

**MS Research Thesis**

**RELATIONSHIP AMONG AWARENESS, ATTITUDE AND  
READINESS OF ARTIFICIAL INTELLIGENCE OF PRE-  
SERVICE TEACHERS**



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**INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD**

**2025**

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A thesis submitted in partial fulfillment of the requirement for the degree of  
MS Teacher Education

**DEPARTMENT OF TEACHER EDUCATION**  
**FACULTY OF EDUCATION**  
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## APPROVAL SHEET

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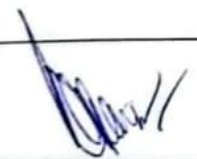
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Tahira Tariq Reg. No. 14-FOE/MSTE/F23, a student of MS Teacher Education at International Islamic University Islamabad, do hereby declared that author of the study has completed the entire requirement for submitting this research work in partial fulfillment for the degree of MS Teacher Education. This thesis is in its present form the original work of the author except those which are acknowledged in the text. The material included in the thesis has not been submitted wholly or partially for the award of any other academic certification than for which it is being presented.



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## **SUPERVISOR'S CERTIFICATE**

The thesis titled "Relationship among Awareness, Attitude and Readiness of Artificial Intelligence of Pre-Service Teachers" submitted by Ms. Tahira Tariq, Reg. No. 14- FOE /MSTE/F23 is partial fulfillment of MS degree in Teacher Education, has been completed under my guidance and supervision. I am satisfied with the quality of the student's research work and allow her to submit this for further process as per IIUI rules and regulations.



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**Supervisor**

**Dr. Fouzia Ajmal**

# **Dedication**

TO

MY LOVING PARENTS & FAMILY,

*(WHO HAVE ALWAYS BEEN MY SOURCE OF STRENGTH AND MOTIVATION)*

&

MY RESPECTED SUPERVISOR DR. FOUZIA AJMAL

*(WHO INSPIRED ME TO STRIVE FOR LEARNING)*

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May Allah Almighty bless all of them! (Ameen)

**Tahira Tariq**

## **Abstract**

Artificial Intelligence (AI) has the power to revolutionize both learning and teaching. The success of AI adoption in the classroom depends upon teacher competence and confidence in using AI tools. The study aims to examine the relationship among awareness, attitude, and readiness of Artificial Intelligence of pre-service teachers in Islamabad, Pakistan. A quantitative correlational research design was employed to examine the relationship among variables. A questionnaire of 30 items was developed employing five-point Likert scale to collect data regarding three variables, each comprising sub variables, as awareness (concept and application), attitude (perceived usefulness and perceived ease of use) and readiness (confidence and competence) of Artificial Intelligence of pre-service teachers in Islamabad. Data were collected through survey with the sample of 210 pre-service teachers from the International Islamic University and National University of Modern Languages Islamabad, Pakistan through both online and onsite modes from primary resources. The data were analyzed using descriptive statistics; Mean and Standard deviation. Furthermore, Pearson Correlation data analysis technique was used to examine the relationship between the variables. Findings revealed that pre-service teachers are familiar with AI concepts and application but minimum gap was observed in the comprehension. Pre-service teachers exhibit a favorable attitude toward perceived usefulness of AI and finding it easy to use. Moreover, pre-service teachers are prepared to integrate AI in their classroom. Furthermore, the significant relationship was found between the awareness and attitude, awareness and readiness and attitude and readiness. The study recommends that teacher education institutions may integrate AI focused modules and hands on training to strength pre-service teachers conceptual and practical knowledge. Universities may provide workshops simulations and continuous professional development to faster positive attitude and readiness for AI integration.

*Key words; Artificial Intelligence, Pre-service teachers, Awareness, Attitude, Readiness*

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## LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ICT	Information Communication Technology
IIUI	International Islamic University, Islamabad
NUML	National University of Modern Languages
PU	Perceived Usefulness
PEU	Perceived Ease of Use
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Model
TR	Technological Readiness
TPACK	Technological Pedagogical and Content Knowledge
EPSTs	English Pre-Service Teachers

# CHAPTER 1

## INTRODUCTION

Artificial Intelligence (AI) integration in education has received significant concentration in the recent years because it has probable impact on both learning and teaching. As a result, there is a great emphasis on preparing pre-service teachers to properly apply Artificial Intelligence in their future classroom. Advancements in technology and the fast adaptation of smart methods have made it vital for every nation to have strong information and communication technologies (ICT) and Artificial Intelligence in global development (Korinek et al., 2021; Sanusi, 2022). Moreover, Artificial Intelligence refers to range of technologies that enable machine to exhibit human like cognitive abilities such as learning adopting and making autonomous decisions. It's wide spread influence across industries economies and social systems demonstrates its powerful formative role including emerging interdisciplinary role like Artificial Intelligence in Education (Chen et al., 2020).

The integration of educational setting presents opportunities to reshape significant teaching practices and learning process. So, through personalized instruction and data informed strategies AI has the potential to improve educational systems outcomes. Nonetheless realizing these benefits depends largely on educators' awareness and readiness to effectively implement AI tools in their teaching practice. Artificial Intelligence (AI) is considered to help humans to learn and acquire, technologies which are recently being applied to help the learning to make it more practical and effective. Thus, in order for education to continue is challenge that need to address when AI is used in the classroom and cause worries among teachers. Collaboration between teachers and AI in the application of learning was mentioned that AI cannot substitute teachers. Teachers must be able to apply science and technology effectively. Teachers may utilize AI for school administration tasks like to plan lessons, learners' attendance, to report student's results, and to create material for learning of students (Chen et al., 2020).

Furthermore, the successful integration of Artificial Intelligence in education relies on educators having a solid understanding of these technologies. As, Artificial Intelligence

continues to shape educational environments it becomes increasingly important to examine teachers' level of awareness regarding its use (Ferikoglu & Akgun, 2022). Such awareness empowers educators to incorporate AI tools effectively into their teaching strategies (Ipek et al., 2023). By identifying specific gaps in teachers' knowledge and skills related to AI, Professional Development Programs can be designed to meet their target for learning needs (Song et al., 2022). Assessing educators' awareness is vital not only for enabling effective AI adoption in classrooms but also making students prepare for AI driven future and first ring understanding of the ethical and societal dimensions of AI (Yau et al., 2022; Adams et al., 2022). So, educators understanding of AI plays a crucial role in the prosperous application of AI tools in the instructional setting, there is a pressing need for more in depth research focused on AI awareness, particularly within teachers training programs (Ng et al., 2023).

### **1.1 Background of Study**

AI systems ability to challenge difficult tasks have led extensive support for its use in addressing global challenges (Bang et al., 2020). In developed countries especially in USA, Korea, Japan, and China AI have become central component for driving economic growth through its application in multiple aspects of life including, health, communication, infrastructure and education (Popkova, 2020). Whereas, developing nations like Pakistan lack attention to AI. There has been limited research undertaking within the country that examine AI and its possible impact on education (Kiani, et al, 2023). On the other site, the growing progress of AI suggests that the future will be strongly linked to it. As a result, children and people of all ages must be educated enough for the future by giving AI a serious role in solving current and future problems (Johnson & Lee, 2022). To achieve this goal, AI must be integrated across the educational system (Johnson and Lee, 2022). There should be developed guidelines to make learning about AI obligatory at all levels of education.

Artificial Intelligence has vast its potential to improve higher education but educators and researchers may face challenges to incorporate it in their teaching practice, research and further tasks. Researchers exhibit resilience in adapting their teaching practice to incorporate utilisation of Artificial Intelligence (Jokhan et al., 2022). It is possible that a lot of traditional educators may be reluctant to use AI technologies into their classroom

(Kuleto et al., 2021). Furthermore, implementation of AI tools in education is complicated by the absence of defined guidelines. Inconsistent AI implementation and improper technology use could arise from under policies and procedures, nevertheless, the internalization of AI tools in educational settings is revolutionizing the way learning is delivered and experienced. This shift presents opportunities for tailored instruction, data-informed decision-making, and enrich administrative efficiency (Chaudhary & Kazim 2022). However, the successful implementation of these innovations in schools relies heavily on educators' awareness and preparedness to utilize them effectively and responsibly (Uygun et al., 2024).

As technology becomes more integral to education, it is essential for teachers—both in-service and pre-service to develop sufficient awareness to ensure effective integration into their future classrooms. Despite the increasing use of technology, research suggests that teachers' awareness of its potential remains limited, with practical knowledge and application skills often lagging behind theoretical understanding (Uygun et al., 2024). It is essential for teachers to understanding how AI technologies can be utilized in educational process, as a study explored how get-well teachers in Estonia view the use of AI in education. The finding revealed that although educator acknowledged the advantages of AI could bring to teaching, they also expressed considerable concern about the lack of adequate training and resources for effective implementation. The research highlighted the critical need for Continuous Professional Development and support to assist teachers in incorporating AI tools into their instructional methods (Chounta et al., 2022).

The integration of Artificial Intelligence in education is rapidly transforming teaching and learning process worldwide. AI applications in education from intelligent tutoring systems to automated grading and personalized learning pathways are reshaping classroom dynamics and pedagogical strategies (Farooq et al., 2025). As schools and universities continue to embrace these innovations the role of teachers becomes increasingly crucial in ensuring that AI is used effectively and ethically. Despite the growing global interest in AI many pre-service teachers particularly in developing countries like Pakistan lack adequate understanding of how AI can be applied in education. The awareness is often superficial and their exposure to practical AI tools during teacher training is limited (Asghar et al., 2025). Following this some pre-service teachers are

familiar with the concept of AI their understanding of its educational implication remains shallow, leading the two uncertainty and hesitation about its use in future classrooms (Alshamari et al., 2023). Attitude Play a crucial role in determining how likely teachers are to adopt new technologies, including AI. Studies have indicated that a positive attitude towards AI is a strong predictor of teacher's willingness to engage with it particularly when paired with professional development and institutional support. In the context of Pakistan teachers' attitude have been linked with their sense of Ease of Use and Usefulness of AI tools in educational settings. However, without structured trainings even positive attitude cannot translate into meaningful classroom practice.

Readiness to implement AI is another essential factor that goes beyond simple similarity with technology. Readiness in compasses psychological comfort, confidence to infrastructure and the believe that can enhance teaching outcomes. For instance, a study conducted in Punjab found that teacher's readiness was influenced by their technological self-efficacy, prior exposure to AI tools and the support they receive from their institutions (Farooq (2025). International research finding has shown that believes about the Usefulness and Ease of Use of AI tools, combined with pedagogical values, significantly affect how prepared teachers feel to integrate AI into their classrooms. Teacher so views AI as a facilitator of student learning are more likely to invest time and effort into its adoption however both theoretical knowledge and hands on experience are needed to bridge the gap between attitude and actual implementation (Ofem et al., 2025).

Furthermore, one of the studies highlights the readiness for AI integration is closely linked to the degree of awareness and positive attitude of pre-service teachers which hold towards AI utility and usability. Moreover, subjective norms in job relevance also contributed to perceptions of AI Usefulness implying that social and contextual sector shape acceptance behaviors. These insights affirm that building AI awareness and fostering positive attitude are essential precursors to enhancing readiness among pre-service teachers (Zhang et al., 2023). Thus, understanding this interrelated construct description for designing effective teacher education programs that aligns with the evolving demands of incorporation of AI in the classroom. In the line of this, defining literacy as the capacity to comprehend, assess and utilize systems effectively has emerged as a key skill for the 21<sup>st</sup> century (Wang et al., 2023). Researcher emphasize that a high level of AI literacy enables

individual to respond more effectively to pressing social challenges. AI literacy is not solely technical with also compasses ethical awareness, responsible usage and critical understanding of AI capabilities and limitations (Celebi et al., 2023). While the consider regular research has been conducted globally their remains a noticeable gap in the Pakistani context specifically there is limited investigation into how awareness, attitude and readiness interact and influence among pre-service teachers. Understanding this interrelationship is critical for developing effective teacher training programs and policies that can prepare future educators to navigate an increasingly AI-driven educational landscape. This study aims to investigate the relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers.

## **1.2 Problem Statement**

It is crucial for future teachers to be competent and confident to use AI tools in their classroom to make effective learning environment, yet challenges persist. Pre-service teachers have insufficient understanding of AI technologies which hinder the application in teaching. Without popper awareness and positive attitude towards AI pre-service teachers may not feel ready to use these tools effectively which can affect their ability to create engaging classroom environment. Without a deeper understanding of the significant connection, between awareness, attitude and readiness the future teachers may continue to face confusion and lack direction when expected to integrate AI in teaching. Limited researches have been conducted to explore the connection among awareness, attitude and readiness of pre-service teachers for AI integration in teaching. So, it was important to fill this gap in education research knowledge, as examining the relationship among awareness, attitude and readiness for Artificial Intelligence of pre-service teachers can be the key factors in the success of applying AI in teaching in Pakistan.

## **1.3 Objectives of the Study**

The objectives of the study were to;

1. Investigate the awareness level of pre-service teachers to integrate Artificial Intelligence in their future classroom.
2. Explore the attitude of pre-service teachers towards Artificial Intelligence integration in their future classroom.

3. Assess the readiness level of pre-service teachers' to effectively incorporate Artificial Intelligence in their future classroom.
4. Examine the relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers to integrate AI in future classroom.

#### **1.4 Hypotheses of the Study**

H01: There is no significant relationship between awareness and attitude of Artificial Intelligence of pre-service teachers.

H02: There is a no significant relationship between awareness and readiness of Artificial Intelligence of Pre-service teachers.

H03: There is no significant relationship between attitude and readiness of Artificial Intelligence of pre-service teachers.

#### **1.5 Significance of the Study**

The study is significant for pre-service teachers as it will help them understand where they currently stand in term of their knowledge, attitude and preparedness for using Artificial Intelligence in teaching. The research provides future teachers with a clear picture of their strengths and the areas where they may need for the improvement. It encourages them to reflect on their own readiness to integrate AI in their classrooms and highlights the value of building confidence and competence to use, AI tools. The findings can help pre-service and in-service teachers to become more aware of how AI can support lesson planning, classroom management, student engagement and personalized learning. Examining the relationship among awareness, attitude and readiness for Artificial Intelligence of pre-service teachers can provide valuable insights for teacher training programs to denying areas where future teachers need support allowing them to design targeted learning experiences which can contribute for more AI competent teaching workforce, ultimately enhances the quality of education and prepare learners for a future where AI is gradually prevalent.

#### **1.6 Delimitations of the Study**

The research was delimited to the pre-service teachers enrolled in the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> semesters of three programs; BS Education, B. Ed (Hons) four-year program and BS

Health and Physical Education at International Islamic University Islamabad and National University of Modern Languages Islamabad. The focused on advance semesters was made, it was reasoned that student in the initial semester lack comparable exposure to the teacher education content and therefore, may not demonstrate the same level of awareness, attitude and readiness towards Artificial Intelligence as those in advance semesters. Since not all education programs at these universities had 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> semesters at the time of data collection. Therefore, only those programs meeting these criteria were included in the population; BS Education, B. Ed (Hons) and BS Health and Physical Education.

## **1.7 Operational Definitions**

### **1.7.1 Artificial Intelligence**

The study of computer science that focus on building machines which can carry out tasks requiring Human Intelligence is known as Artificial Intelligence. These include solving problems, comprehending spoken language, spotting patterns and making judgments.

### **1.7.2 Artificial Intelligence in Classroom or Teaching**

This refers to the application of Artificial Intelligence enhancing learning and instruction process including personalize learning, learning environment, classroom engagement, smart class, real time feedback, content creation, professional development.

### **1.7.3 Artificial Intelligence Awareness among Pre-Service Teachers**

Artificial Intelligence awareness refers to teachers' familiarity to the AI concept, AI powered tools and its application in teaching.

### **1.7.4 Pre-service Teachers Attitude towards AI**

Attitude refers to the emotional and behavioral dispositions of pre-service teachers includes Perceived Usefulness, Perceived Ease of Use regarding Artificial Intelligence integration in teaching.

### **1.7.5 Readiness of Pre-Service Teachers to Integrate AI in Future Classroom**

Readiness refers to the self-assessed level of preparation of pre-service teachers, their confidence, and ability to effectively used AI in future classroom. This means the more teachers are confident and competent the more they ready to integrate Artificial Intelligence in teaching.

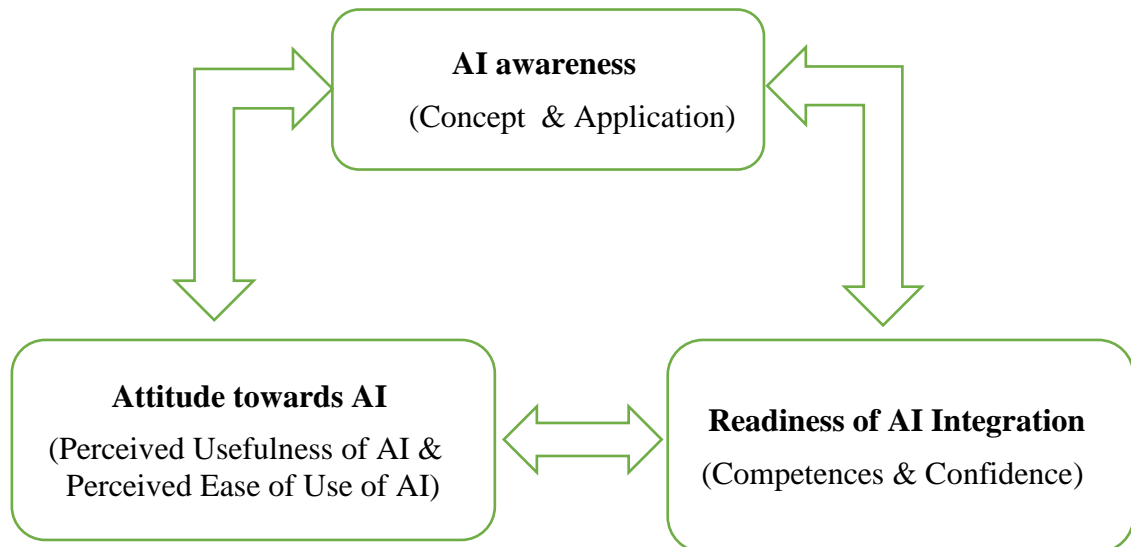
## 1.8 Theoretical Framework

The study is grounded on Technology Acceptance Model (TAM) developed by Davis (1989). TAM is model to understand how users accept and utilize technology. According to TAM, there are two primary factors, Perceived Usefulness and Perceived Ease of Use shapes an individual's attitude towards technology and in turn, influence their behavior intentions to use it. In the context of this research TAM provides a valuable lens to explore how pre-service teachers' awareness of Artificial Intelligence shape their attitude towards AI, and ultimately influencing their readiness to integrate such technologies into their future classrooms. As Venkatesh and Davis (2000) emphasized users are more likely to adopt a technology if they believe it will enhance their job performance and is easy to use, which directly supports the relationship among awareness, attitude and readiness explored in the study.

## 1.9 Conceptual Framework

Figure. 1

*Conceptual Framework of the Study*



## CHAPTER 2

### LITERATURE REVIEW

Smart technologies, information and communication technologies are becoming important in multiple aspect of human existence (Ishola et al., 2022). This is one of these technologies that can stand as potent tool that has ability to alter many facets of society in the technology that is changing. The education sector that has lot to gain from Artificial Intelligence mostly called as AI in education (Holmes et al., 2023). The rapid progress of AI technology has produced shift in education institutions. Educational institutions rapidly incorporated AI to provide individualized learning to students. The incorporating of AI in education is replacing traditional teaching and learning strategies with modern approaches. AI is used to improve learning and teaching, monitor teaching methodologies and academics. Artificial Intelligence in teaching, operations in administration, development of curriculum, instructions, and learning of student. AI has significantly boosted the effectiveness of operational duties like to assess student's tasks, and giving review on their work (Chen, 2020). Teaching is a complex profession as with teachers make multiple decisions per day. Teachers take participation in classroom activities, outdoor interaction with students, collaboration with other teachers and administrative work.

A report by Mckinsey (n.d) showed that the early impact of AI enhances teaching positions through dropping burdens in their operational tasks. According to the report recovered time from Artificial Intelligence empowered technologies must be recreated towards further efficient instructions with the goal such as;

1. Narrowing the 11 hours of weekly preparation to six.
2. Handling details to reduce work load and increase attention on the students
3. Going above and beyond what the instructor is able to do in order to fulfill their obligation to students.
4. Increasing the effectiveness and yield of teacher's professional development.
5. Assisting teachers with their planning and reflecting.

These insights from the Mckinsey report clearly illustrate the potential of AI to alleviate teachers' administrative burdens and enhance instructional effectiveness.

However, to fully realize these benefits it is crucial that educators are not only provided with AI tools but also equipped the knowledge, skills and framework necessary to use them effectively.

As, Artificial Intelligence is anticipated to play a major role in shaping educational technology settings particularly by working closely with teachers to enhance learning experience (Cardona et al., 2023). This suggests the need to increase educators' awareness regarding the demands and consequences to associate with implementing AI, using comprehensive approach to its practical use in educational environment. In broader educational settings, implementing a well-organized AI curriculum is essential for improving educators' understandings and skills related to Artificial intelligence. As, one of the studis focused at how AI curricula are developed and evaluated at the pre-tertiary level, revealing favorable effects on students' attitude and motivation towards learning about Artificial Intelligence (Chiu et al 2021). The results highlighted the necessity of well-planned curricula to successfully incorporate AI into educational environment.

As teachers are highly required to interact with AI in today's classroom, it is important that the development of these technologies needs divers' inputs and perspectives. This understanding should contribute to developing practical strategies that helps teachers perform their duties more efficiently achieving tasks that might be challenges without the support of AI. These strategies should focus one encouraging the meaningful and effective use of AI tools in the classrooms rather than just trying to avoid a lesson or lesson the difficulties that AI might introduce (Uzun, 2025).

On the others, a number of institutional national and international studies highlight four primary benefits of AI for university educators and students;

1. Transformation of teaching practice
2. Customized learning pathways
3. Efficient educational administration
4. Enhanced educational access

AI has vastly extended the instructional toolkit for educators. From modernized digital aids like writing assistants and translators to new interactive agents such as Chabot and virtual tutors, teaching methods are both evolving and being redefined. Moreover AI.

Facilitate the creation of adaptive learning environments where instructional materials are tailor to individual learning styles and paces. This transformation empowers educators to move beyond one size fits all approaches and adopt more personalized, student, centered teaching practice. AI powered adaptive system analyses individual students' strengths, weaknesses and preferences is enabling high ling highly tailor learning experience and empowering educators to meet diverse learner needs. These systems can dynamically adjust content difficulty, provide targeted feedback and recommend specific resources to support each student's progress by continuously collecting and interpreting data on students' performance which helps identify learning apps early and offers timely interventions (Bates et al., 2020; Chassignol et al., 2018; Cukurova et al., 2020; Kandlhofer et al., 2016; Nazaretsky et al., 2022; Ninaus & Sailer, 2022; Renz & Hilbig, 2020; Sharkey, 2016; Zawacki-Richter et al., 2019).

By automatic administrative duties facilitating streamlined teacher student communication and delivery instant feedback AI substantially diminishes educator's workload in helps them concentrate on instructional quality. Additionally, powered platforms facilitate seamless teacher student communication through automatic notifications reminders in real time feedback mechanism this efficiency not only reduce administrative burdens but also improve organization and accuracy and responsiveness. By handling these time-consuming responsibilities educators and administrators today dedicate more energy towards enhancing instructional quality, professional development and student's support. AI-driven learning platform transcend institutional and geographic boundaries first ring greater inclusivity benefiting learners with disabilities and those from varied cultural are social background and increasing the internationalization of higher Education (Bates et al., 2020; Chassignol et al., 2018; Cukurova et al., 2020; Kandlhofer et al., 2016; Nazaretsky et al., 2022; Ninaus & Sailer, 2022; Renz & Hilbig, 2020; Sharkey, 2016; Zawacki-Richter et al., 2019). In summary AI has the potential to revolutionized higher education by enhancing the teaching and learning experience in multiple dimensions. By transforming teaching practices customizing learning pathways improving administrative efficiency and expanding educational access AI is not only shaping the futures of education but also making it more inclusive personalized and effective. As AI

continues to evolve its integration into universities worldwide can bridge gaps, foster innovation and create a more dynamic and accessible learning environments for all.

The future of education is being imagined and AI is at the forefront of this transformative journey. Equipping pre-service teachers to effectively engage with AI-enhanced education presents significant challenges (Pedro et al., 2019). The integration of AI technologies in education has grown rapidly in recent years. As AI-powered tools are increasingly used to provide learning analytics, personalized recommendations and diagnostic support across educational contexts (Zhang et al., 2023). However, the implementation of AI in teacher education remains a significant challenge. As emphasized in the study, teachers are the backbone of the classroom and the driving force behind the next stage of AI growth in teaching (Zhang et al., 2023).

The challenges associated with AI implementation in education can be broadly classified into three categories: technology, teachers and students and social ethics (Zhai et al., 2021). Despite the growing reasons of AI in K-12 and higher education, there is a lack of research related to teachers' attitudes towards them (Zhang et al., 2023). This gap is especially concerning in the case of pre-service teachers whose perspectives are crucial in shaping the future classroom. Many studies over the past two decades have found that technology had not been entirely accepted because many teachers still had negative attitudes towards it and were reluctant to use it (Istemic et al., 2021; Kaban & Ergul, 2020). The reasons for the resistance include anxiety about new technology, the preference to stay within one's comfort zone and inclination to reuse familiar materials and teaching strategies (Tallvid, 2016). These same barriers may also prevent pre-service teachers from adopting AI technologies. Another critical challenge is the insufficient AI-related knowledge and skills among pre-service teachers. The study highlights that pre-service teachers lack relevant knowledge and skills about AI (Zhang et al., 2023). These include a clear understanding of how AI systems facilitate learning, research in data analytical skills and new teamwork and management skills (Luckin et al., 2016).

## **2.1 Artificial Intelligence Awareness**

Artificial Intelligence (AI) has the ability to transform advanced education, but its actual application may have many issues for academics. One common issue is the

insufficient knowledge and comprehension about AI technology (Chen et al., 2020). Educational institutions are not informed of the applications and advantages of Artificial Intelligence, this may hinder their ability to incorporate the AI curriculum and research (Bearman et al., 2023). In essence, understanding of Artificial Intelligence (AI) is predicated on AI principles, abilities, knowledge, and beliefs all are these are not dependent on previous information. Comparatively only using AI apps, students should comprehend these technologies and concepts, particularly AI learning tools becoming more appropriate for student of using machine learning models (NG et al., 2022).

Researchers have designed learning curricula and practical exercises with a focus on learner's attainment of AI concepts in order to promote AI literacy (Druga et al., 2019; NG et al., 2021). This means having knowledge of AI by having interactions with AI representatives and AI-driven technologies and tools. The second cognitive level embraces once a solid comprehension of AI principles is attaining by using the knowledge and implementation of AI in diverse settings be easy (Druga et al., 2019). Examining teachers' awareness of artificial intelligence is important for multiple reasons. To begin with many educators, lack is clear understanding of how AI operates and how it can be practically applied within the educational context which limits their ability to use it effectively (Du et al., 2024). Additionally, investigating their views and attitude toward AI is key to encourage their engagement with AI concepts and their willingness to explore its potential in teaching and learning (Alkanaa, 2022). Gaining inside into teachers' expectations and perspective on AI serves as a foundation step in ensuring its successful adoption in classroom environment (Porn 2024).

### **2.1.1 Dimensions of AI Awareness**

Technological awareness is a complex construct that encompasses more than just basic knowledge. It involves understanding theoretical foundations, practical applications, and the social and ethical implications of technology. This includes recognizing potential biases, considering ethical issues, and evaluating the broader impact of technology on society (Touretzky et al., 2023). Researchers suggest that technological awareness should also include self-confidence to acquire and apply technology effectively, as well as the willingness to use it for educational or social purposes. The link between technological

literacy and comfort in using technology for positive impact implies that those with higher awareness are more confident in applying technology responsibly (Walter, 2024).

In teacher education, achieving technological competence involves more than just understanding technical concepts. It requires critical thinking, practical skills, and the ability to leverage technology to create effective learning experiences. Educators need to develop a sophisticated level of understanding that enables them to critically evaluate, communicate with, and integrate technology into their teaching practices (Du, 2014). Research supports the importance of technological literacy for educators. Researches indicated that higher technological proficiency among teachers leads to improved classroom management, increased use of digital tools, and enhanced student engagement. Additionally, research highlights the significance of trust in technology, developed through training and support, in effectively integrating it into educational settings, particularly in subjects like STEM. This trust has been linked to increased creativity, inquiry-based learning, and critical thinking among students (Li, 2022; Chiu & Chai 2020).

Professional development is crucial for developing educators' technological competence. Research emphasizes the importance of enhancing teachers' ability to integrate technology effectively into their teaching practices. This includes fostering skills such as ethical decision-making, curriculum design, and guiding students in responsible technology use (Nazaretsky et al., 2022). Lastly determining a distinctive dimension of AI awareness among aspiring teachers enable more personalize intervention in teacher education (Zhao et al., 2022). Research suggests that recognizing these variations enables institutions to address specific knowledge gaps, boost teacher confidence, and prepare them for effective technology integration. As a result, educational institutions are being pushed to revamp their curricula to include technology and its ethical implications, better equipping teachers for the demands of a rapidly changing society (Lee, 2024).

Furthermore, recognizing the different dimensions of awareness for Artificial Intelligence among pre-service teachers is crucial for developing focused strategies that align with their varying understanding and perception. Gaining insight into these awareness and pattern enables educators and decision makers to identify and bridge specific knowledge deficits, supporting the successful adoption of AI in diverse educational

settings. These awareness profiles provide essential direction for teacher training programs allowing for the customization of professional development efforts to enhance teachers ease assurance and proficiency in using AI tools effectively (Zhao et al., 2022).

Improving AI literacy among teachers is vital to preparing students for a world shaped by Artificial Intelligence. When educators have strong understanding of AI, they can enhance both instructions and students learning while also promoting ethical and responsive use of AI. Integrating AI awareness into teacher education programs plays a key role in developing a forward-thinking teaching force capable of using AI tools effectively and ethically. By strengthening their AI competences, educators are better equipped to handle ethical dilemmas and harnesses AI's potential to enrich educational experience (Nazaretsky et al., 2022; Lee, 2024; Zhao, Watterston & Tröhler, 2022).

### **2.1.2 Integrating AI into Pedagogical Practice; the Role of TPACK**

The main objective of AI literacy professional development is to build educator capabilities, understanding and hand on skills in Artificial Intelligence allowing them to integrate AI effectively into their instructional method. These development initiatives equip teachers with essential knowledge about AI concepts, address ethical consideration and offer practical guidance for applying AI tools within the classroom setting (Nazaretsky et al., 2022). High quality professional development is to strengthen teachers Technological Pedagogical Content Knowledge (TPACK), enabling them to thoughtfully integrate AI technologies into their instructional approaches to support and enhance student achievement (Mishra & Koehler 2006; Nazaretsky et al., 2022).

As technology advances, researchers have developed new frameworks to guide educators. One such framework builds on existing models of technological pedagogical content knowledge to address the integration of emerging technologies in education. (Celik 2023; Ning 2024). This integration of technology and teaching methods is redefining the learning landscape, enabling more tailored educational experiences while challenging the boundaries of traditional classroom approaches (Angeli & Valanides, 2009; Karataş & Yüce, 2024; Casal-Otero et al., 2023). Educators need to develop skills that combine technological knowledge, teaching methods, and subject expertise to effectively integrate technology into their practice (Lorenz & Romeike, 2023; Sun et al., 2022). To harness the

potential of technology in education, educators need technical skills and a nuanced understanding of its limitations and ethical implications. Concerns like data privacy, bias, and equity require thoughtful consideration to ensure that technology integration promotes fair and values-driven teaching practices (Deng & Zhang, 2023; Wang, 2024).

In recent years growing attentions has been paid to the importance of AI awareness among educators, as it forms the basis for meaningful and ethical integration of AI tools in teaching (Touretzky at al., 2019; Long and Magerko, 2020). Studies emphasize that without AI literacy teachers may struggle to critically evaluate or appropriately apply the AI applications in their instructional practices. Therefore, fostering AI awareness is not only to understand the tools themselves but also empowering the educators to make informed pedagogically based decisions in an increasingly AI driven educational environment.

## **2.2 Attitude towards Artificial Intelligence**

The mindset of an individual to use tools of AI in their instructions, studies, or managerial projects is influenced by their academic attitude. These parameters are influenced by perceived utility, simplicity of usage, and conformity with procedures (Andrews et al., 2021). A greater intention to deploy AI technologies in the classroom is correlated with an optimistic behavior. Various elements can influence the shift from idea institutional backing, AI resources, and training opportunities. In addition, a teacher's technological skill and confidence in efficiently utilizing AI can be important role (Gupta & Yadav., 2022).

Moreover, an academician's mindset, intention, and preparedness to accept AI can be affected by federal legislation and the evolving landscape of educational technology. Academic institutions and policymakers should understand these relationships (Wang et al., 2023). The enhancement of new intervention and intensions to close the gap between attitude and intensions promote the AI incorporation for improving quality of the instruction and learning (Chiu & Chai, 2020). In the context of higher education educators have a relationship with their use of AI and beliefs to use (Wang et al., 2021). For instance, studies have shown that to incorporate AI in education educators put high value in

perceived convenience (Chatterjee & Bhattacharjee, 2020). Institutions with training programs with AI resources have effective AI implementations.

Expanding on this, high AI literacy is now a quick crucial competency in 21st century driven by the growing influence of knowledge in technology. A person demonstrates AI literacy when they are able to engage with AI tools in a competent and responsible manner (Wang et al., 2023). The perception and acceptance of artificial intelligence are key factors in its successful integration into educational settings. AI, computer-based system is able to performing task that typically involve human intelligence of a substantial benefits in teaching in learning. Its contributions include automating the grading process by me mimicking a teacher's assessment pattern, delivering feedback through response analysis and recommending personalize instructional planes tailor to individual learner's needs (Kulkarni & Che, 2019). These capabilities not only enhance instructional but also support more individualized and data driver approaches to education making learning experience more effective in responsive to student's needs.

Nevertheless, the rapid integration of Artificial Intelligence technology in education has brought both opportunities in challenges for teacher preparation programs. Preparing pre-service teachers for AI powered education remains a significant hurdle due to limited AI related knowledge in exposure (Pedro et al., 2022) There is a study grounded in the Technology Acceptance Model 3 (TAM3) identified perceived usefulness and perceived ease of use as the strongest predictors for teacher's behavioral intention to use AI tools confirming previous TAM based findings. Interestingly while factors like AI self-efficacy and perceived enjoyment positively influenced perceived ease of use. AI anxiety showed no significant impact on it suggesting a nuanced understanding of pre-serves teachers emotional and cognitive readiness (Zhang et al., 2023).

The study highlights the readiness for AI integration is closely linked to the degree of awareness and positive attitude pre-serves teachers hold towards AI utility and usability. Moreover, subjective norms in job relevance also contributed to perceptions of AI usefulness implying that social and contextual sector shape acceptance behaviors. These insights affirm that building AI awareness and fostering positive attitude are essential precursors to enhancing readiness among pre-service teachers (Zhang et al., 2023) Thus,

understanding this interrelated construct description for designing effective teacher education programs that aligns with the evolving demands of incorporation of AI in the classroom. In the line of this, defining literacy as the capacity to comprehend, assess and utilize systems effectively has emerged as a key skill for the 21<sup>st</sup> century. (Wang et al., 2023). Researcher emphasize that a high level of a literacy enables individual to respond more effectively to pressing social challenges. Literacy is not solely technical with also compasses ethical awareness, responsible usage and critical understanding of AI capabilities and limitations (Celebi et al., 2023).

Despite its growing relevance attitude toward AI vary significantly specially among pre-service teachers who are future implemented of educational technology. Attitude is considered as critical sector in the adoption of AI influencing both openness to its use and its pedagogical integration. Research indicates that while technological competence and familiarity may Foster positive perceptions of AI these attitudes are also shaped by demographic and psychological variables (Kaya et al., 2024). To explore this complexity further Ozden et al. (2025), address the gap in understanding the dynamic between AI literacy and attitude toward AI among the service teachers. The study grounded in bandura social learning theory was it's that both individual experience and environmental factors such as age, gender, academy standing and field of study can shape perceptions and learning behaviors related to AI. Their finding suggests a positive but weak correlation between a literacy and attitude indicating that literacy alone is insufficient to foster strong positive attitude (Ozden et al., 2025). This underscores the importance of emotional experimental and contextual influences in technology acceptance.

Since, 2019 numerous studies have examined University students' awareness and perceptions about AI across various discipline like economics administration and healthcare. Their findings include; Students are aware of application in their disciplines and generally maintain positive attitudes (Ahmad et al., 2022; Baigi et al., 2023; Fernandes et al., 2022). However, they are knowledge is often limited to basic or elementary understanding (Saad at al., 2022; Asmatahasin et al., 2021; Doumat et al., 2022; Teng et al., 2022). Students encounter obstacles such as in sufficient knowledge access issues, time constraints and curriculum gaps (Al-Qerem et al., 2023; Doumat et al., 2022; Fernandes et al., 2022). Nevertheless, approximately one third of participants Express skepticism citing

decreased cognitive ability or over dependence on AI and feel hesitant to use AI in academic and professional contexts. Importantly over 75% of respondents sport integrating AI into their curricula. The mixed perception reflects a broader challenge in the adoption of emerging technology in education where enthusiasm for innovation of an coexist with uncertainty and fear of an intended consequences for AI integration suggest a willingness to impress technological advancement at their concerns point to the need for structure guidance and training. Educator preparation programs must therefore not only build technical competent but also foster critical thinking about AI role, limitation and impact on the human learning and autonomy. Addressing these concerns both confident and readiness is important for meaningful AI integration in the future classroom.

### **2.2.1 Pre-Service and In-service Teachers' Perceptions of AI**

Previous studies have examined In-service and pre-service teachers' perspectives on AI in education. Teachers evaluated AI tools as ethically more concerning than non-AI tools despite both being equally acceptable. Nonetheless, AI technologies were seen as less burdensome (Cojean et al., 2023). One of the research projects observed misconceptions about AI among pre-service teachers (Cojean et al., 2023) while another research reported reluctance among k 12 teachers to trust with their own knowledge (Nazaretsky et al., 2021). Estonian K-12 teachers exhibited limited understanding of AI but recognized its potential as a practical support tool (Chounta et al., 2022). Alkolaly (2021) reported positive attitude towards AI among Saudi EFL teachers and students. In Spain, Alvarez-Herrero (2024) found that teachers appreciated high potential for professional development but preferred more better pedagogical and ethical guidance. A Study conducted in Nigeria examined pre-service teachers attitude towards AI using a reliable survey instrument of pre-service elementary teachers attitudes and utilization of Artificial Intelligence in teaching learning activities questionnaire (PSETAUAIQ; index= 0.77) administered to 96 pre-service teachers. The findings showed consistently positive attitudes toward integrating AI into teaching and learning accompanied by high level of utilization. The study also reported no significant gender differences in attitude or AI use indicating a uniform acceptance of AI across groups (Harakchiyska et al., 2024).

Perceived usefulness and Ease of use as key predictors of free service teachers' intention to adopt AI though they also noted a disconnection between theory and

application and flagged the need for clear ethical and pedagogical frameworks (Zhang et al., 2023). Conversely, many Turkish pre-service teachers harbored fear and concern about AI, anticipating negative impacts such as job displacement in confidentiality threats, and primarily acknowledging AI's benefits in sectors like health and science but consistently emphasizing its risks (Haseski, 2019). These disparate findings demonstrate the complexity of educators' view on AI in the classroom, exposing a terrain influenced by differing degrees of cultural awareness and professional concerns. While many educators acknowledged the potential benefits of AI for teaching and learning their readiness to implement these tools often hinges on access to adequate training, ethical clarity and pedagogical support. As such for AI to be effectively integrated into educational system it is essential to address misconceptions build trust and provide targeted professional development that aligns with educators' needs and values.

### **2.2.2 Perceptions about AI Perceived Usefulness**

Perceived usefulness is a central construct after technology acceptance model refers to the extent to which an individual believes that using the specific method or tools will improve their performance or effectiveness in completing a task (Davis, 1989). Within the context of AI integration in higher education perceived usefulness represents undergraduate evaluations of how tools such as ChatGPT, Grammarly, Bard, Turnitin, Stable Diffusion and personalized learning platforms can support and improve their academic productivity and outcomes (Chan & Hu, 2023; Chng et al., 2023; Falebita & Kok, 2024).

Furthermore, a growing body of research affirms that perceived usefulness significantly influences both attitude towards technology and the likelihood of its adoption (Ayanwale & Ndlovu, 2024; Esiyok et al., 2024; Kim et al., 2020). Users who believe who perceives a tool as beneficial are more inclined to develop satisfactory attitude towards their use and ultimately integrate them into their academic or professional routines (Adelana et al., 2024; Das & Madhusudan, 2024; Mutambara, 2023). In the context of AI perceived usefulness is thus recognized as a pivotal factor influencing users' intention to engage with and apply these technologies (Li et al., 2024).

Recent empirical studies further reinforce the centrality of perceived usefulness and perceived ease of use in shaping pre-service teachers' acceptance of AI. Pre-service teachers generally perceive Artificial Intelligence as both beneficial and manageable to operate in multiple large-scale studies provide strong evidence using a sample of 452 pre-service teachers demonstrated that perceived usefulness ( $\beta= 0.501$ ) and perceived ease of use ( $\beta=0.297$ ) were the strongest predictors of intention to adopt AI in teaching, confirming the core assumptions of the Technology Acceptance Model (Zhang et al., 2023). Similarly, Runge et al. (2025) reported that AI related technological knowledge enhances pre-service teachers' perceptions of AI usefulness and ease of operation indicating that familiarity with AI concept strengthen positive attitude towards its integration.

Supporting these findings, Seo et al. (2023) established that perceived usefulness has a direct and substantial effect on intention to adopt AI technologies. Likewise, Putra et al (2024) found that pre-service teacher generally exhibits strong levels of perceived usefulness and ease of use when interacting with AI tools for instructional purposes. Collectively the studies drawing on diverse contexts and large participants samples present robust evidence that pre-service teachers tend to hold favorable perceptions of utility and accessibility which in turn enhances their willingness to integrated AI into future classroom practice.

### **2.2.3 Perceptions about Perceived Ease of Use**

Perceived ease of use is a fundamental component in various studies employing the technology acceptance model commonly referring to how effortless individual believe it is to operate a given technology (Davis, 1989; Dwivedi et al., 2023). In the context of the study perceived ease of use reflects undergraduate impressions and emotional responses regarding the simplicity and stress-free nature of interacting with AI tools. These include whether students feel confident and unbend when engaging with technology such as ChatGPT, Grammarly or personalized AI based platforms.

Davis's (1989) original TAM framework proposed a theoretical link between perceived ease of use and perceived usefulness. Resting that tools perceived as easy to use are more likely to be seen as beneficial. The connection has been substantiated by several contemporary studies which report that higher levels of perceived ease of use is often lead

to stronger perceptions are usefulness (Labrague et al., 2023; Lestari & Indrasari, 2019; Sanusi et al., 2024). Additionally, both constructs have shown to be influential predictors of technology adoption particularly in the real realm of AI (Alanzi et al., 2023; Al-Mughairi & Bhaskar, 2024; Chan & Lee, 2023; Wang et al., 2021).

Despite these consistent finding much of the existing research emphasizes general TM applications and often overlook context specific factors influencing AI use in higher education. Variable such as users' psychology readiness, demographic attributes and the unique characteristics of AI technologies themselves mediate or modify the relationship among perceived use fullness and perceived ease of use and adoption intentions. Exploring these moderating factors could qualify a significantt understanding for university students to engage with AI driven educational tools.

## **2.3 Readiness of Pre-Service Teachers to Integrate AI in Future Classroom**

### **2.3.1 The Mediating Role of AI Readiness**

Artificial intelligence readiness for educators in compasses the knowledge skills and psychological preparedness necessary for teachers to effectively integrate AI technology into their teaching practices (Ayanwale et al., 2024). Research indicates that artificial intelligence readiness is a significant factor influencing teachers' preparedness to adopt new technologies (Shirahada et al., 2019; Yue et al., 2024). AI readiness have impact on behavioral intentions to educate AI. Prepared teachers have positive beliefs toward incorporation of AI in education. Teacher's readiness plays important role to the success of AI education, without teachers, the teaching and learning process cannot be successes (Ayanwale et al.,2022). Although there are multiple courses and resources created by researchers to explain the idea teachers lack sufficient understanding to teach AI (Sanusi et al., 2021).

Research has started to look at teacher preparation for teaching AI, through career advancement programs and co designing educational material after recognizing teachers' insufficiency of AI competence which can be the obstruction to AI usage (Lee & Perret, 2022; Lin & Van Brummelen, 2021). Examining teachers' preparedness to instruct AI in the classroom is crucial and professional development is also important this is because teachers' attitude and acceptance of technology may indicate their interest in teaching it.

Without teacher training it may difficult to apply course content in the classroom (Lin & Van Brummelen, 2021). The rapid advancement of technology is transforming education, redefining teacher roles and requiring educators to adapt to new realities. As technology becomes more integral to the classroom, it's crucial to understand how teachers perceive and prepare for these changes to effectively integrate them into their practice (Uzun et al., 2025).

The rapid evolution of Artificial Intelligence technology is receiving higher education by integrating AI in tools into teaching in learning environments. AI tools such as chat boards intelligent tutoring systems and generative AI have become essential resources for students and educators like sporting task ranging from information retrieval to automatic feedback (Falebita & Kok. 2024). These developments demand not only technical infrastructure but also the psychological and cognitive readiness of users particularly pre-service teachers to effectively adopt and integrate AI into education contexts.

Moreover, the integration of Artificial Intelligence into k-12 education has introduced new responsibilities for teachers, as their readiness significantly impacts the success of AI education. Study examining 368 Nigerian in-service teachers to explore factors influencing their behavioral intentions in readiness to teach AI, considering variables such as AI anxiety, perceived usefulness, attitude toward AI, confidence in teaching, perceived relevance and AI readiness (Ayanwale, 2022). The findings revealed that teacher's confidence in teaching AI strongly predict their intention to teach the subject. While the perceived relevance of AI significantly influenced their readiness to implement it in classrooms. Other factors including AI anxiety and social good were less predictive of teachers, teaching intention and readiness these results emphasize the importance of building teacher confidence and highlighting elements to faster effective education guiding future strategies for teacher training in curriculum development.

### **2.3.2 AI Readiness in Higher Education; Focus on Technological Readiness**

Artificial intelligence studies particularly in educational contact is often. Conceptualized through the lens of technology readiness. In the study by Falebita and Kok (2024), Technological Readiness (TR) is defined as an individual's preparedness and

willingness to adopt and integrate AI tools into various academy can professionally tasks. This readiness is compasses into just says to technology but also psychological readiness such as openness to change and innovation and the confidence to engage with emerging digital tools. Unlike general technology readiness which often describe institutional or organizational level preparedness TR is used specific focusing on the individuals' capabilities and dispositions. This distinction is important for educators and researchers aiming to understand how students especially pre-service teachers approach the integration of AI in learning environments. Recognizing TR as a user centric concept provides inside into personal factors that drive is Hinder AI adoption (Falebita & Kok, 2024).

Research indicate that technological readiness can influence several psychological variables relevant to technology adoption. For example, higher TR has been linked to stronger technological self-efficacy, as individuals who are ready to adopt new technologies often feel more capable of learning and using them (Labrague et al., 2023). Additionally, TR has been associated with users' perception of usefulness and ease of use of AI tools. Participants who are who exhibited higher TR were more likely to believe that AI tools could enhance their academic tasks and founds the tools easier to use. This support findings from Anh et al, (2024), who also observed a positive relationship between TR and AI adoption in professional development and educational settings. From the practical standpoint these findings underscore the importance for fostering AI readiness as a foundational element in pre-service teacher education. For future educators' readiness should not be limited to technological skills alone but also involve flexible attitude and confidence in engaging with AI technologies.

### **2.3.3 Confidence in Learning AI**

Pre-serves teacher's belief in their capacity to learn AI place a crucial role in determining their preparedness to incorporate AI into STEM education (Roy et al., 2022). This sense of conviction reflects the self-assurance in obtaining the essential knowledge and competencies related to AI (Lin et al., 2023). When the process strong confidence in learning about AI, pre-service teachers are more inclined to engage in training opportunities explore AI tools within their instructional practices and remain adaptable within evolving educational environments. Strengthening this confidence through targeted professional development is essential to enable future educators to effectively utilize AI in

enhancing STEM learning and equipping students for a technology driven-world (Sanusi et al., 2024).

### **2.3.4 Technological Self-efficacy and AI Adoption**

Technological self-efficacy refers to an individual's beliefs in their capacity to use technology effectively (Pan, 2020). In the context of AI these beliefs play a crucial role in determining both attitudes towards AI and the actual use of AI tools. Studies have shown that higher technological self-efficacy is associated with greater willingness to explore and adapt new technologies (Kent & Giles, 2017; Liwanag & Galicia, 2023). Particularly in teacher education pre-service teachers with strong self-efficacy are more likely to integrate technology into pedagogical practices however some findings reveal disconnect while self-efficacy predicts usage and ease of use. It does not necessarily translate into positive attitude or perceived usefulness of AI tools (Esiyok et al., 2024; Falinita & Kok, 2024). This implies that functional competence alone may not be sufficient to foster favorable perceptions are emotional responses to word AI use.

### **2.3.5 Factors Affecting AI Readiness**

Understanding the factors that influence educators' readiness to integrate artificial intelligence into teaching is an essential for successful implementation in educational settings. As AI technology is becoming more prevalent in modern education systems teachers' ability and willingness to adopt these tools depend on a variety of personal professional and contextual variables. Research highlights that readiness is not only shaped by individual competence but also by external support systems and institutional culture (Blut & Wand, 2020). Identifying and examining these contributing factors is critical to designing effective interventions training programs and policies strategies and enhancing AI adoption in education. The following section explores the key factors that affect readiness among pre-service teachers.

#### **2.3.5.1 Knowledge and Technical Competence**

Given the high level of competency required for AI related tasks educators must possess both strong theoretical understanding and technical capabilities characteristics indicative of high Artificial intelligence when delivering instruction is leveraging AI tools in their classroom. This readiness enhances teachers' perception of AI usefulness and

ease of use ultimately strengthening their behavioral intentions to implement AI in teaching (Blut, 2019; Tang et al., 2021).

### **2.3.5.2 Behavioral Intentions and Perceived Usefulness**

One of the researchers found that Artificial Intelligence readiness is a strong predictor of teacher's behavioral intentions to adopt AI in their instructional methods. Teachers who believe they are adequately prepared in terms of both knowledge and skill are more likely to embrace AI technologies in their classrooms. Moreover, higher level of Artificial Intelligence readiness helps to reduce psychological barriers such as anxiety or resistance often associated with adopting new technologies (Ayanwale et al., 2023).

### **2.3.5.3 Adaptability and Resilience in AI Integration**

Well prepared educators tend to show greater adaptability and resilience when in countering technology empowering them to explore AI functionalities and its more effective application in instructive settings (Ayanwale et al., 2022; Chai et al., 2021).

### **2.3.5.4 Social Norms and Peer Influence**

Social norms have also been found to significantly influence Artificial Intelligence readiness. Fundi et al. (2023) observed that in collaborative and well-structured institutional settings teachers are often influenced by the attitude and behaviors of their pairs and an administrator. The positive examples set by colleagues who successfully incorporate AI into their teaching can inspire others to identify the value of AI and pursue the advancement of their own competency. These pair influences served as informal models that reinforce readiness.

### **2.3.5.5 Institutional Support and School Leadership**

School leadership is a vital role in strengthening the impact of social norms by providing policy support, allocating resources and organizing systematic training initiative that faster AI adoption (Fundi et al., 2024). Social norms also have indirect effects on Artificial Intelligence readiness through other facilitating variables suggesting that social influence mechanisms work across multiple dimensions to enhance teacher preparedness for AI these finding highlight the importance of cultivating a supportive institutional culture that encourages active engagement with AI technologies (Ramnarian et al., 2024).

## **2.4 Theoretical Review**

The relationship among Artificial Intelligence awareness, attitude and readiness of pre-service teachers for future classroom is a complex phenomenon that can be understood through the Technology Acceptance Model that explain the relationship between awareness, attitude and readiness, especially regarded to the integration of technology in the classroom. Developed by Davis (1989), TAM is well known model for comprehending its ability to explain how people adopt and utilize technology. Perceived utility and simplicity to use are the fundamental elements that shape an individual attitude to use technology, which intern affect their behavioral intensions to use the technology, according to TAM. In this research, TAM help to understand how pre-service teacher's awareness of AI might influence their attitude towards AI, which subsequently impact their readiness to incorporate AI into their future classroom.

## **2.5 Empirical Review**

Growing body of research has investigated the awareness, attitude and readiness of Artificial Intelligence among various population. However, the focus on the relationship among awareness, attitude and readiness among pre-service teachers remains relatively understudied. To know the level of awareness of Artificial Intelligence, attitude and readiness of pre-service teachers to integrate Artificial Intelligence in teaching is important as they will shape the future of teaching and learning. Recently the study conducted on Artificial Intelligence and pre-service teachers; a study to assess awareness and knowledge at University of Poonch AJK found that while most participants had a reasonable understanding of AI but felt that the current curriculum didn't cover enough AI content (Kiani et al., 2023).

The Open University Malaysia conducted a study on the use of Artificial Intelligence by educators in higher education. The study highlights the positive relationship and significance of attitude, Perceived Usefulness, Ease of Use in shaping intensions and influencing behavior associated to AI incorporation (Osman et al., 2024). There is another study conducted on teacher readiness and intentions to teach Artificial Intelligence in schools indicated that teachers' readiness and ability to use AI in schools will predict AI (Ayanwale et al., 2022). A qualitative study conducted by Sangapu (2018) determined that

teachers and students both needed more understanding to know the benefits of AI application in education and developing their instructional and acquiring skills. Furthermore, perception of instructors and students supports an effective integration of AI in education. Moreover, research conducted on the topic assessing future teachers' readiness in AI driven classroom indicated that future teachers have strong ethical knowledge of AI but showed lower readiness in using and implementing AI tools and problem-solving skills. Research recommendations suggested there is requirement of training programs which pay attention on practical AI implications, problem solving and AI management skills to link identified gaps (Sabornido et al., 2024).

The study and Sultan Kudarat State University provides empirical evidence on English pre-service teachers (PSTs) awareness and acceptance of Artificial Intelligence in language teaching. Using a descriptive correlational design with total enumeration sampling, the study assessed their familiarity with AI tools, attitude toward AI, perceived ease of use and intentions to use AI in classroom practice. Findings showed that English pre-service teachers were very familiar with AI powered learning platforms and held positive attitude towards AI benefits for divers learning needs and student engagement. They also reported generally favorable perception perceptions of ease of use and strong intentions to adopt AI, they remain neutral about using AI for creating lesson plans, activities and assessment. A moderate positive correlation was identified between awareness and AI acceptance indicating that greater AI awareness is linked to increase willingness to use AI in teaching. The study recommends training programs to improve pre-service teachers' practical skills and ethical understanding of AI integration in education (Relator et al., 2025).

Another study examined pre-early childhood teachers attitude towards science teaching mediated the relationship between there Artificial Intelligence utilization awareness and their intention to accept AI based educational practices. Using an online survey of 134 pre-early childhood teachers, the researchers employed SPSS 27.0 and process Macro Model to conduct descriptive statistics and correlational analysis. Results showed that science teaching attitude served as a significant mediating factor, teachers with higher utilization awareness demonstrate strong AI acceptance intentions when they also held positive attitude towards teaching. The study highlighted that positive perceptions of

AI in Early Childhood education combined with sportive teaching attitude, contribute to more active acceptance of AI integration. It further emphasized the importance of embedding opportunities to use AI within pre-service science education curricula to enhance both awareness and teaching attitude (Choi et al., 2023).

Furthermore, A study investigated pre-service teachers' preparedness for Artificial Intelligence integration in Philippine Higher Education Institutions by examining their AI literacy, readiness, confidence and acceptance level. Using a cross sectional survey design with 384 pre-service teachers the study employed validated instruments and conducted descriptive statistics independent sample datasheet and correlational analysis. Results showed high readiness-confidence and moderate to high AI literacy and AI acceptance. The study reported strong positive correlations among AI literacy readiness-confidence and AI acceptance, indicating their interrelated role in influencing preparedness for AI adoption. The author emphasized the importance of developing inclusive and targeted AI education and training programs that address demographic and infrastructure disparities to ensure that future educators are equipped for effective AI integration (Balasa, 2025).

Following this a study examined at King Faisal University contribute to this emerging body of literature by examining the preparedness of academic staff to employ AI based tools in their instructional practice. Drawing on responses from 465 faculty members, the study reported a moderate level of readiness of AI integration. A significant relationship was found at the significance level 0.01 between faculty members readiness, to incorporate AI in teaching and the perceived benefits of AI in higher education and teaching, attitude towards AI, behavioral intensions to use AI. Differences in readiness were observed across gender, age and teaching experiences while no variation were observed across rank or college type. The study underscores the need for the capacity building initiatives to enhance faculty skills, awareness and institutional support for effective AI integration in the higher education (Alnasib, 2023).

The literature shows number of gaps despite the increased interest for AI in teaching. Study on Artificial Intelligence and pre-service teachers; to assess awareness and knowledge at University of Poonch AJK had demonstrated that even pre-service teachers have some understanding of AI but the current curriculum is insufficient in providing AI

knowledge. There is a need for curriculum reforms that integrate comprehensive AI education for future teachers (Kiani et al., 2023). Research specifies that even there is existence of professional development programs, but due to insufficient experience and knowledge many pre-service teachers lack the readiness to teach AI (Sanusi et al., 2021). More research is essential to determine how training and resources improve the readiness of pre-service teachers towards the integration of AI in education that may close the gap between actual classroom application and knowledge.

Intention to adopt AI in teaching is significantly influence by the attitude of pre-service teachers. However, limited study has been done to determine how these attitudes can transfer into actual readiness and integration of AI (Gupta & Yadav, 2022). The function of perceived utility and simplicity of usage needs further research is needed to determine how to better assist pre-service teachers in adopting AI (Osman et al., 2024; Ayanwale et al., 2022). Although studies have explored AI integration in advance education, insufficient empirical support exists on AI readiness specifically among pre-service teachers. This study aims to address this gap by examining the correlation between AI awareness, attitudes, and readiness within this specific group. By addressing these gaps, this study aims to contribute valuable insights into how AI can be better integrated into teacher education, ultimately preparing pre-service teachers for AI-enhanced future classrooms.

## **2.6 Summary**

The study has investigated the relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers. As, educational institutions' AI technologies transforming from traditional method to student centered AI enabled approaches that promise individualize learning and more effective administrative process around the world. Although AI potential in education is significant, but challenges persist particularly related to teachers' awareness, attitude and readiness to implement AI to implement AI in education. This research was based on the Technology Acceptance Model (TAM) to investigate the pre-service teachers' awareness of AI influences the attitude and readiness to integrate AI in teaching. Previous studies have found that teachers generally lack AI expertise with sufficient AI content in curricula, which harms their aptitude to

integrate AI in their teaching practice. Professional development and institutional support are necessary for the success of AI integration.

The literature review provided a comprehensive exploration of the role of Artificial Intelligence in education with particular focus on pre-service teacher's awareness attitude and readiness towards its integration. The reviewed studies collectively emphasized that while AI holds vast potential to enhance teaching efficiency, personalize learning and administrative operations. Its successful implementation depends greatly on teachers understanding acceptance and preparedness. However, a critical examination of existing research revealed notable disparities in pre-service teachers' level of AI literacy and confidence. Although global studies demonstrated increasing awareness of AI applications, many studies highlighted insufficient depth in conceptual and technical understanding. Furthermore, studies indicated that limited exposure lack of training and curriculum gaps significantly hinder pre-service teacher readiness to integrate AI effectively into classroom practices. Despite this theoretical grounding inconsistencies across empirical findings particularly regarding how awareness translates into actual implementation highlight a persistent gap.

Studies stressed the urgent need for structured professional development hands on AI training and curriculum reform to bridge the gap between knowledge and practice. Therefore, this chapter concluded that while pre-service teacher exhibit growing awareness in positive attitude toward AI but there remains a critical need to strengthen their readiness through systematic exposure, pedagogical alignment and institutional support. This identified gap justifies the present studies focus on examining the relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers in Pakistan

## CHAPTER 3

### RESEARCH METHODOLOGY

This section describes the methodological approach used to address the research questions. This section provided details about research design, research paradigm, Population, Sample, Instrument used to collect data, data collection procedure, data analysis and ethical consideration.

#### 3.1 Research Design

This quantitative research employed correlational research design to examine the relationship among awareness, attitude, and readiness of Artificial Intelligence of pre-service teachers. The research design is appropriate to examine the relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers.

#### 3.2 Research Paradigm

The research is based on the positivist paradigm, to emphasize objective measurements and empirical evidences. It aligns with the quantitative nature of the study using structured instruments to collect data and statistical method to test the hypothesis.

#### 3.3 Population of the Study

The population of the study consisted of 495 pre-service teachers enrolled in undergraduate programs of the faculty of education at universities;

- The International Islamic University, Islamabad
- The National University of Modern Languages, Islamabad

At the International Islamic University, the population included students of BS Education in the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> semesters while at the National University of Modern Languages it comprised students of B. Ed (Hons) and BS Health and Physical Education enrolled in the same semesters. The focused on advance semesters was made, it was reasoned that student in the initial semester lack comparable exposure to the teacher education content and therefore, may not demonstrate the same level of awareness, attitude and readiness towards Artificial Intelligence as those in advance semesters. Since not all education programs at these universities had 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> semesters at the time of data

collection. Therefore, only those programs meeting this criterion were included in the population; BS Education, B. Ed (Hons), BS Health and Physical Education.

**Table 3.1**

*Population and Sample*

Sr No	Universities	Programs	Semesters	Population	Sample
1	International Islamic University Islamabad	BS Education	6 <sup>th</sup> Semester	128	25
			7 <sup>th</sup> Semester	59	22
			8 <sup>th</sup> Semester	62	25
2	National University of Modern Languages Islamabad	B.Ed. (Hons)	6 <sup>th</sup> Semester	63	21
			7 <sup>th</sup> Semester	46	22
			8 <sup>th</sup> Semester	55	22
		BS Health & Physical Education	6 <sup>th</sup> Semester	35	25
			7 <sup>th</sup> Semester	24	20
			8 <sup>th</sup> Semester	23	28
Total				495	210

(Gay, 2012).

**3.4 Sample and Sampling Technique**

The sample size included 210 pre-service teachers according to the table Gay (2012). This study employed convenient sampling technique. The sample was drawn from pre-service teachers enrolled in advanced semesters 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> of BS Education, B. Ed (Hons), and BS Health and Physical Education programs at International Islamic University, Islamabad and National University of Modern Languages Islamabad.

**3.5 Research Instrument**

The questionnaire consisted of 30 items was developed based on literature review to collect data on pre-service teachers' awareness, attitude and readiness toward Artificial Intelligence. The questionnaire comprised of a five-point Likert scale ranging from

strongly disagree to strongly agree allowing for the complex understanding of the participants views. The questionnaire comprised of three main variables awareness, attitude and readiness each measured through sub variables across a total of 30 items. Each variable was represented by 10 statements. The awareness section addressed knowledge of AI and its applications; the attitude section focused on perceived usefulness and perceived ease of use and the readiness section measured pre-service teachers' competences and confidence in applying AI.

**Table 3.2**

*Variables and Sub Variables*

Sr. No	1	2	3	
	<b>Variables</b>	<b>Awareness</b>	<b>Attitude</b>	<b>Readiness</b>
1	Sub variables	AI concepts	Perceived Usefulness of AI	Competences to integrate AI in teaching
2		AI Application	Perceived Ease of Use of AI	Confidence to integrate AI in teaching

**3.6 Procedure (Validity, Pilot Testing & Reliability)**

The pre-testing of the research is known as pilot study of the research to check or investigate the validity and reliability of research instrument before using it in large scale of study. To develop the anticipated consequences, the questionnaire might be rationalized, rephrased and restructured for the comfort and considerate of respondent.

**3.6.1 Validity**

In this study, the validity of the instruments was verified over the experts' opinions. Experts' opinions were taken from senior faculty members from the faculty of Education from International Islamic University and National University of Modern Languages, Islamabad to ensure the validity of the instruments. Their suggestion and accuracy have been considered to improve these tools.

### 3.6.2 Pilot Testing

A pilot test was conducted on pre-service teachers who were not included in the core study prior to final data collection. The responses from the pilot test were analyzed to measure the internal consistency of the instruments using Cronbach's Alpha, a statistical tool widely used to assess the reliability of scales.

### 3.6.3 Reliability

The reliability of the questionnaires was checked through SPSS by applying Cronbach's Alpha. Consistency level where the identification is gauged estimated or calculated. The reliability of 5-point Likert was calculated.

**Table 3.3**

*Reliability statistics of the research instrument calculated through Cronbach's Alpha*

<b>Sr. No</b>	<b>Variables</b>	<b>No of Items</b>	<b>Cronbach's Alpha Value</b>
1	Awareness	10	0.93
2	Attitude	10	0.91
3	Readiness	10	0.92

The table 3.3 shows the reliability analysis of research instrument using Cronbach's Alpha, with 21 participants responding to a 30-item scale. The obtained Cronbach's Alpha value for awareness was 0.39, the Cronbach's Alpha value for the attitude was 0.91 and Cronbach's Alpha value for the readiness was 0.92 which indicated that all the statements of the questionnaire are quite reliable.

### 3.7 Data Collection

The data were collected from two universities of Islamabad: International Islamic University Islamabad (IIUI) and National University of Modern Languages, Islamabad. The data was collected through both online and onsite modes to ensure accessibility for all participants. Online questionnaires were distributed through WhatsApp while onsite data was collected by visiting to the area.

### **3.8 Data Analysis**

The descriptive statistics, with mean and standard deviation were used to summarize the pre-service teacher's understanding of AI, their attitude and readiness to integrate Artificial Intelligence in teaching with Five-point Likert scale. In descriptive analysis there were three variables: awareness, attitude and readiness AI awareness was measured through two dimensions, Conceptual understanding and familiarity with AI tools in teaching. The second variable, attitude of pre-service teachers was also broken into two sub variables Perceived Usefulness and Perceived Ease of Use of Artificial Intelligence. Moreover, the third variable, readiness of pre-service teachers was also analyzed through sub variables, confidence and self-efficacy. Furthermore, Inferential Statistics was used to analyze the relationship among variables. Pearson correlation data analysis technique was used to examine the relationship among awareness, attitude, and readiness for Artificial Intelligence of pre-service teachers. These techniques are appropriate for identifying patterns and relationship within the quantitative data.

### **3.9 Ethical Consideration**

In this research study, research ethics were considered by the researcher. Information collected from respondents was kept private and used only for research purposes. The researcher build trust between the researcher and participants before the data collection and behave in a trustworthy manner. Researcher take the consent of respondents while including them in the research and took permission for collecting data from respondents.

## CHAPTER 4

### DATA ANALYSIS AND INTERPRETATIONS

The collected data were examined using descriptive statistics, including mean and standard deviation to summarize the pre-service teacher's understanding of AI, their attitude and their readiness to integrate Artificial Intelligence in teaching. In the descriptive analysis, three variables were assessed. AI awareness was measured through two dimensions; conceptual understanding and familiarity with AI tools in teaching. The second variable, the attitude of pre-service teachers was divided into two sub variables: Perceived Usefulness and Perceived Ease of Use of Artificial Intelligence. Moreover, the third variable, the readiness of pre-service teachers was analyzed through the sub variables of confidence and self-efficacy.

Furthermore, Inferential Statistics were used to analyze the relationship among the variables. The Pearson correlation data analysis technique was applied to examine the relationship among awareness, attitude, and readiness of Artificial Intelligence of pre-service teachers. These techniques are appropriate for identifying patterns and relationship within the quantitative data and for providing empirical support for the studies assumptions. To interpret the responses obtained through the 5-point Likert scale, the following mean score ranges were used to categories the level of awareness, attitude and readiness, of pre-service teachers towards Artificial Intelligence adoption in teaching.

**Table 4.1**

*Interpretation Scale of Mean Scores*

<b>Sr. No</b>	<b>Range of Mean Scores</b>	<b>Interpretation</b>
1.	1.00-1.80	Very low level
2.	1.81-2.60	Low level
3.	2.61-3.40	Moderate level
4.	3.41-4.20	High level
5.	4.21-5.00	Very high level

These ranges were used to interpret the average responses of participants for each statement and variable in the questionnaire. Higher mean score indicated the stronger agreement or a more favorable perception, whereas lower mean score represent the weaker agreement.

#### 4.1 Demographic Information

**Table 4.2**

*Descriptive Statistics of Demographic Information by Programs*

Sr. No	Programs	Frequency	Percent	Valid Percent	Cumulative Percent
1	BS Education	72	34.3	34.3	34.3
2	BS Health and Physical Education	73	34.8	34.8	69.0
3	B. Ed (Hons)	65	31.0	31.0	100.0
	Total	210	100.0	100.0	

The table 4.2 shows the distribution of responses in the study out of the total 210 participants 34.5% is from the BS Education, 34.8% from the BS Health and Physical Education and 31% from the B. Ed (Hons). The distribution indicates the relatively balanced representation across the three programs of faculty of Education.

**Table 4.3**

*Descriptive Statistics of Demographic Information by Semesters*

Sr. No	Semesters	Frequency	Percent	Valid Percent	Cumulative Percent
1	6 <sup>th</sup> Semester	71	33.8	33.8	33.8
2	7 <sup>th</sup> Semester	64	30.5	30.5	64.3
3	8 <sup>th</sup> Semester	75	35.7	35.7	100.0
	Total	210	100.0	100.0	

The table 4.3 represents the distribution of respondents based on their current's semesters among the 210 participants 33.8% are from the 6 semesters, 30.5% from the 7 semester and 30.7% enrolled in the 8 semesters. This indicates a fairly even distribution with the highest representation from the 8 semesters. The cumulative percentage confirm

that all responses have been accounted for ensuring the complete and valid data set for analysis

## 4.2 Descriptive Statistics of the Variables

**Objective 1:** To investigate the awareness level for Artificial Intelligence of pre-service teachers.

**Table 4.4**

*Mean Scores of Pre-Service Teachers' Understanding of Artificial Intelligence*

Sr. No	Statements	N	Minimum	Maximum	Mean	Standard Deviation
1	I am familiar with the basic concepts of Artificial Intelligence use in teaching.	210	1.00	5.00	3.87	0.95
2	I am aware of different AI applications used in teaching.	210	1.00	5.00	3.70	0.99
3	I know the difference between AI and traditional programming.	210	1.00	5.00	3.58	1.06
4	I can give my opinion about the key features of AI in teaching	210	1.00	5.00	3.65	0.93
5	I am familiar with the ongoing discussion about AI in teaching	210	1.00	5.00	3.80	0.89

Table 4.4 shows the descriptive statistics of Artificial Intelligence understanding. The general statements regarding AI concepts ranged from 3.58 to 3.87 indicating the moderate to high level of awareness. The highest mean (M=3.87) was formed for the familiarity with the basic concepts of Artificial Intelligence is suggesting the foundational understanding is relatively strong. However, the lower mean (M=3.58) for the statement “I know the difference between AI and traditional programming” reveals the gap in technical understanding highlighting the need for exposure.

**Table 4.5***Mean Scores of Pre-Service Teachers' Awareness of AI Tools Used in Teaching*

Sr. No	Statements	N	Minimum	Maximum	Mean	S. Deviation
6	I am aware of AI tools to plan lessons.	210	1.00	5.00	3.84	0.96
7	I am aware that how AI tools can be used to gain a deeper understanding of lessons	210	1.00	5.00	3.94	0.85
8	I am aware of AI tools to make presentations	210	1.00	5.00	3.94	0.93
9	I am aware of AI tools used to make different charts for classroom instruction	210	1.00	5.00	3.74	0.98
10	I am aware of AI tools used for assessment procedures	210	1.00	5.00	3.76	0.94

Table 4.5 examines awareness of AI tools and results shows slightly higher average, ranging from 3.74 to 3.94. Pre-service teachers indicated a higher awareness for AI tools used for presentations and lesson understanding (M= 3.94), showing a strong connection between their training and the classroom utility of AI.

**Table 4.6***Overall Mean Score for Pre-Service Teachers' Awareness of Artificial Intelligence*

	N	Minimum	Maximum	Mean	Standard Deviation
Awareness	210	1.00	5.00	3.78	0.68

The overall mean scores for awareness is 3.78 with a standard deviation of 0.68. This indicates that pre-service teachers generally possess moderately high level of

awareness regarding Artificial Intelligence including its concepts and applications in teaching.

**Objective 2.** To explore the attitude of pre-service teachers towards Artificial Intelligence integration in teaching

**Table 4.7**

*Mean Scores for Pre-Service Teachers' Perceived Usefulness of Artificial Intelligence*

Sr. No	Statements	N	Minimum	Maximum	Mean	Standard Deviation
1.	I believe that AI can significantly enhance the quality of teaching	210	1.00	5.00	3.83	0.88
2.	Using AI tools can enhance productivity of my work.	210	1.00	5.00	3.88	0.85
3.	AI tools can enable me to accomplish tasks more quickly	210	1.00	5.00	3.84	0.83
4.	AI tools can make it easier for me to complete my work.	210	1.00	5.00	4.08	0.84
5.	AI tools can improve my understanding about my subjects	210	1.00	5.00	4.02	0.84

The results in table 4.7 suggested a positive attitude towards the usefulness of Artificial Intelligence in teaching. Most items show high scores on the scale, particularly “AI tools can make it easier for me to complete my work” (M=4.08, SD= 0.840) and Artificial Intelligence tools can improve understanding about my subjects (M=4.02, SD= 0.846). These high scores indicate that Pre-service teachers acknowledge the practical benefits of Artificial Intelligence, including enhancing productivity and understanding.

**Table 4.8***Mean Scores of Pre-Service Teachers' Perceived Ease of Use of Artificial Intelligence*

Sr. No	Statements	N	Minimum	Maximum	Mean	Standard Deviation
6.	I can find it easy to get AI tools to do what I want them to do.	210	1.00	5.00	3.96	0.75
7.	Learn to use AI tools would be easy for me.	210	1.00	5.00	3.94	0.76
8.	Interacting with AI tools would be understandable.	210	1.00	5.00	3.86	0.80
9.	I would find AI tools to be flexible to interact with.	210	1.00	5.00	3.89	0.78
10.	I feel there is nothing wrong with using AI tools.	210	1.00	5.00	3.69	0.94

Table 4.8 reveals that participants generally find AI tools easy and manageable to use. The highest mean was for “I can find it easy to get AI tools to do what I want them to do” (M=3.96, SD= 0.756) Whereas mean for the statement “learning to use AI tools would be easy for me” is (M=3.94, SD= 0.765). Even the lowest rated items “I feel there is nothing wrong with using AI tools” (M= 3.69, SD= 0.944) still reflects favorable view.

**Table 4.9***Over all Mean Score of Pre-Service Teachers' Attitude to Integrate AI in Teaching*

	N	Minimum	Maximum	Mean	Standard Deviation
Attitude	210	1.00	5.00	3.90	0.61

The overall mean scores for attitude as shown in table 4.9 is 39.03 with the standard deviation of 0.61. These results demonstrate a favorable attitude among the participants

towards both the Perceived Usefulness and Perceived Ease of Use of Artificial Intelligence technologies. This indicate that pre-service teachers recognize the value of Artificial Intelligence in teaching and also feel reasonably comfortable with its potential application in their future teaching practice.

**Objective 3.** To assess the readiness of pre-service teachers’ to effectively incorporate Artificial Intelligence in teaching.

**Table 4.10**

*Mean Scores of Pre-Service Teachers’ Confidence to Integrate AI in Teaching*

<b>Sr. No</b>	<b>Statements</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
<b>1</b>	I feel confident to use AI tools in the classroom	210	1.00	5.00	3.66	0.93
<b>2</b>	I am confident that I can successfully integrate AI into my lesson planning	210	1.00	5.00	3.79	0.89
<b>3</b>	I feel prepared to address challenges that may arise from using AI in the classroom.	210	1.00	5.00	3.70	0.86
<b>4</b>	I have the necessary resources e.g. (technology support) to implement AI in my future classroom.	210	1.00	5.00	3.72	0.90
<b>5</b>	I am willing to receive additional training on AI in teaching if needed.	210	1.00	5.00	3.81	0.87

In table 4.10 responses show a generally positive sense of readiness among pre-service teachers to use Artificial Intelligence. Statements with highest mean score were “I am willing to receive additional training on Artificial Intelligence in teaching if needed” (M= 3.819, SD= 0.872) indicating to an openness to professional development. Other items

like I am confident that I can successfully integrate Artificial Intelligence into lesson planning (M= 3.79, SD= 0.89) also scored relatively demonstrating good levels of confidence. While still positive the items I feel confident in my ability to use Artificial Intelligence tools in the classroom (M= 3.55, SD=0.935) the lowest mean suggesting room for the improvement in hands on experience and support.

**Table 4.11**

*Mean Scores of Pre-Service Teachers' Self-Efficacy to Integrate AI in Teaching*

<b>Sr. No</b>	<b>Statements</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
<b>6</b>	I believe I have the necessary skills and knowledge to get the desired outcomes of AI tools.	210	1.00	5.00	3.69	0.85
<b>7</b>	I feel in control to elaborate with AI tools	210	1.00	5.00	3.70	0.79
<b>8</b>	I am able to adapt the use of AI tools to fit the specific needs of different projects or situations.	210	1.00	5.00	3.85	0.78
<b>9</b>	I actively seek out opportunities to improve my skills in using AI tools	210	1.00	5.00	3.84	0.79
<b>10</b>	I can help other teachers to use AI in classroom instruction	210	1.00	5.00	3.81	0.86

Table 4.11 suggest strong self-efficacy among participants. Item such as “I am able to adapt the use of Artificial Intelligence tools to fit the specific needs for different projects or situations” (M= 3.85, SD 0.87) scored the highest. This reflects a proactive and confident mind set. Conversely, the statement I believe I have the necessary skills and knowledge to get the desired outcomes of AI tools (M=3.69, SD=0.85), receive the lowest mean score

this slightly lower score suggest that some participants may perceive room for improvement in their foundational AI skills and knowledge.

**Table 4.12**

*Overall mean Score of Pre-Service Teachers' Readiness to Integrate AI in Teaching*

	N	Minimum	Maximum	Mean	Standard Deviation
Readiness	210	1.00	5.00	3.76	0.60

The overall mean score for readiness is 3.76 with standard deviation of 0.06. This suggest that pre-service teachers generally feel confident and prepared to incorporate Artificial Intelligence tools into their future classroom but it also suggests a demand for more structured training and real classroom exposure as the very high level of the mean score is 4.41-5.00.

### 4.3 Inferential Statistics of Variables

**Table 4.13**

*Relationship between Awareness and Attitude of Artificial Intelligence of Pre-Service Teachers*

Variables		Awareness	Attitude
Awareness	Pearson Correlation	1	0.727
	Sig. (2-tailed)		.000
	N	210	210
Attitude	Pearson Correlation	.727	1
	Sig. (2-tailed)	.000	
	N	210	210

The table 4.13 represents Pearson correlation coefficient between the awareness of Pre-Service teachers and their attitude towards Artificial Intelligence. The Pearson Correlation coefficient is  $r = 0.727$  with p-value of 0.000 indicating a positive and statistically significant relationship between the two variables at the 0.01. This suggest that as awareness of Artificial Intelligence concepts and tools increases, pre-service teachers tend to develop a more favorable attitude towards using AI in educational settings.

**Table 4.14**

*Relationship between Awareness and Readiness of Artificial Intelligence of Pre-Service Teachers*

Variables		Awareness	Readiness
Awareness	Pearson Correlation	1	0.733
	Sig. (2-tailed)		.000
	N	210	210
Readiness	Pearson Correlation	0.733	1
	Sig. (2-tailed)	.000	
	N	210	210

The table 4.14 represents Pearson correlation coefficient between the awareness and readiness of Pre-Service teachers towards Artificial Intelligence. The Pearson Correlation coefficient is  $r = 0.733$  with p-value of 0.000 indicating a positive and statistically significant relationship. This means that higher awareness of AI including knowledge of tools and applications is associated with greater readiness to integrated AI into teaching.

**Table 4.15**

*Relationship between Attitude and Readiness of Artificial Intelligence of Pre-Service Teachers*

Variables		Attitude	Readiness
Attitude	Pearson Correlation	1	0.794
	Sig. (2-tailed)		.000
	N	210	210
Readiness	Pearson Correlation	0.794	1
	Sig. (2-tailed)	.000	
	N	210	210

The table 4.15 represents Pearson correlation coefficient between the attitude and readiness of Pre-Service teachers towards Artificial Intelligence. The Pearson Correlation coefficient is  $r = 0.794$  with p-value of 0.000 indicating a positive and statistically significant relationship.

**Table 4.16**

*Overall Representation of Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers*

Sr. No	Variables	R	p-value
1	Awareness and Attitude	0.727	P < 0.01
2	Awareness and Readiness	0.733	P < 0.01
3	Attitude and Readiness	0.794	P < 0.01

Table 4.16 shows the Pearson correlation coefficient among the three-core variables: Awareness, Attitude and Readiness for AI among pre-service teachers. All relationships are significant at the 0.01 level. The significant correlation is observed between attitude and readiness ( $r= 0.794$ ) followed by awareness and readiness ( $r=0.733$ ) and awareness and attitude ( $r=0.727$ ). These results demonstrating that increasing AI awareness can improve attitude which in turn significantly enhances readiness among pre-service teachers to corporate AI in teaching.

## **CHAPTER 5**

### **SUMMARY, FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Summary**

The study was conducted to investigate the relationship among awareness attitude and readiness for Artificial Intelligence of pre-serves teachers enrolled at the International Islamic University and National University of modern languages Islamabad. The objectives of the study were to investigate the awareness level for Artificial Intelligence of pre-service teachers, to know the attitude or pre-service teachers towards Artificial Intelligence integration in teaching, to assess the readiness of pre-service teachers of Artificial Intelligence in teaching and to examine the relationship among attitude awareness and readiness of Artificial intelligence of pre-service teachers. The study was directed by the technology acceptance model which possessed that attitude and intended behavioral towards the technology are influenced by the perceptions of its usefulness and ease of use.

Furthermore, the structured questionnaire, consisting of 30 items was developed to measure pre-service teacher's awareness attitude and readiness towards Artificial Intelligence integration in teaching. The questioner employed a 5-point Likert scale ranging from strongly disagree to strongly agree allowing participants to express their level of agreement on each statement. The instrument was divided into 3 main sections corresponding to the study variables; awareness, attitude and readiness. Following this, to ensure the instruments' credibility its content validity was verified through experts' opinions from senior faculty member at the International Islamic University and the National University of Modern Languages, Islamabad.

Pilot test was conducted from 21 pre-service teachers not included in the main study to determine internal consistency. The Cronbach's alpha values of awareness 0.93, attitude 0.92 and readiness 0.93 confirm the high reliability of the instrument. The population of the study comprised 495 pre-service teachers enrolled in the undergraduate education programs; BS Education, B.Ed. (Hons), BS Health and Physical education at International Islamic University Islamabad. These participants were chosen from advanced semesters

6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup>, as they had greater exposure to teacher education content and technology integration concepts. Using Gay's (2012) sample size determination table, a simple of 210 pre-service teachers were selected through convenient sampling technique, data were collected through both online and onsite modes to insure accessibility and inclusively of all participants. Data analysis was performed using descriptive statistics mean and standard deviation and inferential statistics, Pearson correlation to determine the strength of relationship among the three variables.

## **5.2 Findings**

Based on the objectives of the study, following findings were derived from the data analysis:

1. The Mean of Mean scores for awareness (M=3.78, SD 0.68) supporting the interpretation that pre-service teachers are generally familiar of AI concepts, tools and its classroom application but somehow there is a need for comprehensive practical knowledge.
2. The Mean of Mean scores for attitude was 3.90, with the standard deviation of 0.61 reflected a significant positive perception of Artificial Intelligence particularly in term of its Perceived usefulness and perceived Ease of use.
3. The Mean of Mean scores for readiness was 3.76, with the standard deviation of 0.60 indicated that teachers are confident and prepared to integrate AI in their future classroom.
4. Strong positive correlation was found between awareness and attitude (0.727,  $p < 0.01$ ). This indicated that the more per service teachers are aware of AI concepts and application, the more likely they are to develop positive attitude towards its use.
5. Similarly, significant relationship existed between awareness and readiness 0.733,  $p < 0.01$ ). This indicated that when pre-service teachers possess greater knowledge of Artificial Intelligence, they feel more confident and prepared to integrate into teaching.
6. The significant relationship was found between attitude and readiness indicating that positive attitude significantly boosts readiness (0.794,  $p < 0.01$ ) shows that pre-

service teachers who perceive Artificial Intelligence as useful and easy to use are most likely to feel ready to apply it in classroom.

### **5.3 Discussion**

The aim of the study was to examine the relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers in Islamabad, Pakistan. The findings indicated that pre-service teachers demonstrated a moderate to high level of awareness for AI concepts and tools, this is aligned with the research conducted by Kiani et al. (2023), which found that while many pre-service teachers in Pakistan had a basic understanding of AI, their curriculum lacked sufficient AI content, limiting deeper conceptual awareness. The present study also reflects findings from Du et al. (2024) and Touretzky et al. (2019), emphasized that awareness must go beyond familiarity it should include understanding of ethical, technical and social implications. However, the higher-level understanding was only moderately evident in the current study. The lack of specific knowledge on the difference between AI and traditional programming ( $M=3.58$ ) confirm that Pakistani teachers education programs still need teachers training programs enhancement.

Despite this participant were highly aware of AI tools used in teaching tasks such as lesson planning, presentations, and assessments aligning with global trends that show growing exposure to AI in classroom application. Pre-service teachers exhibited positive attitude towards AI ( $M= 3.90$ ) agreeing that AI improves efficiency, understanding and simplifies task, this finding validates Davis's 1989 Technology Acceptance Model Where Perceived Usefulness and Perceived Ease of Use strongly influence user's attitude. This is spotted by Osman et al. (2024), who identified similar trends in higher education faculty that usability and perceived value significantly affect attitude towards AI adoption. Similarly, Chatterjee and Bhattacharjee (2020) confirmed that user's belief in AI benefits directly influences their intention to use AI in educational setting.

Interestingly, findings from the study contradict earlier studies by Istenic et al. (2021) and Tallvid (2016), which showed reluctance or negative attitude among teachers due to fair lack of familiarity or resistance to change. The optimistic attitude in the study may reflect a generational shift or increase digital literacy among pre- service teachers in

Pakistan. The mean readiness score  $M=3.76$ ) indicates that participants were highly ready to integrated AI into their future classrooms. They demonstrated self-efficacy, willingness to undergo training and confidence in applying AI tools. These results bring into line with Ayanwale et al. (2022) who asserted that readiness strongly influences teachers' behavioral intent to adopt AI. Teachers who believe in their competency, are more open to experimentation in innovation. However, some respondents in this study still expressed uncertainty regarding actual classroom application reflecting Sabornido et al. (2024) who observed that while futures teachers possess ethical and conceptual understanding, they often lack practical exposure in problem solving skills for real applications.

In addition, the study confirms the significant of professional development and organizational support as emphasized by Nazaretsky et al. (2022) and Walter (2024). Without structured training, teachers may possess theoretical knowledge but remain unprepared to translate it into effective classroom practices. Furthermore, Pearson correlations results showed strong and significant relationship among all variables: awareness and attitude, awareness and readiness and readiness and attitude. This results from the Technology Acceptance Model which proposes a pathway from knowledge (awareness), to perception (attitude) to behavioral intention (readiness). The strongest relationship was found between attitude and readiness suggesting that even when awareness is sufficient, attitude play a pivotal role in moving towards actual implementation.

This pattern is reflected in studies by Zang et al. (2023) and Wang et al. (2021) who found that positive attitude was more predictive of AI adoption than mere awareness. Moreover, Fundi et al. (2023) emphasized attitude formation is influenced by peer behavior, institutional culture pointing toward the importance of environmental sports systems in readiness development. In more developed regions where AI increasingly embedded in teacher education, Pakistani programs are still developing AI related curricula which limits pre-service teachers' exposure yet the high correlations among awareness attitude and readiness reflects a strong willingness to learn, indicating that target training and infrastructure investment can yield rapid improvement.

Relatively high level of awareness, positive attitude and readiness in the study are consistent with recent international findings. Large scale research from Estonia founded

teachers who had experience with AI tools reported significantly high level of readiness and perceived usefulness, and that readiness and perceived usefulness are among the best predictors of AI adoption in classrooms (Granstrom & Oppi, 2025). Similarly, studies focused on pre-service teachers showed that stronger technology and pedagogical knowledge is associated with higher readiness. Pre-service teachers' cohorts with targeted AI-related training demonstrate both technical and ethical readiness to integrate AI in classroom (Bautista et al., 2024). Earlier work in other contexts likewise highlights readiness and perceived usefulness as Central to teachers' intentions to adopt AI. Together these studies reinforce the interpretation that exposure targeted competence development and pedagogical alignment help to explain the higher awareness attitude and readiness measured in this study (Ayanwale et al., 2022).

Furthermore, the findings of high awareness, positive attitude and strong readiness among pre-service teachers are consistent with Ofem et al. (2025) who reported positive relationship between teachers' attitude, technology readiness and perceived ease of use in predicting preparedness to use AI in classroom assessment. This convergence reinforces the robustness of the results of this study. The problem statement identified limit AI knowledge, and no readiness and the absence of empirical research in the Pakistani context this study successfully address these concerned by measuring actual levels of awareness, attitude and readiness revealing strong interrelationship among these variables and demonstrating the need for AI focused reforms in teacher education.

#### **5.4 Conclusions**

Based on the objectives, following conclusions were drawn from the findings of the study:

1. Based on the objective one, pre-service teachers exhibited high level of awareness regarding Artificial Intelligence particularly in understanding basic AI concepts and the use of AI tools in teaching, however there was a noticeable gap in technical knowledge such as distinguishing traditional programming and Artificial Intelligence.
2. The attitude of pre-service teachers towards the use of AI in teaching was positive.

Pre-service teachers perceived AI as useful in enhancing teaching effectiveness and understanding, they also found it was to be reactively easy to use.

3. Pre-service teachers reported a reasonably high level of readiness to incorporate AI into their future classrooms. They expressed confidence to use AI tools, willingness to receive further training and strong self-efficacy related to AI integration however actual classroom implementation was lately lower indicating the need for hands on experience.
4. Based on the objective four, a statistically significant and strong positive relationship was found between awareness and attitude indicating that greater awareness of AI leads to more favorable attitude toward it use in teaching, strong and statistically significant relationship was observed between awareness and readiness suggesting that pre-serves teachers who are more aware of AI or more confident and prepared to integrate into their classrooms. Furthermore, strong positive relationship was found between attitude and readiness this shows that teachers with more positive attitude towards AI are also more likely to feel ready and capable of using AI in educational setting.

## **5.5 Recommendations**

Based on the conclusions of the study, following recommendations were made.

### **a. Recommendations of the Study**

1. According to conclusion one, pre-service teachers have a basic conceptual understanding of Artificial Intelligence but lack depth in technical knowledge. It is recommended to the pre-service teachers to continued efforts be made, for example; Engage with practice along with theoretical foundations and acquire functional concepts of AI, ethical knowledge, watch tutorials, take short online courses, attend workshops, seminars and conferences to deepen in-depth understanding of Artificial Intelligence usage in teaching.
2. Based on the conclusion two, attitude towards AI among pre-service teachers was found to be general positive especially concerning perceived usefulness and

perceived ease of use. To foster more positive attitude towards AI integration it is recommended that teacher training programs and university instructors may prioritize exposure based and experience-driven learning. When pre-service teachers interact with AI tools in a supportive, low risk environment, they are more likely to perceive as beneficial and approachable. Furthermore, faculty members may reinforce positive attitude by integrating AI into their own teaching methods, demonstrating real classroom applications of AI such as adaptive learning platform, content generators or assessment tools to help pre-service teachers visualize its practicality and value.

3. Based on the conclusion three, the study indicated that while pre-service teachers are moderately ready to integrate AI. It is recommended that Universities may organize mandatory AI integration workshops and conduct simulated classroom environments for AI tool usage. Additionally, guided reflection and constructive feedback can help reinforce learning, and support the transition from theoretical understanding to practical implementations.

**b. Recommendations for Future Studies**

1. While the study used a quantitative approach, future researchers may incorporate qualitative methods interviews focus groups to explore the in-depth the personal experience motivations in barriers that influence pre-service teachers' attitude and willingness to adopt in their future classroom.
2. Future researchers may adopt a longitudinal design to examine how pre-service teachers' awareness attitude and readiness towards over time. Particularly from the beginning of teacher education program through to their early teaching years. Search research can provide insights into when and how interventions in training are most effective.

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## APPENDICES

### Appendix A

I want to conduct research on the topic “Relationship among awareness, attitude and readiness of Artificial Intelligence of pre-service teachers. The following questionnaire was utilized for data collection. It was consisted of 3 sections with subsections in each variable, assessing awareness, attitude and readiness of Artificial Intelligence of pre-service teachers. There are 10 statements in each section. The questionnaire employs five points Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Note: Please read the following statements carefully and tick (✓) the column of your own choice.

#### Abbreviations of options are as follow;

Strongly Agree (SA) Agree (A) Undecided (UD) Disagree (DA) Strongly Disagree (SD)

**Section A: AI Awareness:** Artificial Intelligence awareness refers to teachers’ familiarity to the AI concept, AI powered tools and its application in teaching.

Sr. No.	Statements	SD	D	UD	A	SA
1	I am familiar with the basic concepts of Artificial Intelligence use in teaching.					
2	I am aware of different AI applications used in teaching.					
3	I know the difference between AI and traditional programming.					
4	I can give my opinion about the key features of AI in teaching					
5	I am familiar with the ongoing discussion about AI in teaching					

<b>6</b>	I am aware of AI tools to plan lessons.					
<b>7</b>	I am aware that how AI tools can be used to gain a deeper understanding of lessons					
<b>8</b>	I am aware of AI tools to make presentations					
<b>9</b>	I am aware of AI tools used to make different charts for classroom instruction					
<b>10</b>	I am aware of AI tools used for assessment procedure.					

**Section B: Attitude:** This section includes two sub variables to measure attitude of pre-service teachers towards AI in teaching. Perceived usefulness refers to the degree to which users believe that AI will help to improve their performance. Whereas, perceived ease of use refers to the degree to which users believe that AI is easy to use and require minimal efforts.

<b>Sr. No.</b>	<b>Statements (Perceived usefulness)</b>	<b>SD</b>	<b>D</b>	<b>UD</b>	<b>A</b>	<b>SA</b>
<b>1</b>	I believe that AI can significantly enhance the quality of teaching					
<b>2</b>	Using AI tools can enhance the productivity of my work.					
<b>3</b>	AI tools can enable me to accomplish tasks more quickly					
<b>4</b>	AI tools can make it easier for me to complete my work.					
<b>5</b>	AI tools can improve the understanding about my subjects.					

	<b>Statement (Perceived ease of use)</b>					
<b>6</b>	I can find it easy to get AI tools to do what I want them to do.					
<b>7</b>	Learning to use AI tools would be easy for me.					
<b>8</b>	Interacting with AI tools would be understandable.					
<b>9</b>	I can find AI tools to be flexible to interact with.					
<b>10</b>	I feel there is nothing wrong with using AI tools.					

### **Section C: Readiness**

Readiness refers to the self-assessed level of preparation of prospective teachers, their confidence, and ability to effectively used AI in future classroom.

<b>Sr. No.</b>	<b>Statements about (confidence)</b>	<b>SD</b>	<b>D</b>	<b>UD</b>	<b>A</b>	<b>SA</b>
<b>1</b>	I feel confident to learn and use AI tools in the classroom					
<b>2</b>	I am confident that I can successfully integrate AI into my lesson planning.					
<b>3</b>	I feel prepared to address challenges that may arise from using AI in the classroom.					
<b>4</b>	I have the necessary technology support to implement AI in my future classroom.					
<b>5</b>	I am willing to receive additional training on AI use in teaching if needed.					
	<b>Statement (Competency)</b>					
<b>6</b>	I believe I have the necessary skills and knowledge to get desired outcomes of AI tools.					

<b>7</b>	I feel in control to elaborate with AI tools					
<b>8</b>	I am able to adapt the use of AI tools to fit the specific needs of different projects or situations.					
<b>9</b>	I actively seek out opportunities to improve my skills in using AI tools					
<b>10</b>	I can help other teachers to use AI in classroom instruction					

## Appendix B

### Certificate of Validation

“Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”



Tahira Tariq

MS Scholar, Department of Teacher Education, Faculty of Education, International Islamic University Islamabad (IIUI), Pakistan

This is to certify that the researcher-developed instrument has been assessed by me, and I found that it is appropriate, reliable and valid for the process of data collection for the research title “Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”

Name: Dr Muhammad Sher Baz Ali

Designation: Assistant Professor

Institute: International Islamic University Islamabad

Signature:  \_\_\_\_\_

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## Certificate of Validation

**“Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”**



Tahira Tariq

MS Scholar, Department of Teacher Education, Faculty of Education, International Islamic University Islamabad (IIUI), Pakistan

This is to certify that the researcher-developed instrument has been assessed by me, and I found that it is appropriate, reliable and valid for the process of data collection for the research title “Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre- service Teachers”

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**DR. MUNAZZA MAHMOOD**  
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Dept. Educational Leadership & Management  
Faculty of Education  
International Islamic University Islamabad

**Certificate of Validation**

**“Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”**



Tahira Tariq

MS Scholar, Department of Teacher Education, Faculty of Education, International Islamic University Islamabad (IIUI), Pakistan

This is to certify that the researcher-developed instrument has been assessed by me, and I found that it is appropriate, reliable and valid for the process of data collection for the research title “Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre- service Teachers”

Name: Dr. Alina Kaza

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Signature: [Handwritten Signature]

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**DEPARTMENT OF TEACHER EDUCATION**  
**FACULTY OF EDUCATION**  
**INTERNATIONAL ISLAMIC UNIVERSITY**  
**ISLAMABAD, PAKISTAN**

### Certificate of Validation

**“Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”**



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This is to certify that the researcher-developed instrument has been assessed by me, and I found that it is appropriate, reliable and valid for the process of data collection for the research title “Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre- service Teachers”

Name: Dr. Humaira Akram

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## Certificate of Validation

“Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”



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MS Scholar, Department of Teacher Education, Faculty of Education, International Islamic University Islamabad (IIUI), Pakistan

This is to certify that the researcher-developed instrument has been assessed by me, and I found that it is appropriate, reliable and valid for the process of data collection for the research title “Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”

Name: Dr. Fatima Barooi

Designation: AP

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**Certificate of Validation**

**“Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre-service Teachers”**



**Tahira Tariq**

MS Scholar, Department of Teacher Education, Faculty of Education, International Islamic University Islamabad (IIUI), Pakistan

This is to certify that the researcher-developed instrument has been assessed by me, and I found that it is appropriate, reliable and valid for the process of data collection for the research title “Relationship among Awareness, Attitude and Readiness for Artificial Intelligence of Pre- service Teachers”

Name: Dr. Obaid Ullah

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