DEVELOPING AI LITERACY IN EDUCATION: A FRAMEWORK FOR TEACHER PROFESSIONAL DEVELOPMENT

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Abstract

This study aims to explore the development of AI literacy in the context of teacher professional development and to propose a comprehensive framework for its integration within school education. The research identifies the current state of AI literacy among teachers, addresses the challenges faced in its integration into professional development programs, and develops an actionable framework for enhancing AI literacy among educators. Employing a descriptive survey method, the study surveyed 100 school teachers, selected through purposive sampling, to gather insights into their understanding and perceptions of AI literacy. The data was analysed through percentage analysis, revealed a significant gap in the teachers' preparedness for integrating AI into their teaching practices. Most teachers reported minimal awareness and limited exposure to AI literacy, with few opportunities for training or professional development in this domain. This lack of foundational knowledge and skills poses a substantial barrier to the effective implementation of AI-related educational practices.

The study emphasizes that AI literacy is crucial for fostering innovation and preparing students for future challenges in an increasingly digital world. The findings align with the goals outlined in the National Education Policy (NEP) 2020, which underscores the importance of integrating technology and digital literacy into the education system for enhancing the quality of teaching and learning. Accordingly, the study proposes a detailed framework for AI literacy that can be implemented within teacher training programs to equip educators with the necessary skills and understanding to navigate the evolving landscape of education technology. The framework is designed to address both the pedagogical and technological aspects of AI, ensuring that teachers are adequately prepared to integrate AI into their curricula and professional development.

This research advocates for a systemic shift in teacher training to incorporate AI literacy, positioning it as a vital component of modern educational practices. The proposed AI literacy framework is envisioned as a critical tool for building the capacity of teachers, thus contributing to the holistic development of students and nation-building in the context of a rapidly advancing technological society.

Keywords: *AI Literacy, Teacher Professional Development, National Education Policy 2020, Technology Integration, Education Framework*

INTRODUCTION

Human kind has witnessed several revolutions in past which has completely changed the way the human society live work and function. Artificial Intelligence or AI, is predicted to be a next big revolution of human kind. This revolution will have a deep impact on not only the way we live, think, work and learn but also transform on what we know about ourselves. It is going to change our world at rapid pace. With its capabilities it will have a huge transformative impact on society, culture, ethics, business and more importantly on education. Looking at the intensity of impact AI and its functions it becomes imperative to upskill teacher educators and provide AI literacy framework for teachers so that they can improve the teaching learning process and bring about a change in the way the student learn things.

The development of AI can be traced back to Alan Turing who in 1936 introduced the concept of the Turing machine, a theoretical model that laid the foundation for simulating human intelligence through computations. Today, AI simply refers to a technology designed to enable machines to carry out functions that require human intelligence. In an increasingly digital age, where technology has been seamlessly integrated into our daily routines, there is a need for educators to have a significant idea of the concept of AI and be equipped with the necessary knowledge and skills by which they can prepare the students for an AI driven future. The knowledge

of AI can help the teachers focus on imparting a personalized learning experience for the students, foster a critical thinking domain for the students and prepare the students for future careers. Keeping all this in mind, the use of AI in education therefore requires careful consideration as they are expected to be the designer, facilitator of students and the guardian of safe and ethical practice of AI integrated education.

Therefore, world organization like UNESCO and United nations are stressing on the importance of involving and understanding AI technologies, possessing the skills to use it and maintaining an ethical guideline to apply the AI technology in education. National educational authorities like NEP need to define teacher's role in using AI, competency build up, teacher training requirements so that we develop a competent and ethical teachers in using AI assisted teaching learning methods.

However as important as it seems there are no significant number of studies done on the AI Literacy Framework for Teachers, it has been noticed that there are deficiencies in current teacher training programs concerning AI Literacy owing to the fact that AI is a relatively new concept in the field of education and technology was rarely a central part of the curriculum. According to recent survey UNESCO 2023 only seven countries had developed frameworks or programmes on AI for teachers in 2022. This is mainly due to the lack of knowledge and competencies of the Teacher to integrate the AI tools with the teaching learning methods or pedagogies.

The AI Literacy frame work purpose is to train and develop the competencies of the teachers to use AI and enabling them to integrate the AI technology into their teaching practices in not only in an innovative way but also in ethical manner

RATIONALE FOR THE STUDY

The rapid technological advancements on Artificial Intelligence frontier have a profound impact in the field of science, technology, business, arts and research. Education is no exception to these technological advancements. This has created an urgency to empower the teachers to understand the technical, ethical and pedagogical aspect of AI technology. UNESCO and National education authorities like NEP emphasis on integration of technology with innovative and traditional pedagogies, to improve the quality of teaching learning process making it more engaging and motivating for new generation learners

The AI literacy frame work will provide a reference pathway for teacher progression, emphasizing and outlining desired outcomes at each level. Moreover, it provides the frame work for teachers for the design and planning to training courses in AI and build a competency to use various AI tools in the regular teaching learning methods.

The Artificial Intelligence Literacy Framework

The AI Competency Framework sets out five domains that the educators must be aware of as they set out to handle AI in an educational setting. The domains are as follows: Basis of AI, Experiential Learning of AI Tools, Creative AI, Educational Challenges of AI, Risks of AI. Furthermore, in order to achieve these domains, this framework provides the format of Discover, Practice and Champion. With the gradual employing of such a format, the educators would be able to achieve a strong base in Artificial Intelligence. Each of these domains are incomplete without the other and only an integrated approach towards each of these aspects would lead to the success of the proposed framework. An elaborate structure of each of these domains and its realization has two aspects to it the Domains aspect and the progression level of literacy. The Domain aspect implies the knowledge, understanding, skills and implications of using AI in education.

Domian structure of AI frame work for Teachers

➢ **Basics of AI**: An important part of achieving AI Literacy among educators is to have a proper foundational knowledge of Artificial Intelligence. The teacher must have a basic conceptual knowledge of the artificial intelligence and its application on the first place. Based on this fundamental knowledge, the teacher builds up their further competencies on the usage and application of AI.

➢ **Experiential Learning of AI tools:** 'Learning by doing' is a concept relevant from some time now. Employing such kind of learning of the basic AI Tools and facilities that are prominent in the educational context with respect to streamlining certain tasks such as grading and other administrative works and providing a personalized learning experience for the students would contribute towards giving an educator the necessary competency in a digital setting.

➢ **Artificial Intelligence Pedagogy**: In this the teacher develop the necessary skills to integrate AI with innovative pedagogies. It will equipe teachers to amalgamate appropriate AI tool with innovative pedagogies making it more student centric and enhancing the teaching learning methodology as emphasized by NEP2020.

➢ **Educational Challenges of AI:** Various challenges are found in association with AI in the educational field. Understanding the challenges that AI pose in educational field is very important so that the educators can ensure a responsible and equitable integration of AI technology in the classroom settings. For example, students

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belonging to low economic backgrounds are not able to fully make use of the benefits provided by AI Tools. Furthermore, while AI has many perks it can prevent a student from developing an independent and critical thinking. Hence, the educators must know the implications of using AI and should be able to balance its use without hampering the creativity, problem solving and critical thinking of the students

➢ **Risk of using AI in education:** The biggest risk concerned with AI is the moral issues associated with it. Most of the AI Tools require personal information to be accessed and the use of AI Tools by students are thus risky. For example, among teens there is a tendency to initiate fake messages and videos as is seen to be most relevant in social media. Teachers and educators must be aware of such risk and educate the students appropriately so that students make responsible use of it.

The domains are the areas which the teachers need to build their competencies around Knowledge, understanding, usage and implications of AI in education. Teachers can assess their achievement level of each domain on regular basis and evaluate themselves in 3 levels of progression of AI literacy. The 3 levels being Discover, Practice and Champion. With the gradual employing of such a format, the educators would be able to achieve a strong base in Artificial Intelligence.

➢ **Discover or Explore**- This is the initial level where the learning revolves around familiarizing oneself with the basic concepts of AI and the relevant tools of AI with respect to the educational context. Teachers at this level explore various available tool and their functions while understanding the ethics and risk associated with it.

➢ **Practice**- At this level of proficiency teacher should be able to identify and use appropriate AI tool in teaching learning process. They should be able to integrate the innovative and traditional pedagogies with the AI tool to make it more student centric, engaging and motivating. At the same time the educator or teacher should handle AI in such a way that it does not give way to any kind of bias or safety concerns. Additionally, sensitizing the students or the user about the responsible use and how they are accountable for their own actions.

➢ **Champion**- At the champion level teacher should be able to frame policies on AI educations and its ethical standards. Teacher should be able to develop the AI enhanced pedagogies and develop a continuous AI education toolkit. At this stage they must also encourage the integration of AI tactics in the syllabus of the educational institutions by keeping in mind a quality learning experience for the students.

Table:1 The AI competency framework high level structure: Domains and Levels

DOMAINS OF AI	Level of AI literacy		
	Discover	**Practice**	**Champion**
1. Basics of AI	Foundational Concepts of AI and its tools.	Responsible use/Accountability	Incorporation of AI Tactics in syllabus
2. Experiential Learning of AI tool	Practical use of AI	Applied AI	Educational Customization using AI Tools
3. Artificial Intelligence Pedagogy	Resourcefulness of AI	Resourcefulness of AI	Innovative Educational pedagogy integrated with AI
4. Educational Challenges of AI	Limitations of AI in an educational setting	Analysis of the Related concerns.	AI Guidelines Compliance
5. Risks of using AI in education	Silent Menace of AI	AI Guidance	Ethical Policies of AI

AI and their pedagogical aspects
This covers the ability to validate and select proper AI tools and to integrate them into pedagogical strategies to support course preparation, teaching, learning, socialization, social caring and learning assessment.

A frame work recognized competence development is Discover, Practice, Evaluate,
Duration. These AI tools are freely available for Use

Sr no.	NAME OF THE AI TOOL	LOGO	Free / Paid	Age group	Description	USES IN THE EDUCATIONAL FIELD.
1)	Grammarly		free	everyone	Grammarly's AI helps you overcome writer's block by instantly generating text for social media,websites, blogs, cover letters, taglines, and much more.	Grammarly is a writing assistant tool for the English language that checks for spelling, grammar, tone and detects potential plagiarism.
2)	Quillbot		free	For everyone	a writing assistant that uses artificial intelligence (AI) to help you write better, faster, and smarter	QuillBot is a writing tool powered by AI that helps with paraphrasing, and refining written content.
3)	Gemini large language model		free	Everyone	it's a family of multimodal AI models designed to process multiple modalities or types of data, including audio, images, software code, text and video.	Gemini, which was once called Bard, is an AI chatbot built by Google
4	Elicit		free	For researchers	Analyze research papers at superhuman speed	Elicit is an AI-driven research assistant designed to help professionals and academics quickly search and analyse scientific papers.
5	ChatGpt		free	all	Helps students with homework, explanations, and tutoring.	It is designed to generate human-like text based on the input it receives. ChatGPT can assist with a variety of tasks such as answering questions, engaging in conversations, writing essays, providing explanations, and offering recommendations, among others

6	Khanmigo		free	teachers	Save time on prep, tackle homework challenges, and get personalized tutoring.	Khanmigo helps to generate fresh lesson ideas, personalizes student assignments, and provides resources for educators to enhance their knowledge.
7	Duolingo		free	teachers	Duolingo learning experts to create new lessons faster than ever. Here's how the humans behind the lessons	"BirdBrain". It analyses user data to improve its models and provide a better learning experience features include: • Personalized learning paths, Spaced repetition, AI-generated content, Smart notifications, Video Call, Explain My Answer
8	carnegie		free	Maths teachers	math, literacy and ELA, world languages, and applied sciences, as well as high-dosage tutoring and professional learning	Carnegie Learning, Inc. is a provider of K–12 education services for math, literacy and ELA, world languages, and applied sciences
9	squirrel		free	teachers	provides a student-centered intelligent and personalized education	Educational process of teaching, learning, evaluation, testing and training.
10	Gradescope		free	teachers	a tool that helps instructors grade and assess student work	Used for a variety of assignments, including exams, homework, and programming projects. Grade scope can also help with collecting, organizing, and storing student work.

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11	turnitin		free	teachers	a plagiarism prevention and originality checking service that compares student writing against a large database of content	This helps teachers to identify instances where students might have copied content from other sources, promoting academic integrity by checking student work against a vast database of existing content, allowing them to assess the originality of student submissions
12	Quillionz		free	teachers	Quillionz generates editable Notes from your content, using its AI capabilities. Highlight important parts, summarize main points, and reinforce key concepts using the Notes	Generate MCQ's, Recall, True/False, Short answers, and Fill-in type questions. Create Notes. Powered Question Generate Review for Teachers Common Sense Education
13	IBM Watson Tutor		free	teachers	improve student outcomes and engagement	AI-powered tutoring and personalized study recommendations.
14	Brainly – AI		free	student	gives every student 24/7 access to personalized learning assistance, enabling them to receive verified and tailored answers to their homework and study questions.	Q&A platform where students get help from peers and AI-powered explanations.
15	Seeing- AI		free	teachers	help teachers who are blind or visually impaired understand their surroundings. It can identify objects, read text, and describe images.	Assists visually impaired students by describing surroundings and text.
16	Google Lookout		free	teachers	help teachers with low vision or blindness navigate their surroundings. It uses a phone's camera and sensors to recognize objects, text,	Helps students with disabilities by recognizing objects and text.

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17	Otter.ai & Rev.com		free	teachers	Easily transcribe audio or video. Generate notes for your meetings. online transcript	AI-powered transcription tools for note-taking and accessibility.
18	Quizlet		free	teachers	Features Digital flashcards, Matching games, Practice electronic assessments, and Live quizzes.	Uses AI to generate flashcards and adaptive learning quizzes.
19	Knowji		free	teachers	is a vocabulary tool that utilizes audio and visual aids and employs effective learning techniques and entertaining approaches to enhance student's learning speed	AI-based vocabulary learning app with spaced repetition.
20	Canva for Education		free	teachers	online design platform that helps teachers and students create and collaborate on visual projects.	Canva for Education AI assists in creating educational presentations and infographics.
21	Proctorio, Examity, and Respondus		free	teachers	onitor students during online exams, utilizing features like webcam recording, screen capture, and lockdown browsers to help prevent cheating, with each platform offering slightly different functionalities and approaches to surveillance; Respondus is often considered the most widely used in higher education,	for online exam monitoring and cheating detection.
22	Knewton Alta		free	teachers	AI-driven adaptive learning that adjusts difficulty based on student performance.	an online learning platform that uses adaptive technology to help students learn and improve their knowledge. It's available for a variety of subjects, including math, biology, chemistry, and physics.

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23	Curipod		free	Teacher	help teachers create interactive lessons. The goal is to engage students and spark their curiosity.	Curipod is an innovative, AI-powered tool that enables educators to design engaging classroom activities such as polls, quizzes, and interactive drawings.
24	Yippity		free	teachers	an AI-powered tool that simplifies quiz creation by generating multiple choice, true/false, and fill-in-the-blank questions from any text, ideal for educators and content creators.	simplifies quiz creation by generating multiple choice, true/false, and fill-in-the-blank questions from any text, ideal for educators and content creators
25	Almanack		free	teachers	a book or publication that contains a calendar and information about a variety of subjects. Almanacs are often updated annually.	Almanack is an AI tool that helps teachers quickly create lessons, slide decks, worksheets, report card comments, and more, making lesson planning faster and easier.
26	Pictory		free	teachers	Pictory is a highly functional and clever AI video tool with a number of use cases that make it extremely quick for marketers to turn out video content.	Pictory uses AI to turn video and text content into short, branded videos, making it perfect for education contexts.
27	DreamBox Learning		free	teachers	an online program that helps students learn math and reading. It's designed to be personalized and adaptive to each student's needs.	AI-powered math learning that adapts to students' needs.
28	BrightByt es		free	teachers	data analytics platform that helps educational leaders improve student learning outcomes. It combines data from schools and regions with insights from experts to create evidence-based frameworks	Predictive analytics to improve student outcomes and prevent dropouts.

29	Socratic Maths		free	teachers	to help students solve problems with step-by-step explanations.	Socratic AI helps students understand their school work by using AI to analyze questions and provide relevant resources like videos, explanations, and study guides across subjects such as math, science, and history, all in an easy-to-use interface

CONCLUSION

The current awareness about the AI tools and its implementation in education is very limited and that to improve this situation we need a robust AI literacy framework which will enhance the knowledge understanding skills and implications on the use of AI technology in education. The AI literacy framework assure to train and upskill the teachers to adopt AI effectively and ethically. It also helps to inform all the stakeholders of education like educational institutions, teachers, parents and policy makers about the need to adopt AI literacy programmes in the teacher education.