Chapter-II

Review Of Related Literature

2.1 Introduction

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

2.2 Concept and Evolution of Artificial Intelligence in Education

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

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

2.3 Global Research on AI Awareness Among Teachers

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

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

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

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

2.4 Indian Context of AI Awareness in Education

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

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

2.5 Factors Influencing AI Awareness Among Pre-Service Teachers

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

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

2.6 Challenges in Integrating AI Into Teacher Education

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

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

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

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

2.7 Theoretical and Conceptual Framework

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

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

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

2.8 Research Gaps Identified

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

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

2.9 Summary

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