

Revolutionizing Language Learning and Teaching in Education 4.0: Perspectives on Critical AI Literacy and AI Tools

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Abstract

In an education system, the language classroom is a creative space that facilitates proficiency in critical thought development, emotional growth and better comprehension of the world. With the advent of the digital revolution, emerging AI technology has potentially permeated the field of education. This technology has exponentially transformed the fundamental trends of learning and teaching in classrooms, and Education 4.0 also encourages the integration of technology-enabled environments of learning. With regard to this, new pedagogical techniques and innovative methods should be adopted for revolutionary advancement in higher education institutions. The primary objective of the paper is to chart out the evolution of learning in classroom and to shed light on the concept of Critical AI Literacy along with its importance in creating digital awareness among language trainers and trainees. With the construction of latest tech-driven classrooms, it will be easier to harness the creative abilities of students by incorporating AI-oriented learning tools. The aim is also to explore the possibilities of new pedagogies in language learning and teaching that are mediated by AI-powered platforms for effective language understanding. AI tutoring systems and learning analytics will benefit in providing personalised learning experience and better teacher-student engagement that might lead to exceptional academic outcomes. The paper offers recommendations to exhibit a positive attitude toward AI technology in language learning classroom education. It addresses the concerns and challenges, evaluates the present scenario of language education, and reflects on its future scope with augmented methods and cutting-edge AI tools.

Keywords

Artificial Intelligence, Critical AI Literacy, Education 4.0, Innovative Pedagogy, Language Learning and Teaching, Technology.

Introduction

In the age of rapid developments in technology, it is imperative to be inclusive of all potential domains in which technology makes significant contributions. The incorporation of ultra-modern artificial intelligence technology in the field of education has a broader scope to improve the overall experience of learning and teaching. Artificial Intelligence is said to be the product of the fourth industrial revolution and intends to bring about the fourth stage of development in education. AI technology is taking over in almost all fields of inquiry at a fast pace and is revolutionizing the way things were seen before. It is only in the recent times that the world has thought of inculcating AI in education, despite that it has been in existence since the 1950s. British mathematician Alan Turing was the first to discover and discuss this concept in his seminal paper entitled "Computing Machinery and Intelligence" in which he tried to determine whether machines can think. However, it was in 1956 that John McCarthy, an American computer scientist, coined the term 'Artificial Intelligence' in the Dartmouth Summer Research Project on Artificial Intelligence.

Considering that there are some professionals in the education sector who demand to upgrade the field using AI, there are many educational practitioners and researchers who speculate "whether advancements in AI would challenge or even replace teachers since many other jobs are being replaced by automation. There is an emerging recognition that teachers' professional roles need to be adjusted as AI advances and this will trigger new organizational forms. Emerging challenges also included students' attitudes towards these changes" (Zhai et al., 2021). While this research paper highlights wide-ranging positive and negative perspectives, its pivotal focus remains on exploring how AI is reshaping and revolutionizing education.

Objective of study

The primary goal of the research paper is to look at the potential of artificial intelligence in constructing an efficient and effective language teaching and learning model that helps teachers and students learn in an engaging and innovative style. AI-driven innovation in education focuses on making an indelible mark on how teaching and learning are perceived. To foster this integration, language classrooms are particularly deliberated upon. Language classrooms are a storehouse of opportunities to learn any language in a comprehensive manner. Language learning and teaching will soon be exponentially

**Review of
Literature**

transformed from their fundamental trends and will empower learners. Therefore, this paper attempts to trace the evolution of classroom learning, define the new pedagogy of Education 4.0, comprehend concepts such as Critical AI Literacy, discuss various innovative AI tools that are useful for language teaching and learning, identify concerns and challenges, and reflect on future perspectives of AI-centered learning experiences.

Evolution of Classroom Learning

In India, promoting Education 4.0 sparked progression and innovation. To comprehend Education 4.0, it is important to understand education's trajectory and its evolution to date. In olden days, classrooms comprised of a natural setting where students gathered under the tree to learn from their guru and it has been said that "in ancient India, both formal and informal ways of education system existed. Indigenous education was imparted at home, in temples, pathshalas, tols, chatuspadis and gurukuls... Temples were also the centers of learning and took interest in the promotion of knowledge of our ancient system". Going back to the primeval roots of residential learning and teaching, it was said to be "largely oral and students remembered and meditated upon what was taught in the class." (Goudgeri, 2022). This system of learning continued until formal education was introduced. Much later, during the British rule, missionary schools were setup, aiming to impart education in English. Students being non-native speakers of English were mere passive recipients in the learning culture. Therefore, Education 1.0 was essentially associated with memorization of factual knowledge. The Internet Revolution introduced Education 2.0 that promoted web-based learning that helped teachers access online platforms effectively. Though the student-centric approach was still narrow but the next stage, Education 3.0, brought a new wave empowering individuals with ICT (Information and Communication Technologies). With technology's expansion, the teacher's role changed from guides to facilitators, and students evolved into co-creators of knowledge. Transition to digital classrooms relied on online platforms marked by Education 4.0. It promotes a more personalized technique of teaching and learning, practical skill-based knowledge and supports holistic development through technology, and aligns with today's fast-paced world.

Main Text

Pedagogy of Education 4.0

Education 4.0 advocates utilization of Artificial Intelligence (AI), the Internet of Things (IoT), Digital Simulation, Augmented Reality (AR), Virtual Reality (VR) and other significant technologies in classroom teaching and learning. It aims for innovative pedagogy by incorporating AI into the 21st century education sector. In order to reshape the quality of the educational landscape and to cope up with the global-level challenges of education, the Government of India has implemented the National Education Policy (NEP) 2020.

NEP 2020 recognizes technology's pivotal role in nurturing holistic development and preparing learners for the digital age. This discourse explores NEP 2020's profound impact on technology integration in education, emphasizing AI and adaptive learning. It reveals AI-powered personalization's potential to revolutionize education by aligning it with each learner's unique needs. The journey continues into AI's role in assessments, providing tailored evaluation and feedback. (Gurramkonda & Sahaji, 2023)

NEP-2020 was launched with the intent to practise digital and innovative learning through various initiatives such as Academic Bank of Credit (ABC), a technology-based facility of credit that permit students, enrolled in Indian universities, with multiple entry-exit options. It is a digital platform that helps to store, verify, transfer and redeem students' credits. Another one is Indian Sign Language, introduced as a subject at the secondary level, in order to help hearing-and-speech impaired students with better communication experience. National Educational Technology Forum (NETF) is a forum that encourages free exchange of ideas on how technology should be used to upscale and enhance learning, teaching, planning, assessment, administration and overall management for both the wings- school education and higher education. AI for All, an online course with two sections (AI Awareness and AI Appreciation), concentrates to provide knowledge about Artificial Intelligence to every citizen of all age groups in the country. (National Education Policy (NEP) 2020: AI for All, n.d.)

Critical AI Literacy

Historically, the word 'literacy' means "the ability to read and write" according to Oxford dictionary. Another meaning of the word is "a level of minimal competence in reading and writing". In particular, an individual's command over language becomes the driving force for a better education. If a person can't read adequately, one can't derive literacy in any subject that is inclusive of the language subject. Literacy can be categorised into various forms, namely, Digital literacy, Computational literacy, AI literacy, Critical AI literacy among others. In order to avoid misconceptions about Critical AI Literacy, it is a prerequisite to understand various other forms of literacy.

Digital Literacy, since the 1990s internet revolution, was used by educators but the concept was introduced by Paul Gilster in his book, *Digital Literacy*. Colin Lankshear and Michele Knobel, in their book *Digital Literacies: Concepts, Policies and Practices* explain digital literacy "as an ability to understand and use information from a variety of digital sources and regard it simply as literacy in the digital age. It is therefore the current form of the traditional idea of literacy *per se*—the ability to read, write and otherwise deal with information using the technologies" (Bawden, 2008). Computational Literacy is not just

possessing proper knowledge and skill to operate a computer, but the ability to use code to communicate ideas or learn the linguistic nuances of a language in the language learning process. "Teaching literacy through computational thinking involves leveraging existing computational thinking and coding skills to promote language and literacy development. For students with varying skill levels, programming can serve as a doorway into traditional and new literacies development" (Jacob & Warschauer, 2018). To facilitate language learning and teaching in students and teachers, using computer instructions can be helpful in terms of understanding a language's syntax or form, meaning and usage. "Framing programming and natural languages in this way is particularly beneficial to speakers of other languages who possess computational competence but may lack linguistic proficiency" (ibid).

AI Literacy informs an individual with accurate knowledge about the potential and consequences of AI which helps them to make informed decisions. "AI literacy is an individual's ability to not only utilize AI, but to also critically recognize changing cultures. Furthermore, based on the basis of understanding AI, AI literacy allows the individual to design their own life. In other words, AI literacy is the basic ability to become a subjective human in the AI era" (Yi, 2021). This type of literacy is important to up-skill one's professional life in the age of AI and can also be defined as "a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (Long & Magerko, 2020). At the same time, it is necessary to comprehend AI Literacy through its ethical, technical and practical understanding. Critical AI Literacy extends digital literacy and critical thinking by fostering awareness of generative AI models and tools, their uses and limitations therefore "the foundations of critical digital literacy is in the confluence of academic preoccupations with the concept of literacy that went beyond mere reading, writing, or technical skills, and included raising awareness about the socio-cultural, political and ultimately the power equations involved in the use of language, and the role of digital technology in everyday experiences and meaning-making" (Joseph, 2023). However, there are serious issues regarding its application, such as "overreliance on automation, algorithms based on biased data, and algorithms that do not provide information that is clinically meaningful" and it is necessary to provide solutions to these issues that "requires better understanding of AI and their ML approaches and corresponding measures to achieve this". (Strauß, 2021). For instance, learners and teachers must carefully evaluate the output derived from AI-assisted tools such as ChatGPT and should only consider the information that is credible.

Innovative AI-Powered Tools for Language Learning and Teaching

To keep up with the pace at which technology is improving itself, making use of AI tools will act as a catalyst in education. "AI is the technology that every educator needs to be exposed to. Using AI, it seems that the presence of a teacher nor the learning of language is necessary in spite of the fact that a machine is able to handle a class. With its use, education can be more student-centered and, consequently, it leads to the empowerment of the learners." (Ali, 2020). There is a growing number of tools available on digital platforms that can prove beneficial for language learning and teaching.

There are many AI Writing Assistants such as Grammarly, built on GPT-3 and used to proofread and polish up write-ups for grammar, punctuation, spelling mistakes. EssayBot, a personal AI-assisted writing tool, helps students by suggesting essay titles and prewritten paragraphs based on prompts. QuillBot, rewriting and paraphrasing tool, helps writers write better and at a faster pace. It has features like Paraphraser, Grammar Checker, Plagiarism Checker, Citation Generator and Translator, that are essential in the writing process. AI-Writer is the only writing assistant that generates SEO (Search Engine Optimization)-friendly content and cites its sources from wherever it takes the information. ChatGPT 3.5 is a generative pre-trained transformer developed by OpenAI, uses predictive analysis and functions on the prompts by the user. It can summarise essays, write poems, create titles of the write-up, draft an email etc.

Some Personalized AI language learning softwares such as Duolingo, an effective AI tool, promotes language learning in a free, fun and effective way through gamification approach that incorporates interactive medium of learning like quizzes, exercises, and personalized feedback. AI-powered platform Memrise involves techniques of gamification and works on the memorization of language. Similar to Duolingo, it uses flashcards that facilitates quicker learning process and makes language acquisition easier. Italki facilitates language learning by connecting learners with teachers through video chat. It permits one-on-one tutoring sessions promoting personalized learning. Busuu, self-study platform, is a language learning site with free access to fourteen languages, offering multiple level courses. It deals with language acquisition through audio-video quizzes, vocabulary, pronunciation practice, fill in the blanks etc. TalkPal improves learning outcome focusing on four essential components of language learning, i.e., listening, speaking, reading and writing. Babbel software emphasizes on language proficiency and better learning outcomes by offering resources like Babbel Videos to watch, Babbel Podcasts to listen, Babbel Magazine to read, Babbel self-study app, and Babbel Live. Eduaide.Ai aids educators to create lesson plans, teaching resources, and assessments like reading comprehension assignments, sentence structures, word search, vocabulary rhymes, etc, enabling automated assignments and evaluation on the basis of submissions.

Concerns and Challenges

Despite many possibilities and opportunities to learn and grow in language learning and teaching, there are numerous concerns and challenges that appear in the pathway of innovation and progression. Some of the problems are insufficient access to technology. Even in the 21st century technological world, there are many regions in India which have limited access to technology and are tech-deprived of Digital literacy and hence, AI literacy. Data privacy is another challenge. Data, being the new asset of the digital world, needs to be saved from getting misused. From language learning and teaching point of view, breaching of personal data like name, personal lecture record, and class notes need protection. Furthermore, there is scarcity of funds and limited resources for teacher training to digitally empower teachers and work toward an AI-enabled future in language learning and teaching. Lack of human interaction and physical learning environment in AI systems is another challenge.

Conclusion

In a nutshell, it can be inferred that with the initiation of latest tech-driven classrooms, it will be easier to harness the creative abilities of students by incorporating AI-oriented learning tools. Though there are concerns and challenges related to AI technology, it is essential to adopt newer pedagogical training in order to foster growth and development in language learning and teaching. AI-centered learning needs to be tailored in such a way that reaps revolutionary advancements in higher education institutions. Use of AI technology should be promoted and implemented for teaching, learning and assessment, administration and management in education sector. By comprehending the basis of Critical AI Literacy in education and using AI tools discussed in the paper, language learning and teaching can become simple and easy.

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