This chapter details the research design, sample, tools used, data collection and analysis procedures, along with ethical considerations and delimitations of the study.

3.2 Research Design

The study employed a **descriptive survey design** using a structured questionnaire to quantitatively assess the level of awareness, attitudes, and perceived challenges related to AI among pre-service teachers. The survey design was chosen as it allows for the systematic collection of data from a large group to generalize findings regarding awareness levels and related factors.

3.3 Population and Sample

3.3.1 Population

The population consisted of all pre-service teachers enrolled in teacher education programs at **IASE (Institute of Advanced Studies in Education), Bhopal**, during the academic session 2024–2025.

3.3.2 Sample

The sample included **121 pre-service teachers** who responded to the online questionnaire. The entire sample was drawn from IASE, Bhopal, using a **convenience sampling technique**, given accessibility and the voluntary nature of participation through Google Forms.

3.4 Research Questions

This study aims to answer the following research questions:

1. What is the level of awareness among pre-service teachers about Artificial Intelligence (AI) and its applications in education?

2. What are the major sources of AI knowledge and exposure for pre-service teachers?
3. What are the attitudes of pre-service teachers toward the use of AI in education?
4. What level of preparedness does pre-service teachers perceive they have for integrating AI tools into their future teaching practices?
5. What challenges and concerns do pre-service teachers anticipate in using AI in educational contexts?

3.5 Research Tool

A **Google Form-based structured questionnaire** was developed by the researcher. The instrument consisted of both closed-ended and multiple-choice questions divided into five sections:

- **Section A: General Awareness of AI**
    - Questions on prior knowledge of AI, sources of information, and perceived understanding.
- **Section B: AI in Education**
    - Awareness of AI applications in teaching, learning, assessment, and administration.
- **Section C: Attitudes Toward AI**
    - Perceived benefits, effectiveness, and concerns related to AI in educational settings.
- **Section D: Preparedness and Training**
    - Level of preparedness, previous training, interest in workshops, and perceived challenges.
- **Section E: Future Perspectives**
    - Views on integration of AI in teacher education and its impact on the teaching profession.

The tool was reviewed for **content validity** by experts in education and ICT. Reliability was established through a **pilot test**, and the internal consistency of the scale was deemed acceptable.

3.6 Procedure of Data Collection

Data collection was conducted through an **online Google Form**, which remained open for responses for a fixed duration in 23rd April 2025. The form was circulated among pre-service teachers of IASE, Bhopal, via email, WhatsApp groups, and classroom announcements.

Participants were informed about the purpose of the study, assured of confidentiality, and asked for informed consent before participation. A total of **121 valid responses** were recorded and used for analysis.

3.7 Data Analysis Techniques

Data collected through the Google Form were automatically compiled into Google Sheets and exported for statistical analysis.

- **Descriptive Statistics**:
    - Frequencies, percentages, and graphical representations were used to summarize data on awareness, usage, attitudes, and challenges.

Analysis was conducted using **Microsoft Excel and Google forms summary analysis**.

3.8 Ethical Considerations

- Participation in the survey was **voluntary**, and all participants provided **informed consent**.
- Anonymity of responses was maintained by not collecting personally identifiable data (except names, which were optional).
- The study was approved by the internal academic supervisor and adhered to the **research ethics guidelines of RIE, Bhopal**.

3.9 Delimitations of the Study

- The study is confined to a **single institution**: IASE, Bhopal.

- Only **pre-service teachers** enrolled during the academic session 2024–2025 were included.
- The research focuses exclusively on **awareness and perceptions** of AI, not on the technical proficiency or actual classroom implementation.
- Data were collected **online**, which may have excluded participants without digital access or familiarity.

Chapter-IV

Data Analysis and Interpretation

4.1 Introduction

This chapter presents the analysis and interpretation of the data collected through a structured Google Form survey. The survey aimed to assess the awareness of Artificial Intelligence (AI) among pre-service teachers at IASE, Bhopal, focusing on their general understanding, knowledge of AI applications in education, attitudes, perceived preparedness, and views on future integration.

A total of 121 responses were received. The data have been analysed using descriptive statistics such as frequency, percentage, and graphical interpretation. The findings are presented thematically, corresponding to the sections of the questionnaire.

4.2 Descriptive Analysis

4.2.1 Section A: General Awareness of Artificial Intelligence

Table 4.1: Shows Percentage & Frequency of response of Section A

	Question	Options	Frequency	Percentage
1	**Have you heard of Artificial Intelligence (AI)?**	Yes	116	95.9%
		No	5	4.1%
2	**Where did you first learn about AI? (Multiple responses)**	Media (TV, Internet, social media)	101	83.5%
		Academic Courses	14	11.6%
		Friends Circle	8	6.6%
		Workshops/Seminars	8	6.6%
3	**How would you describe your understanding of AI?**	Basic (e.g., AI is used in apps or websites)	58	47.9%
		Moderate (e.g., aware of applications like chatbots, voice assistants)	39	32.2%
		Advanced (e.g., knowledge of AI programming or algorithms)	24	19.8%
4		Rarely	46	38.0%

	How often do you encounter discussions about AI in your academic environment?	Occasionally	44	36.4%
		Frequently	25	20.7%
		Never	6	5.0%
5	**Which sectors outside education do you associate most with AI? (Multiple responses)**	Entertainment	72	59.5%
		Healthcare	42	34.7%
		Industry/Manufacturing	36	29.8%

Interpretation:

The data indicates that a large majority (95.9%) of the respondents have heard of Artificial Intelligence (AI), suggesting that AI has become a widely recognized concept among pre-service teachers. Most of this awareness stems from media sources such as television, the internet, and social media, as indicated by 83.5% of participants. In contrast, fewer respondents credited academic courses (11.6%) or workshops and peer discussions (6.6% each) as their source of information. Regarding their understanding of AI, nearly half (47.9%) described it as basic, such as being aware of AI in apps and websites, while 32.2% had a moderate understanding that included familiarity with applications like chatbots and voice assistants. Only 19.8% reported an advanced understanding involving programming or algorithms. When asked about how often AI is discussed in their academic environment, 38.0% mentioned such discussions were rare, and 36.4% said they occurred occasionally, reflecting a limited academic engagement with the topic. Additionally, students mostly associated AI with sectors like entertainment (59.5%) and healthcare (34.7%), indicating a broader understanding of AI's societal presence beyond the field of education.

4.2.2 Section B: Awareness of AI in Education

Table 4.2 Shows Percentage & Frequency of response of Section B

	Question	**Options**	**Frequency**	**Percentage**
1	**Are you aware of AI applications in education?**	Yes	97	80.2%
		No	24	19.8%
2	**Have you used any AI tools in academics?**	Yes	97	80.2%
		No	24	19.8%

3	**Do you think AI can replace traditional teaching methods?**	Yes	82	67.8%
		No	16	13.2%
		Not Sure	23	19.0%
4	**Which areas of education can benefit most from AI? (Multiple responses)**	Student assessment	83	68.6%
		Administrative tasks	53	43.8%
		Personalised Learning	64	52.9%
		Curriculum development	81	66.9%
		Career guidance	72	59.5%
5	**Which AI applications in education are you aware of? (Multiple responses)**	Automated grading	59	48.8%
		Personalized learning tools	43	35.5%
		Virtual teaching assistants	55	45.5%
		AI-powered administrative tools	81	66.9%
6	**Common Tools Mentioned:**	ChatGPT, Gemini, Duolingo		

Interpretation:

Awareness of AI applications within education is relatively high, with 80.2% of respondents indicating they are familiar with such uses. The same percentage also reported having used AI tools in their academic activities, suggesting that exposure often translates into usage. However, opinions were divided on whether AI could replace traditional teaching methods—while 67.8% believed it could, 19.0% were uncertain, and a smaller fraction (13.2%) disagreed. When asked which educational areas could benefit most from AI, student assessment (68.6%), curriculum development (66.9%), and career guidance (59.5%) were commonly selected, showing a belief in

AI's potential to support both instructional and administrative roles. As for specific AI applications known to participants, administrative tools (66.9%) and automated grading systems (48.8%) topped the list, followed by virtual assistants and personalized learning platforms. Commonly mentioned tools included ChatGPT, Google Assistant, and Duolingo, reflecting popular and accessible technologies used in academic settings.

4.2.3 Section C: Attitudes Toward AI

Table 4.3 Shows Percentage & Frequency of response of Section C

	Question	Options	Frequency	Percentage
1	**Do you believe Al can improve teaching and learning experiences?**	Strongly Agree	32	26.4%
		Agree	68	56.2%
		Neutral	17	14.0%
		Disagree	3	2.5%
		Strongly Disagree	1	0.8%
2	**What do you see as the main benefits of Al in education? (Multiple responses)**	Better engagement	79	65.3%
		Efficient assessment	66	54.5%
		Personalised learning	76	62.8%
3	**What concerns do you have about AI in education? (Multiple responses)**	Privacy and security	86	71.1%
		Over-reliance on technology	60	49.6%
		Lack of teacher involvement	70	57.9%
4	**In your opinion, how can AI assist teachers in the classroom? (Multiple responses)**	Managing administrative tasks	64	52.9%
		Providing real-time feedback to students	73	60.3%
		Developing customized lesson plans	79	65.3%
		Enhancing student engagement	80	66.1%

5	**Which areas of teacher preparation should integrate AI-related skills? (Multiple responses)**	Professional development	69	57%
		Lesson planning and resource development	91	75.2%
		Classroom management and student assessment	92	76%

Interpretation:

Respondents generally held a positive attitude toward the use of AI in education. A substantial majority either agreed (56.2%) or strongly agreed (26.4%) that AI can enhance teaching and learning experiences. The perceived benefits of AI included better student engagement (65.3%), personalized learning opportunities (62.8%), and more efficient assessment processes (54.5%). Despite this optimism, several concerns were also noted. The most prominent worry was related to privacy and security (71.1%), followed by the fear of over-reliance on technology (49.6%) and diminished teacher involvement (57.9%). These concerns suggest a cautious approach to integrating AI. Respondents also saw AI as a helpful tool for educators, particularly in enhancing student engagement (66.1%) and creating customized lesson plans (65.3%). Furthermore, many participants expressed a belief that AI-related skills should be incorporated into teacher training, particularly in areas such as lesson planning (75.2%) and classroom management (76%).

4.2.4 Section D: Preparedness and Training

Table 4.4 Shows Percentage & Frequency of response of Section D

	Question	**Options**	**Frequency**	**Percentage**
1	**Have you received any training related to AI?**	Yes	27	22.3%
		No	94	77.7%
2	**Would you be interested in attending workshops or courses on AI in education?**	Yes	111	91.7%
		No	10	8.3%
3		Basic AI concepts	94	77.7%

	What topics would you like to learn about in relation to AI? (Multiple responses)	Ethical considerations in AI	61	50.4%
		AI applications in teaching	91	75.2%
4	**Do you feel prepared to integrate AI tools into your teaching practices?**	Yes	94	77.7%
		No	6	5%
		Not Sure	21	17.4%
5	**What challenges do you anticipate in using AI in the classroom? (Multiple responses)**	Resistance from students or parents	66	54.5%
		Lack of resources	76	62.8%
		Insufficient training	79	65.3%
		Ethical concerns	49	40.5%

Interpretation:

Despite high awareness and usage, only a small proportion (22.3%) of respondents had received formal training in AI, highlighting a significant gap in teacher preparation. However, there is strong interest in learning, with 91.7% expressing willingness to attend workshops or courses on AI in education. Participants showed particular interest in topics such as basic AI concepts (77.7%), AI applications in teaching (75.2%), and ethical considerations (50.4%), indicating a desire for comprehensive and balanced knowledge. When asked about their readiness to integrate AI into teaching, 77.7% felt prepared, though 17.4% remained uncertain. Anticipated challenges included insufficient training (65.3%), lack of resources (62.8%), and resistance from students or parents (54.5%). These challenges underscore the need for institutional support and structured training programs to build confidence and competence among pre-service teachers.

4.2.5 Section E: Future Perspectives

Table 4.5 Shows Percentage & Frequency of response of Section E

	Question	Options	Frequency	Percentage
1	**What potential challenges do you foresee in integrating AI into teaching practices? (Multiple responses)**	Resistance from educators or institutions	54	44.6%
		Lack of training for teachers	93	76.9%
		High costs of implementation	60	49.6%
2	**Do you think AI will impact the role of teachers?**	Yes, it will enhance the teacher's role	58	47.9%
		Yes, it will reduce the teacher's role	51	42.1%
		No, it will not impact the teacher's role	12	9.9%
3	**Would you support the integration of AI as a core subject in teacher training programs?**	Yes	109	90.1%
		No	5	4.1%
		Not Sure	7	5.8%
4	**How would you rate your institution's efforts in preparing students for AI-driven education?**	Excellent	35	28.9%
		Good	38	38%
		Average	39	32.2%
		Poor	1	0.8%

Interpretation:

Looking ahead, the major concern regarding AI integration in education was the lack of teacher training, identified by 76.9% of respondents. Other challenges included the high cost of AI implementation (49.6%) and resistance from educators or institutions (44.6%). Regarding the future role of teachers, opinions varied—47.9% believed AI would enhance the teacher's role, while 42.1% thought it would reduce their importance, showing uncertainty about the long-term impact. A strong majority (90.1%) supported the idea of including AI as a core subject in teacher training

programs, indicating readiness for curriculum reform. Finally, when evaluating their institution's efforts in preparing students for an AI-driven future, responses were mixed: 28.9% rated them as excellent, 38.0% as good, and 32.2% as average. This highlights the need for institutions to do more to equip future teachers for the challenges and opportunities presented by AI.

4.3 Discussion Based on Research Questions

This section presents a synthesis of the major findings of the study as they relate to the five research questions.

Research Question 1: What is the level of awareness among pre-service teachers about Artificial Intelligence (AI) and its applications in education?

The data revealed that while 95.9% of pre-service teachers had heard of AI, only 19.8% rated their understanding as advanced. Most respondents had basic (47.9%) or moderate (32.2%) awareness. Although 80.2% reported being aware of AI applications in education, the depth of knowledge remains limited, highlighting a gap between general awareness and meaningful understanding.

Research Question 2: What are the major sources of AI knowledge and exposure for pre-service teachers?

Media emerged as the predominant source of information (83.5%), while only 11.6% attributed their knowledge to academic coursework. Workshops and peer interactions accounted for an even smaller fraction. This indicates a lack of structured exposure to AI within teacher education curricula and reinforces the need for institutional efforts to provide formal learning experiences.

Research Question 3: What are the attitudes of pre-service teachers toward the use of AI in education?

The majority of respondents expressed positive attitudes: 82.6% agreed or strongly agreed that AI can enhance teaching and learning. Key perceived benefits included personalized learning, improved engagement, and efficient assessment. However, concerns such as data privacy (71.1%), diminished teacher roles (57.9%), and over-reliance on technology (49.6%) were prevalent, indicating a need for ethical and pedagogical training alongside technical understanding.

Research Question 4: What level of preparedness do pre-service teachers perceive they have for integrating AI tools into their future teaching practices?

Only 22.3% of participants had received formal training in AI, yet 77.7% believed they were prepared to integrate AI into teaching. This discrepancy suggests an overestimation of readiness or a lack of awareness regarding the competencies required. Importantly, 91.7% showed interest in attending AI-related workshops, reflecting a strong willingness to learn and upskill.

Research Question 5: What challenges and concerns do pre-service teachers anticipate in using AI in educational contexts?

Participants identified multiple anticipated barriers, including lack of training (65.3%), inadequate resources (62.8%), and resistance from stakeholders (54.5%). High implementation costs and institutional inertia were also noted. These challenges highlight systemic issues in current teacher education programs that must be addressed through targeted reforms and resource allocation.

4.4 Conclusion

The interpretation of the data reveals that pre-service teachers possess a high level of general awareness about Artificial Intelligence (AI), primarily gained through media rather than formal academic channels. While most respondents have a basic to moderate understanding of AI and actively use AI tools in academic settings, their exposure to structured learning or formal training in AI remains limited. Attitudes toward AI in education are largely positive, with many recognizing its potential to enhance engagement, personalize learning, and support administrative tasks. However, concerns regarding privacy, over-reliance on technology, and the diminishing role of teachers are also prevalent.

Despite the lack of formal training, the majority of pre-service teachers express a strong interest in learning more about AI, particularly in practical and ethical domains. They also foresee challenges in implementation, such as lack of training, insufficient resources, and institutional resistance. Nonetheless, there is overwhelming support for integrating AI into teacher education programs, both as a subject and as a tool to enhance teaching practices. The findings highlight a clear readiness and willingness among pre-service teachers to embrace AI in education, provided adequate support, training, and institutional commitment are in place.

Chapter-V

Summary, Findings and Conclusion

5.1 Introduction

This chapter presents a summary and interpretation of the key results obtained from the data analysis described in Chapter IV. The findings are organized in accordance with the research objectives and Research Questions outlined in Chapter I. Based on the data collected from 121 pre-service teachers of IASE, Bhopal, this chapter highlights the patterns in awareness, attitudes, preparedness, and perspectives regarding the use of Artificial Intelligence (AI) in education.

5.2 Statement of the Problem

"A Study of the Awareness about Artificial Intelligence (AI) among Pre-service Teachers"

5.3 Delimitations of the Study

- The study is confined to a **single institution**: IASE, Bhopal.
- Only **pre-service teachers** enrolled during the academic session 2024–2025 were included.
- The research focuses exclusively on **awareness and perceptions** of AI, not on the technical proficiency or actual classroom implementation.
- Data were collected **online**, which may have excluded participants without digital access or familiarity.

5.4 Objectives of the Study

This study aims to:

1. Assess the level of awareness of pre-service teachers regarding Artificial Intelligence (AI) and its educational applications.
2. Identify the key factors—such as previous exposure to AI, curriculum content, institutional support, and digital literacy—that influence pre-service teachers' awareness.
3. Provide suggestions and recommendations for improving AI-related content in teacher education programs to better prepare future educators for technology-integrated teaching.

5.5 Research Questions

This study was guided by the following research questions:

1. What is the level of awareness among pre-service teachers about Artificial Intelligence (AI) and its applications in education?
2. What are the major sources of AI knowledge and exposure for pre-service teachers?
3. What are the attitudes of pre-service teachers toward the use of AI in education?
4. What level of preparedness does pre-service teachers perceive they have for integrating AI tools into their future teaching practices?
5. What challenges and concerns do pre-service teachers anticipate in using AI in educational contexts?

5.6 Summary of Key Findings

Objective 1: To assess the level of awareness of pre-service teachers regarding Artificial Intelligence (AI) and its educational applications.

- **Finding:**
  95.9% of participants had heard about AI. However, only 19.8% rated their understanding as advanced, with the majority (47.9%) reporting only basic understanding.
- **Interpretation:**
  Awareness is widespread, but depth of understanding is limited, indicating a superficial or general familiarity with AI concepts.

Objective 2: To identify the key factors—such as previous exposure to AI, curriculum content, institutional support, and digital literacy—that influence pre-service teachers' awareness.

- **Findings:**
  - Primary sources of AI awareness were media (83.5%), not academic courses (11.6%).
  - Only 22.3% had received any formal training on AI.
  - Institutional efforts were rated "excellent" by only 28.9% of students.
- **Interpretation:**
  Factors such as institutional support and curriculum integration appear to be

weak. Media plays a disproportionate role in shaping AI awareness, suggesting a need for formal inclusion of AI in teacher education programs.

Objective 3: To provide recommendations for integrating AI-related content into teacher education programs.

- **Finding:**
  90.1% of participants supported the idea of integrating AI as a core subject in teacher education. 91.7% expressed willingness to attend workshops or courses related to AI.
- **Interpretation:**
  There is strong student support for institutional reforms. The findings reinforce the need for curriculum designers and policymakers to implement AI training in pre-service teacher programs.

5.7 Educational Implications

- **For Teacher Education Institutions:** AI should be introduced not just as a concept but as a practical tool in pedagogy, curriculum development, and classroom management. Institutions must also organize workshops and training sessions to improve teacher readiness.
- **For Curriculum Developers:** Incorporate AI literacy and ethical understanding into teacher education curricula aligned with NEP 2020.
- **For Policymakers:** The findings underscore the urgency for national-level teacher education policies that mandate AI awareness and competency.
- **For Pre-service Teachers:** There is a growing need for them to take initiative in learning about AI, participate in professional development, and become proactive contributors to tech-integrated learning environments.

5.8 Suggestions for Further Research

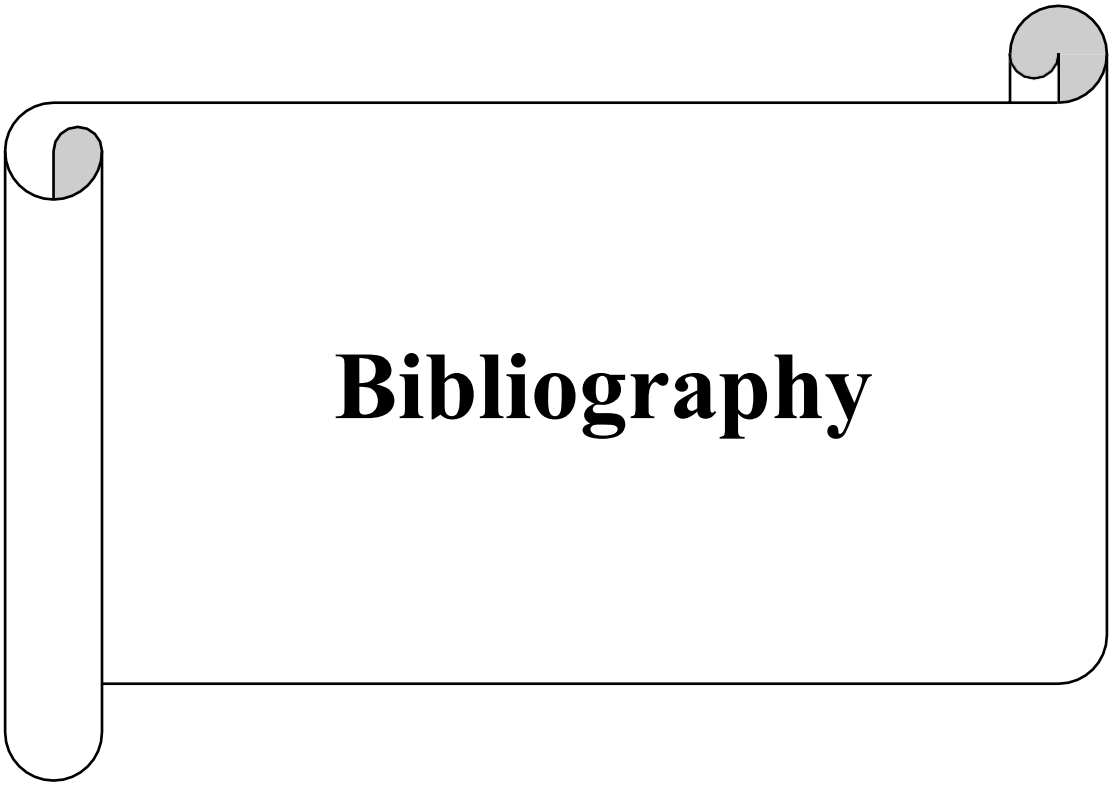
1. Conduct similar studies in rural, tribal, or underrepresented regions.
2. Explore the **effectiveness** of AI-integrated teaching practices through experimental or longitudinal studies.
3. Investigate the **AI skill gap** among in-service vs. pre-service teachers.

4. Study **gender-based or subject-specific differences** in AI awareness and readiness.
5. Design and evaluate an **AI module or workshop** for teacher education and study its impact.
6. Examine the **ethical and psychological dimensions** (e.g., trust, bias, autonomy) of AI in classrooms.

5.9 Conclusion

The study concludes that while AI is a familiar concept among pre-service teachers, deep understanding and practical readiness are still lacking. There is an urgent need to reform teacher education curricula to include AI-focused content and hands-on exposure. The findings also highlight strong interest and openness among future teachers to learn and engage with AI, making them well-positioned for capacity-building interventions.

Teacher education programs must recognize the critical role AI will play in 21st-century classrooms and provide systematic, structured, and ethical training to ensure that future educators are equipped not just to use AI but to lead innovation in tech-integrated learning environments.



Bibliography

Bibliography

Al-Ghamdi, S. F., & Al-Frani, L. A. (2020). The reality of using artificial intelligence applications in private education schools. *International Journal of Educational and Psychological Studies*, 8(1), 57–76.

AlKanaan, H. M. N. (2022). Awareness regarding the implication of artificial intelligence in science education among pre-service science teachers. *International Journal of Instruction*, 15(3), 895–912. https://doi.org/10.29333/iji.2022.15348a

Aldosari, S. A. M. (2020). The future of higher education in the light of artificial intelligence transformations. *International Journal of Higher Education*, 9(3), 145–151.

Abulibdeh, A., Zaidan, E., & Abulibdeh, R. (2024). Navigating the confluence of artificial intelligence and education for sustainable development in the era of industry 4.0: Challenges, opportunities, and ethical dimensions. *Journal of Cleaner Production*, 140527.

Chen, H. (2024). The ethical challenges of educational artificial intelligence and coping measures: A discussion in the context of the 2024 World Digital Education Conference. *Science Insights Education Frontiers*, 20(2), 3263–3281.

Cukurova, M. (2024). The interplay of learning, analytics and artificial intelligence in education: A vision for hybrid intelligence. *British Journal of Educational Technology*.

Floridi, L., Cowls, J., Beltrametti, M., et al. (2018). AI4People—An ethical framework for a good AI society. *Minds and Machines*, 28(4), 689–707.

Jia, F., Sun, D., & Looi, C. K. (2024). Artificial intelligence in science education (2013–2023): Research trends in ten years. *Journal of Science Education and Technology*, *33*(1), 94-117.

Incerti, F. (2020). Preservice teachers' perceptions of artificial intelligence tutors for learning. Unpublished PhD dissertation, The Patton College of Education.

Karsenti, T. (2019). Artificial intelligence in education: The urgent need to prepare teachers. *Formation et Profession*, 27(1), 105–111.

Mahat, D., Neupane, D., & Shrestha, S. (2024). Quantitative Research Design and Sample Trends: A Systematic Examination of Emerging Paradigms and Best Practices. *Cognizance Journal of Multidisciplinary Studie*, *4*(2), 20-27.

Mahmoud, A. M. (2020). Artificial intelligence applications in education. *International Journal of Research in Educational Sciences*, 3(4), 171–224.

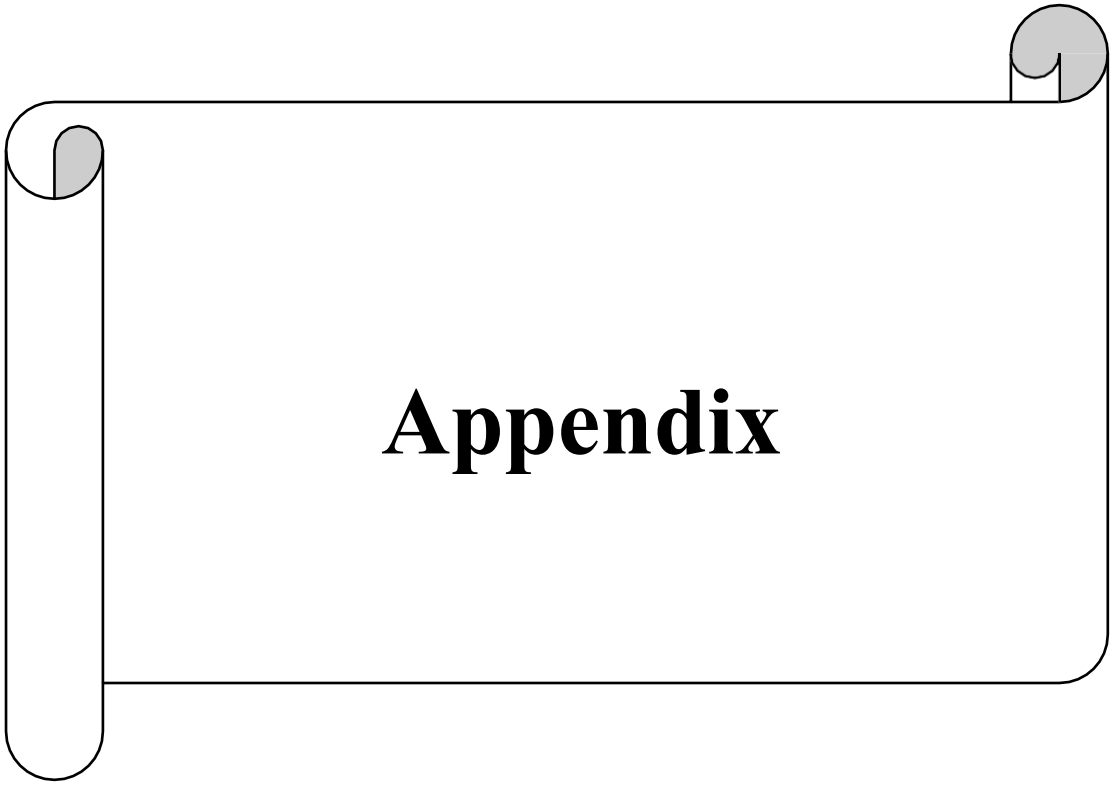
Murphy, R. F. (2019). Artificial intelligence applications to support K–12 teachers. *RAND Perspectives*. https://www.rand.org/pubs/perspectives/PE315.html

Neupane, D., Pant, S., & Bhattarai, P. (2023). Preferred Learning Techniques among Bachelor's Level Students. *Nepal Journal of Multidisciplinary Research*, *6*(2), 145-154.

Tripathi, C. R. (2024). Awareness of Artificial Intelligence (AI) among undergraduate students. *NPRC Journal of Multidisciplinary Research*, 1(7), 126–142. https://doi.org/10.3126/nprcjmr.v1i7.72478

VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. *Educational Psychologist*, 46(4), 197–221.

Zarrouki, R., & Falata, A. (2020). The role of artificial intelligence in improving the quality of higher education. *The Arab Journal of Specific Education*, (12), 1–12.



Appendix

Survey on Awareness about Artificial Intelligence in Education

Demographic Information

1. Name: _____
2. Age: _____
3. Gender: _____
4. College/Institution: _____
5. Year of Study: _____
6. Specialization: _____

Section A: General Awareness of AI

1. Have you heard of Artificial Intelligence (AI)?
   [ ] Yes
   [ ] No

2. If yes, where did you first learn about AI?
   [ ] Media (TV, Internet, etc.)
   [ ] Academic courses
   [ ] Workshops/Seminars
   [ ] Other (please specify): _____

3. How would you describe your understanding of AI?
   [ ] Basic (e.g., AI is used in apps or websites)
   [ ] Moderate (e.g., aware of applications like chatbots, voice assistants)
   [ ] Advanced (e.g., knowledge of AI programming or algorithms)

4. How often do you encounter discussions about AI in your academic environment?
   [ ] Frequently
   [ ] Occasionally
   [ ] Rarely
   [ ] Never

5. Which sectors outside education do you associate most with AI?
   [ ] Healthcare
   [ ] Transportation
   [ ] Entertainment
   [ ] Industry/Manufacturing
   [ ] Other (please specify): _____

Section B: AI in Education

1. Are you aware of any AI applications used in education?
    [ ] Yes
    [ ] No

2. If yes, list any AI tools or platforms you are familiar with: _____

3. Have you used any AI tools in your academic activities?
    [ ] Yes
    [ ] No

4. Which areas of education can benefit most from AI? (Select all that apply)
    [ ] Personalized learning
    [ ] Administrative tasks
    [ ] Student assessment
    [ ] Curriculum development
    [ ] Career guidance

5. Which AI applications in education are you aware of? (Select all that apply)
    [ ] Automated grading (e.g., Gradescope, Google Classroom)
    [ ] Personalized learning tools (e.g., Duolingo, Khan Academy)
    [ ] Virtual teaching assistants (e.g., ChatGPT, Squirrel AI)
    [ ] AI-powered administrative tools (e.g., attendance tracking)
    [ ] None of the above

6. Do you think AI can effectively replace traditional teaching methods?
    [ ] Yes (please specify which methods): _____
    [ ] No

Section C: Attitudes Towards AI

1. Do you believe AI can improve teaching and learning experiences?
    [ ] Strongly Agree
    [ ] Agree
    [ ] Neutral
    [ ] Disagree
    [ ] Strongly Disagree

2. What do you see as the main benefits of AI in education? (Select all that apply)
    [ ] Personalized learning
    [ ] Efficient assessment

[ ] Better engagement
[ ] Other (please specify): _____

3. What concerns do you have about AI in education? (Select all that apply)
[ ] Privacy and security
[ ] Lack of teacher involvement
[ ] Over-reliance on technology
[ ] Other (please specify): _____

4. In your opinion, how can AI assist teachers in the classroom? (Select all that apply)
[ ] Providing real-time feedback to students
[ ] Managing administrative tasks
[ ] Developing customized lesson plans
[ ] Enhancing student engagement
[ ] I'm not sure

5. Which areas of teacher preparation should integrate AI-related skills? (Select all that apply)
[ ] Lesson planning and resource development
[ ] Classroom management and student assessment
[ ] Professional development
[ ] Other (please specify): _____

Section D: Preparedness and Training

1. Have you received any training related to AI?
[ ] Yes
[ ] No

2. Would you be interested in attending workshops or courses on AI in education?
[ ] Yes
[ ] No

3. What topics would you like to learn about in relation to AI? (Select all that apply)
[ ] Basic AI concepts
[ ] AI applications in teaching
[ ] Ethical considerations in AI
[ ] Other (please specify): _____
4. Do you feel prepared to integrate AI tools into your teaching practices?
[ ] Yes
[ ] No
[ ] Not Sure

5. What challenges do you anticipate in using AI in the classroom? (Select all that apply)

[ ] Lack of resources
[ ] Insufficient training
[ ] Resistance from students or parents
[ ] Ethical concerns
[ ] Other (please specify): _____

Section E: Future Perspectives

1. What potential challenges do you foresee in integrating AI into teaching practices?

[ ] Lack of training for teachers
[ ] High costs of implementation
[ ] Resistance from educators or institutions
[ ] Other (please specify): _____

2. Do you think AI will impact the role of teachers?

[ ] Yes, it will reduce the teacher's role
[ ] Yes, it will enhance the teacher's role
[ ] No, it will not impact the teacher's role

3. Would you support the integration of AI as a core subject in teacher training programs?

[ ] Yes
[ ] No
[ ] Not Sure

4. How would you rate your institution's efforts in preparing students for AI-driven education?

[ ] Excellent
[ ] Good
[ ] Average
[ ] Poor

5. Any additional thoughts or suggestions on how AI can be better integrated into teacher education programs? _____