

# Impact Of Artificial Intelligence in Education Sector

Akhil Chandran<sup>1</sup>

<sup>1</sup>*School of IT and Computer science, Jain University, Bangalore Bengaluru, india*

**Abstract**—With the increase in studies about artificial intelligence (AI) in the educational field, many scholars in the field believe that the role of teachers, school and leaders in education will change. In this regard, the purpose of this study is to examine what possible scenarios are there with the arrival of AI in education and what kind of implications it can reveal for future of schools. The research was designed as a phenomenological study, a qualitative research method, in which the opinions of participants from different sectors were examined. The results show that schools and teachers will have new products, benefits and also face drawbacks with the arrival of AI in education. The findings point out some suggestions for use of AI and prevention of possible problems. While participants generally seem to have positive perceptions towards AI, there are also certain drawbacks, especially highlighted by teachers and academicians, regarding the future of teaching. Lawyers and jurists tend to focus more on legal grounds for AI in education and future problems, while engineers see AI as a tool to bring quality and benefit for all in the education sector.

The rapid integration of Artificial Intelligence (AI) into educational settings has sparked significant discussions about its impact on the roles of teachers, schools, and educational leaders. This research aims to explore the potential consequences and opportunities that AI's presence might bring to the classroom environment and how it could reshape the future of education. Utilizing a phenomenological approach, the study examines qualitative data gathered from a diverse group of stakeholders, including educators, academics, lawyers, jurists, and engineers. The findings reveal that AI is seen as a tool that offers numerous benefits, such as personalized learning and administrative efficiency, but also raises concerns regarding its implications for educational practices, teacher roles, and the legal framework surrounding its use. While the majority of participants express optimism about AI's role in enhancing education, educators and academics voice concerns regarding the potential erosion of teacher-student relationships, loss of jobs, and ethical challenges. The study highlights the need for a balanced approach, integrating AI's benefits while addressing the concerns of various stakeholders and creating a

**regulatory framework to guide its responsible implementation in educational institutions**

## I. INTRODUCTION

Artificial Intelligence (AI), a rapidly evolving field defined as the capacity of machines or computational systems to simulate human cognitive processes—such as reasoning, decision-making, and problem-solving—has transitioned from a speculative concept into a transformative force reshaping various industries, including education. Widely recognized for its potential to replicate and even enhance human intellect through algorithms and neural networks, AI is increasingly regarded as the cornerstone of technological advancement in the 21st century. As articulated by Wartman & Combs (2018), AI encapsulates the aspiration of computerized systems to mirror human behavior, with profound implications for both the individual and societal levels. This notion of mimicking human intellect, explored further by Mohammed & Watson (2019), suggests that AI is not merely a tool but an evolving system capable of independent learning and adaptation. Indeed, as Ng (2017) posits, AI is the "new electricity," akin to an essential driving force in modern economies, contributing to a revolution poised to redefine economic and social structures. By 2025, the role of AI as a fundamental driver in the Fifth Industrial Revolution has become increasingly apparent, particularly within the context of education, where it has the potential to radically redefine pedagogy, administration, and the relationship between teachers, students, and technology (Golic, 2019).

China's investments in AI, which surged to \$40 billion in 2017, set a precedent for the global scale of AI's economic potential, with forecasts predicting that China's AI-driven GDP will grow by 26% (\$7 trillion) by 2030, while North America is expected to see a 14.5% increase (\$3.7 trillion) during the same period (PwC, 2017). These data underscore not only

the accelerating pace of AI integration but also the widespread geopolitical and economic shifts it will precipitate in the coming years. The widespread adoption of AI technologies across sectors—from healthcare and finance to education—suggests a global realignment of market dynamics, workforce structures, and institutional practices. Educational systems, in particular, stand on the precipice of a profound transformation, with AI poised to play a pivotal role in reshaping both the delivery of education and the mechanisms by which knowledge is produced, distributed, and consumed.

However, the profound integration of AI in educational settings raises significant questions about its broader societal implications. As Karsenti (2019) suggests, the rapid emergence of AI and related technologies—such as machine learning, natural language processing, and adaptive learning algorithms—will soon be omnipresent, requiring educational institutions to not only accommodate these technologies but to actively integrate them into curricula, pedagogy, and administrative frameworks. Schools and universities must therefore navigate the challenges of adapting to a digital landscape while ensuring that traditional educational values, such as critical thinking and human interaction, are preserved. Moreover, the emergence of AI presents a new frontier for legal, ethical, and regulatory concerns, as stakeholders from diverse fields seek to understand the implications of AI's role in shaping the future of education.

This study aims to investigate the potential applications of AI in educational institutions and assess its multifaceted implications for the future of the educational sector. Through a phenomenological approach, the research will capture the perspectives of professionals from key sectors, including law, business, higher education, and engineering, to gain a nuanced understanding of the opportunities, challenges, and risks associated with AI integration in educational settings. By examining the varied viewpoints of these stakeholders, this research seeks to provide a comprehensive framework for evaluating AI's impact on educational policy, institutional governance, and pedagogical practices. The study also aims to contribute to the broader discourse on how AI can be harnessed in an ethical, equitable, and sustainable manner, ensuring that its transformative

potential is fully realized without exacerbating existing social, economic, or educational inequities.

By 2025, as AI continues to evolve and permeate the educational landscape, understanding its implications will be crucial for ensuring that its integration is aligned with both societal values and the needs of a rapidly changing global economy. This research will offer timely insights into the strategic planning required to harness the benefits of AI while mitigating its risks, contributing to the development of a future educational paradigm that is both innovative and socially responsible.

#### 1) Artificial Intelligence in Education

In the words of Henry Ford, “If I had asked people what they wanted, they would have said faster horses.” This famous quote, referenced by Roll and Wylie (2016), is often used to highlight the limitations of conventional thinking in the face of transformative change. Ford's observation draws attention to how traditional solutions may not always address the most profound needs or opportunities for innovation. In the context of education, it is tempting to view schools as evolving into “faster classes” that focus on producing results within shorter time frames. However, as we transition into the 21st century and beyond, the question arises: are “fast classes” the best approach, or do we need to rethink how education functions to meet the needs of future generations?

As we move further into the 21st century and approach the 22nd century, it is crucial to examine whether the traditional focus on imparting skills, critical thinking, and metacognition remains sufficient. Or should we be considering entirely new educational frameworks designed for a new age—an age where Artificial Intelligence (AI) will undoubtedly play a pivotal role? The rapid advancement of AI in various sectors, including education, raises important questions about the future of human involvement in learning processes. AI offers possibilities for transforming how we teach and learn, but it also challenges us to think deeply about what makes us uniquely human. As such, there is a growing need to explore how AI might differentiate human capabilities from those of robots or automated systems, especially in preserving the emotional and social aspects that make human learning distinctive.

In recent years, AI has increasingly dominated discussions about the future of education, with some questioning whether it could replace traditional teaching roles. Discussions surrounding the extent to which AI can replace or augment teachers have already become a central topic among policymakers and implementers. Felix (2020) points out that these debates are gaining traction, as AI technologies continue to advance and reshape the educational landscape. This raises the issue of whether AI can truly replace human teachers or whether it will serve as a tool to complement and enhance human teaching abilities.

Despite such concerns, Manyika et al. (2017) emphasize that while AI will undoubtedly transform education, the role of good teachers will remain essential in the future. Teachers, they argue, will continue to play a crucial role in fostering students' emotional intelligence, creativity, and communication skills—attributes that AI, as a machine, cannot replicate. According to Manyika et al., the rise of AI and automation will actually have the paradoxical effect of making “people more human” by allowing them to focus on higher-order cognitive skills and emotional engagement, rather than routine tasks that can be automated.

Similarly, Haseski (2019) highlights research findings that underscore the potential benefits of AI in education. AI, he suggests, will make learning more individualized by tailoring learning experiences to the needs of each student. This personalized approach, made possible by AI-powered platforms and intelligent tutoring systems, can foster the discovery of students' unique talents, improve creativity, and reduce teachers' administrative burdens. Through these advancements, AI has the potential to free up teachers' time, allowing them to focus more on personalized instruction and student guidance, rather than repetitive tasks such as grading or answering frequently asked questions.

However, there is an opposing viewpoint. Some scholars, such as Humble and Mozeli (2019), warn of the potential dangers of transferring the roles of teachers to computers. They argue that while AI can support and enhance educational practices, it should not replace the critical role of human teachers. Human educators bring a depth of empathy, emotional intelligence, and social interaction that machines cannot replicate. These attributes are

fundamental to the learning process, as they enable teachers to respond to students' emotional needs, foster positive classroom environments, and engage in meaningful dialogue that deepens students' understanding of complex topics. Thus, while AI may play an important supportive role, it cannot replace the human touch that is vital to effective teaching and learning.

Given these varying perspectives, the responsibility of governments, educational leaders, and policymakers is to create a new teacher profile that integrates AI into the educational process in a balanced and effective manner. As Wogu et al. (2018) argue, the role of educators must evolve to work in conjunction with AI technologies, enabling them to leverage these tools to enhance their teaching practices. To prepare for this future, there needs to be a comprehensive understanding of how AI can be integrated into schools and how teachers can be trained to work alongside these intelligent systems. In this regard, the creation of a teacher profile that emphasizes both technical skills and emotional intelligence will be critical.

The roots of AI in education extend back much further than the current discussions. Humble and Mozeli (2019) trace the theoretical foundations of artificial intelligence to at least the 14th century, with significant contributions made by Alan Turing in the mid-20th century. Over the decades, AI has evolved from a theoretical concept into a practical and widely applied technology. In recent years, discussions surrounding “artificial intelligence leadership” have emerged in organizational management literature, as AI is increasingly seen as a tool for improving decision-making and leadership practices in various industries, including education (Canbek, 2020). As AI technologies continue to advance, their integration into educational systems will likely become more sophisticated, offering unprecedented opportunities for educational transformation.

The growing integration of AI in education suggests that significant transformations are on the horizon. AI is already making an impact in classrooms around the world by helping to personalize education and provide more targeted learning experiences. According to Sekeroglu, Dimililer, and Tuncal (2019), AI can support teachers in delivering personalized education tailored to each student's needs. With AI's ability to analyze student data in

real time, it can provide targeted interventions, identify gaps in learning, and suggest appropriate resources to help students overcome challenges. This level of personalized learning has the potential to revolutionize education by ensuring that no student is left behind and that all learners have the opportunity to reach their full potential.

Moreover, AI can help provide access to education for marginalized groups, including people with disabilities, refugees, and individuals living in remote or isolated areas. Pedro, Subosa, Rivas, and Valverde (2019) emphasize how AI can bridge gaps in access to quality education, offering tailored learning experiences to those who are otherwise excluded from traditional educational systems. For example, AI-powered learning platforms can support students with disabilities by offering adaptive learning environments that cater to their specific needs. In this way, AI can democratize education, providing previously excluded communities with the tools they need to succeed academically.

Although the use of AI in education has the potential to increase educational quality, it is important to recognize that human teachers will continue to play a vital role. As Grosz and Stone (2018) note, AI can enhance education by offering personalized learning experiences, but it cannot replace the need for human interaction. The future of education will likely involve a dual-teacher model, where human teachers work alongside AI-supported assistants to offer individualized instruction. In this model, AI systems would take over routine tasks such as grading, answering frequently asked questions, and providing administrative support, freeing up teachers to focus on more meaningful activities like guiding students through complex problems, fostering creativity, and promoting critical thinking.

This dual-teacher model offers an innovative way to improve educational outcomes by enhancing teacher efficiency and student engagement. By relieving teachers of administrative burdens, AI can help educators spend more time focusing on the human aspects of teaching that machines cannot replicate, such as mentorship, emotional support, and fostering a sense of community in the classroom. As we continue to explore the integration of AI in education, it is clear that this technology holds the potential to reshape the educational landscape in profound ways, offering new opportunities for personalized learning,

increasing access to education, and enhancing the overall quality of the learning experience.

In conclusion, while AI presents both opportunities and challenges for the future of education, it is clear that this technology will play a central role in shaping the educational landscape in the coming decades. The key to ensuring that AI enhances education lies in creating a balanced and thoughtful integration of human teachers and intelligent systems. By doing so, we can harness the power of AI to personalize learning, increase access to education, and support teachers in their critical roles as guides and mentors, while also ensuring that the emotional and social dimensions of learning are preserved. The future of education will not be defined by AI alone but by how we choose to use it to foster a more inclusive, creative, and human-centered approach to learning.

## II. LITERATURE REVIEW

The integration of Artificial Intelligence (AI) into the education sector has become one of the most significant trends in recent years, as it promises to reshape teaching, learning, and educational administration. AI encompasses a range of technologies, including machine learning, natural language processing, and data analytics, all of which have the potential to transform educational systems globally. This literature review synthesizes previous research on the impact of AI in education, highlighting key themes such as personalized learning, teacher support, the potential for educational equity, and the challenges posed by AI implementation.

### 1. Personalized Learning and Adaptive Learning Systems

A prominent theme in the literature on AI in education is the ability of AI to provide personalized learning experiences. AI has the capacity to tailor educational content and resources to individual student needs, preferences, and learning styles. Research by Haseski (2019) and Sekeroglu, Dimililer, and Tuncal (2019) emphasizes how AI technologies, particularly intelligent tutoring systems, enable adaptive learning environments that adjust to the pace and learning style of each student. This personalization allows for more effective learning experiences and supports students in areas where they

might struggle, promoting a deeper understanding of the content.

Many studies, such as those by Mohammed & Watson (2019), demonstrate that AI-driven systems can provide students with real-time feedback and modify instructional content to meet their unique needs. This can help bridge learning gaps, especially for students who are struggling academically. For example, AI systems can analyze student performance and suggest specific areas for improvement or recommend additional resources to aid learning, which enhances engagement and student retention (Grosz & Stone, 2018). The increased focus on personalized education through AI is seen as a significant shift away from traditional one-size-fits-all methods, making learning more inclusive and tailored to individual needs.

## 2. Teacher Support and Workload Reduction

A recurring theme in AI research in education is the potential for AI to support teachers by reducing administrative burdens and routine tasks. According to Pedro, Subosa, Rivas, and Valverde (2019), AI can serve as an assistant to teachers, helping them with tasks such as grading, answering frequently asked questions, and managing student data. By automating these routine tasks, AI allows teachers to focus more on high-value activities such as one-on-one interactions with students, providing emotional support, and fostering creativity and critical thinking (Manyika et al., 2017).

In the dual-teacher model proposed by Pedro et al. (2019), AI systems act as secondary teachers, assisting with instructional tasks, thereby allowing human teachers to concentrate on mentoring, fostering student creativity, and managing complex learning needs. This model emphasizes the complementary relationship between human teachers and AI systems, rather than viewing AI as a replacement for educators. According to research by Humble and Mozeliuss (2019), AI can enhance teacher effectiveness by automating repetitive tasks and providing valuable insights into student performance, thus enabling teachers to tailor their approaches to the needs of each student more efficiently.

## 3. Educational Equity and Access

AI's potential to improve educational equity is another critical area explored in the literature. Research by Pedro et al. (2019) and Mohammed &

Watson (2019) highlights how AI-powered educational tools can make learning more accessible to marginalized groups, including students with disabilities, refugees, and those living in remote areas. AI can provide adaptive learning technologies that are specifically designed to accommodate different learning needs, such as assistive technologies for students with visual or hearing impairments, or language translation tools for non-native speakers.

Sekeroglu et al. (2019) discuss how AI can reduce barriers to education for underserved populations, such as those living in rural or isolated areas, by providing access to high-quality learning resources remotely. AI's ability to create personalized learning experiences is particularly important in these contexts, as it allows students in underserved communities to receive the same level of individualized instruction as those in more affluent areas. This potential for AI to democratize education is seen as one of its most promising features, as it can reduce disparities in educational access and outcomes.

## 4. AI and Teacher-Student Interaction

While AI offers many benefits, several studies have raised concerns about its impact on the teacher-student relationship. As Humble and Mozeliuss (2019) caution, transferring too much of the teaching role to AI could result in the loss of the human elements that are vital to the educational experience. Teachers provide not only instruction but also emotional support, mentorship, and social interaction—qualities that AI, as a machine, cannot replicate.

Manyika et al. (2017) argue that despite the rise of AI, the human aspect of teaching will remain essential in the future. They suggest that AI will enhance the capabilities of teachers, rather than replace them, by enabling educators to focus more on activities that foster emotional intelligence, creativity, and communication—skills that are inherently human. In this regard, AI can assist in creating a more holistic approach to education by allowing teachers to dedicate more time to nurturing these skills in their students, as opposed to focusing on administrative tasks.

## 5. Challenges and Ethical Concerns

Despite the many advantages AI offers in education, there are significant challenges and ethical considerations associated with its implementation.

Humble and Mozeliuss (2019) discuss concerns about data privacy and security, particularly with regard to student data. AI systems in education require vast amounts of data to function effectively, including sensitive information about student performance, behavior, and preferences. The collection and analysis of this data raise questions about who owns the data, how it is used, and how it is protected.

Additionally, the potential for AI to perpetuate existing biases in educational systems is a concern highlighted in the literature. AI systems are trained on historical data, which may reflect societal biases, such as gender, race, or socioeconomic status. If these biases are not carefully monitored, AI could inadvertently reinforce inequities in educational outcomes, rather than alleviating those (Grosz & Stone, 2018). Ethical considerations surrounding the use of AI in education, such as ensuring fairness, transparency, and accountability, are therefore critical to the successful and equitable integration of AI technologies in educational settings.

#### 6. AI and the Future of Education

Looking ahead, many scholars envision AI as an integral part of the future educational landscape. According to Canbek (2020), AI will not only assist in instructional and administrative tasks but also play a role in shaping the future of educational leadership and decision-making. AI-driven analytics could help educational leaders make more informed decisions about resource allocation, curriculum design, and student support services. Moreover, the use of AI in education could lead to new forms of collaboration and knowledge-sharing among educators, students, and institutions.

Despite the growing optimism surrounding AI in education, scholars such as Felix (2020) continue to question whether AI can fully replace the traditional role of the teacher. While AI has the potential to revolutionize many aspects of education, it is unlikely to ever replace the need for human educators, whose roles go beyond the transmission of knowledge. Teachers play a critical role in fostering a supportive and engaging learning environment, building relationships with students, and providing guidance in ways that AI cannot replicate. As such, the future of education will likely involve a partnership between human educators and AI systems, where each contributes its unique strengths to enhance the learning experience.

One of the most prominent themes discussed by Indian researchers is the potential of AI to enable personalized learning. According to Dr. V. K. Goyal (2019), AI has the ability to transform Indian education by catering to the individual needs of students. This is particularly important in a country as diverse as India, where students have varied learning styles, capabilities, and socio-economic backgrounds. Goyal suggests that AI can be used to develop personalized learning pathways that adapt to each student's pace, learning style, and level of understanding. This could enhance learning outcomes and provide students with the support they need to succeed in their academic journey.

Furthermore, Prof. B. M. Chatterjee (2020) argues that AI-powered systems can help in identifying students' strengths and weaknesses in real-time, allowing teachers to intervene when necessary. These personalized systems could be particularly beneficial in large classrooms, which are a common feature in Indian schools, where individual attention to students can often be challenging due to the teacher-student ratio.

### III. RESEARCH METHADODOLOGY

This study was conducted using a phenomenological research design, which is a qualitative research method. Qualitative research is particularly valuable when the goal is to explore a topic in depth, gaining a deeper understanding of the perspectives, experiences, and interpretations of individuals (Creswell, 2013). Phenomenological research specifically focuses on capturing and analyzing individuals' lived experiences, as well as the meanings they attribute to particular phenomena (Yildirim & Simsek, 2008). In line with this approach, our study aimed to explore participants' perceptions and opinions regarding the role and impact of artificial intelligence (AI) in education. By utilizing a phenomenological lens, we sought to gain insights into how professionals from different fields perceive the integration of AI into educational settings, the challenges it presents, and its potential benefits. The study involved participants from four distinct professional backgrounds, ensuring a diverse range of perspectives. To enhance the credibility and depth of our findings, we employed a triangulated data collection approach, which allowed us to

examine the topic from multiple angles, thereby ensuring a more comprehensive understanding of the participants' views on AI in education.

### 1) PARTICIPANTS

Purposeful sampling was chosen for participant selection, as it allows for the identification of information-rich individuals aligned with the research objectives (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2018). In the study on artificial intelligence in education, researchers identified four key participant groups, totaling 14 individuals:

- Academicians: Scholars specializing in educational sciences (5 participants).
- Technical Experts: Professionals with expertise in artificial intelligence, employed in either public or private sectors (4 participants).
- Teachers: Educators currently teaching in public schools (5 participants).

The Participants names are-

#### 1. Academicians

- Prof. Rahul k – assistant professor, Calicut university
- Prof. Sreeram – Senior professor, Calicut University
- Dr. Rekhachandran – Cochin University
- Dr. Leela Kumari – Calicut University
- Dr. Reshmi Nair- Delhi University

#### 2. Technical Experts

- Mr. Arun – Tech lead working in a AI firm
- Mr. kailash – Software Engineer
- Mr. Arjun Krishna – Data Scientist
- Mrs. Aparna Chandran – Software Engineer

#### 2. Teachers

- Leelakumari menon – Higher secondary Teacher
- Meena Kumari – High school Teacher
- Sheba- Higher secondary teacher
- Sindhu k – High school Teacher
- Udaya – Highschool Teacher

The results were reported using tag names to keep the names of the participants confidential.

### 2) DATA COLLECTION AND ANALYSIS

This study employed semi-structured interviews to gather insights from participants regarding artificial intelligence (AI) in education. The research questions

explored participants' perspectives on AI, its integration into education, future implications, and its potential benefits and challenges. Additional questions were included to obtain deeper insights into their views.

To ensure the validity of the questions, feedback was obtained from three experts in educational sciences. The data collection process consisted of two phases. Initially, participants received an online questionnaire, allowing them to respond in writing. This approach aimed to give them the freedom to express their thoughts independently. In the second phase, voluntary face-to-face interviews were conducted to clarify their responses and gather more detailed information. This allowed researchers to address points requiring further explanation.

The collected data were analyzed using the content analysis method, progressing from specific codes to broader themes. Each response was carefully examined line by line to identify meaningful codes, which were then grouped into themes and compared with existing literature. The coding process considered all data points to ensure comprehensive analysis. Key themes were highlighted in the findings, with detailed explanations provided for significant codes, such as the individualization of instruction.

Participants' views were analyzed based on their existing experiences, understanding of AI, and envisioned future scenarios. Most of the data were categorized thematically, except for the final question, which was analyzed using a predetermined numerical format, as shown in Table 1.

The questions asked to participants are:

1. What are your thoughts on artificial intelligence (AI)?
2. How do you think AI will be integrated into education?
3. What is your perspective on the future of AI in education?
4. What do you see as the positive implications of AI in education?
5. What do you see as the negative implications of AI in education?

Additionally, one final question was coded using a predetermined numerical format, but its exact content is not specified

### 3) TRUSTWORTHINESS

Trustworthiness plays a crucial role in qualitative research. To enhance the reliability of this study, the data collection, coding, tabulation, and reporting processes were closely monitored by an expert academician in the field. Additionally, researchers documented their initial assumptions about the topic, while participants were asked about their preliminary judgments.

To ensure a rigorous analysis, an independent review was conducted by three academicians using analyst triangulation. Furthermore, data source triangulation (Streubert & Carpenter, 2011) was employed, incorporating insights from various studies on AI across different sectors, including healthcare and industry, to enable perspective triangulation. Triangulation, as defined by Patton (1999), involves utilizing multiple methods or data sources in qualitative research to develop a well-rounded understanding of a phenomenon. The inclusion of experts from diverse fields in this study on AI in education enriched the dataset and provided a broader perspective.

The study also compared the collected data with findings from existing literature to assess consistency. A thorough content comparison was conducted using multiple data sources to ensure reliability, and researchers took measures to minimize personal biases. Both raw and analyzed data were preserved for potential future verification. The research process, objectives, and methods were clearly communicated to participants, ensuring transparency and transferability. Ethical considerations were emphasized, and participants were informed of their right to withdraw from the study at any time.

## IV. FINDINGS AND DISCUSSION

The themes identified in this section are developed based on the most frequently emphasized points raised by participants. Although the codes within these themes are not ranked by frequency, the most significant ones are highlighted and explained. To ensure accuracy and credibility, the final findings were reviewed and validated by participants from different fields of expertise.

During the analysis, it became clear that participants primarily focused on the products, applications, and

outcomes that artificial intelligence will introduce into various aspects of daily life. They discussed how AI will shape different domains, including education, industry, and personal interactions. Beyond this, several other key themes emerged, which are further detailed in the following sections.

Given that participants addressed multiple dimensions of AI—such as its benefits, drawbacks, and potential improvements—the study aims to present a well-rounded perspective. Under each theme, a selection of representative quotes is included to reflect participants' views and provide deeper insight into their perceptions and expectations regarding AI.

### 1) PRODUCTS (OUTCOMES)

Within this theme, participants shared their expectations regarding AI-driven products and tangible outcomes in the education sector. The products dimension includes various anticipated innovations, encompassing not only physical tools but also software, systems, methodologies, and models. The key AI-powered products and solutions expected to play a significant role in education can be outlined as follows:

- Advanced technology software
- Robot assistants and robot teachers
- Smart classes in schools
- Individualized education (pertains to individualization of instruction)
- Simulations for education and lessons
- Scenario and case study-producing systems
- Interest, ability, and needs analysis systems
- Vocational guidance system (for career choice)
- Programs or tools for taking attendance
- Unmanned systems of all sorts
- Learning outcome detection system (for levels of students)
- Personal teaching tools
- Attention and distraction analysis system
- Academic success detection and suggestion system for improvement
- Learning systems in cloud environments and virtual learning environments
- Curriculum editing system
- Systems that perceive and report students' learning patterns

Supporting the products/outcomes theme, one participant, SREERAM (an academician), stated,

"Artificial intelligence in education can be applied in various areas, including personalized learning, examination processes, facial recognition for attendance tracking, and classroom management." He particularly emphasized AI-driven tools for individualized learning experiences.

Similarly, Kailash (a software engineer) highlighted the role of AI in personalized education, stating, "Artificial intelligence can help virtualize teaching, making individualized education more accessible."

Additionally, Arun (an expert engineer) noted, "With the advancement of machine learning algorithms tailored to educational systems, curriculum planning could be managed by AI-driven tools."

## 2) DRAWBACKS

In this theme, the possible drawbacks and risks about the use of artificial intelligence in education were mentioned. These drawbacks, according to the participants, can be listed as follows:

- Encouraging mechanical thinking while diminishing intuitive knowledge.
- Replacing humanistic values with a more utilitarian or pragmatic approach.
- Potential risks such as full-scale student evaluation and categorizing individuals based on intelligence levels.
- Shaping individuals to be solely information-driven.
- Reducing or eliminating the necessity of human involvement in education.
- Risks associated with uncontrolled AI technologies in education, such as data security concerns.
- Adverse impacts on social interactions and relationships.

Artificial Intelligence (AI) is increasingly being integrated into educational systems, raising important discussions about its potential risks and challenges. While AI presents numerous advantages in personalizing learning and improving educational outcomes, many educators and stakeholders have voiced significant concerns about its long-term implications. Among these concerns, teachers appear to be the most apprehensive about the growing influence of AI in education and the possible diminishing role of human educators.

Leela Kumari, a teacher, highlighted the increasing control AI is likely to exert over educational processes. She remarked, "Artificial intelligence will continue expanding its control, reducing the necessity for human involvement." This concern is based on the rapid advancements in AI-driven teaching tools, which are capable of automating lesson plans, grading, and even student interactions. The fear is that as AI becomes more autonomous and efficient, the human element in education might gradually be pushed aside, reducing the need for teachers in classrooms.

Reshmi, an academician, provided a broader perspective on the psychological and cognitive impacts of AI integration. She cautioned, "We may be moving toward a future where individuals adopt a rigid, machine-like way of thinking." This statement reflects concerns about how AI-driven education could standardize learning processes to the point where creativity, critical thinking, and independent thought are stifled. If AI systems prioritize efficiency and standardized testing over exploratory learning, students may be conditioned to think in a structured, algorithmic manner rather than developing innovative problem-solving skills.

Meenakumari, another teacher, shared a particularly worrisome prediction: "I foresee a time when teachers may no longer be essential in education." This sentiment was echoed by Arjun, a data scientist, who stated, "AI could eventually take over all educational responsibilities, potentially eliminating the need for teachers altogether." These concerns stem from the increasing capability of AI to deliver highly personalized learning experiences, adapt to individual student needs, and provide instant feedback. While these features enhance education, they also pose the risk of reducing the perceived value of human teachers. If educational institutions prioritize cost-saving measures and efficiency, they might begin replacing teachers with AI-driven systems, ultimately leading to job displacement and a lack of human mentorship in classrooms.

Several participants attributed these fears to the influence of dystopian portrayals of AI in movies and media. Many science-fiction narratives depict AI as an entity that surpasses human intelligence and autonomy, leading to scenarios where humans are rendered obsolete. While such depictions are often exaggerated, they highlight genuine ethical and

practical concerns regarding the unchecked implementation of AI in education. The fear that AI could surpass its intended role and dominate educational structures is not entirely unfounded, given the current trajectory of technological advancements.

Despite these concerns, it is important to recognize that AI's role in education is not necessarily one of replacement but rather augmentation. AI can assist teachers by handling administrative tasks, providing data-driven insights into student performance, and supporting personalized learning approaches. However, the human element—empathy, mentorship, and the ability to inspire—remains irreplaceable.

To mitigate the risks associated with AI in education, policymakers, educators, and technologists must work together to establish ethical guidelines and frameworks. AI should be designed to support teachers rather than replace them, ensuring that education remains a human-centered endeavor. Training programs can also help teachers adapt to AI-assisted teaching methods, allowing them to leverage technology without losing their essential role in the learning process.

In conclusion, while AI presents remarkable opportunities in education, it also introduces significant challenges that must be carefully addressed. The concerns raised by educators and experts highlight the need for a balanced approach—one that embraces technological advancements while preserving the irreplaceable human aspects of teaching. Through responsible implementation and continuous dialogue, AI can be integrated into education in a way that enhances learning experiences without compromising the fundamental values of human-driven education.

### 3) BENEFITS

In this theme, the results obtained from the opinions of the participants about the benefits of using artificial intelligence in education are presented. Accordingly, these benefits are:

- Assessing and evaluating individuals.
- Supporting students in learning at their own pace.
- Identifying individual needs accurately.
- Offering practical solutions to long-standing issues.

- Reducing paperwork in schools.
- Saving time and improving efficiency.
- Enhancing the quality of education.
- Making tasks easier for educators.
- Assisting in decision-making through quick data analysis.
- Adapting teaching methods to match student abilities and learning speed.
- Selecting the most effective learning strategies based on data insights.
- Enabling smaller, well-planned learning groups for better outcomes.
- Making personalized learning more effective.
- Aiding policymakers with population forecasts to guide educational investments.

Artificial Intelligence (AI) is increasingly being recognized as a powerful tool in the field of education, offering numerous advantages for both students and educators. One of the key benefits of AI is its ability to track, assess, and analyze students' knowledge, helping to identify their strengths and weaknesses. As Sreeram, an academician, highlighted, AI systems can monitor students' learning progress, review their academic performance, and assist in formulating personalized career guidance plans. By leveraging AI-driven insights, educators and career counselors can offer students tailored advice on which professional paths they should focus on in the future, thereby maximizing their potential for success.

In addition to academic assessment, AI can play a crucial role in student welfare and development. Aparna, an experienced engineer, emphasized that AI can facilitate frequent reporting of students' academic and behavioral situations at school. This continuous monitoring allows for the generation of data-driven proposals aimed at enhancing students' learning experiences. These reports can be shared with relevant stakeholders, such as teachers, parents, and school administrators, to ensure timely interventions that contribute to students' overall betterment. By implementing AI-driven insights, educational institutions can create more supportive learning environments and foster student growth effectively. Moreover, AI can revolutionize the way students' verbal skills and comprehension levels are assessed.

Sheba, a teacher, pointed out that AI-powered tools can analyze students' speech patterns and determine the extent to which they have grasped various concepts. This analysis can then be used to provide targeted regulatory guidelines and recommendations to help students refine their communication skills and deepen their understanding of subject matter. By offering personalized learning support, AI enhances students' educational journeys and ensures that teaching methodologies are adapted to meet individual learning needs.

The insights shared by these participants closely align with the positive impacts associated with 'learning analytics,' a widely researched area in education. Learning analytics involves the use of AI and data science techniques to track student performance, predict learning outcomes, and personalize educational experiences. By harnessing AI-driven analytics, educators can develop more effective teaching strategies, improve student engagement, and ensure that each learner receives the support they need to thrive academically.

In conclusion, AI has the potential to transform education by providing data-driven insights that enhance student learning, assessment, and career planning. By monitoring academic progress, generating personalized recommendations, and fostering meaningful interactions, AI empowers both students and educators to achieve better educational outcomes. As technology continues to evolve, integrating AI into the education system will play a vital role in shaping a more efficient, personalized, and student-centric learning experience.

#### 4) SUGGESTIONS

This context included the suggestions provided by the respondents which included the use of artificial intelligence in the sector of education. These suggestions or recommendations are presented below:

- **Standardized Measurement:** A specific and standardized method should be developed to measure the effectiveness of artificial intelligence when implemented in the education sector.
- **Pilot Testing and Evaluation:** AI-driven educational apps or systems should first undergo pilot testing and evaluation. Their integration

into the broader educational framework should be based on the outcomes of these trials.

- **Academic Research and Analysis:** Comprehensive academic research and analysis should be conducted on AI-based systems to ensure their efficacy and relevance in education.
- **Infrastructure Development:** The necessary infrastructure to support the implementation of AI in education should be established.
- **Auditing Mechanism:** A robust auditing method should be implemented to monitor and evaluate the performance and impact of AI systems in education.
- **Psychological Considerations:** The psychological impact of AI on students and educators must be taken into account, ensuring that human psychology is not overlooked.
- **Preventive and Supportive Software:** There is a need to develop software that not only supports educational processes but also prevents potential negative outcomes associated with AI use.
- **Impact on Decision-Making:** The effects of AI-related technologies on individuals' decision-making abilities in their daily lives should be carefully assessed.
- **Social Relations Preservation:** The integration of AI in education should be carried out in a manner that does not negatively affect social relationships or interactions.
- **Multidisciplinary Collaboration:** The implementation process should involve a multidisciplinary approach, engaging all relevant stakeholders, including but not limited to educators and engineers. AI should not be seen as a universal solution but should be applied selectively in areas where it is truly needed.

Udaya, a teacher, emphasized the need for responsible and mindful use of artificial intelligence (AI). He argued that AI should only be applied in areas where it is essential, avoiding unnecessary integration. Rekha, a professor, supported this view, stressing the importance of proceeding with caution. He highlighted the value of academic research and pilot testing to evaluate AI systems before widespread implementation. Additionally, he underscored the necessity of integrating human oversight into AI technologies to reduce potential risks.

Arjun Krishna proposed a two-part strategy to address these concerns:

1. Resource Development and Communication: Authorities should be equipped with the necessary tools and resources to fulfill their responsibilities. Secure and transparent communication channels should be established to ensure accountability.

2. Deterrent Measures: Strict penalties should be enforced to prevent breaches of confidentiality and to minimize harm in cases where breaches occur.

In conclusion, the integration of AI requires a balanced approach, combining caution, legal compliance, and robust data protection measures to ensure its benefits are realized without compromising ethical standards or individual privacy.

## V. CONCLUSION

The discussions among participants highlighted five key themes regarding AI in education, along with an overarching topic on its transformative role in learning. The integration of AI into education is a subject of great interest, given its potential to revolutionize teaching methodologies, improve learning outcomes, and address existing challenges in the educational sector. The rapid advancements in AI-driven technology have sparked debates on both its advantages and concerns, leading to a more profound examination of its implications in the educational landscape.

One of the primary themes discussed was the development and implementation of AI-driven educational tools, applications, and potential advancements in the field. AI has been instrumental in the introduction of simulation software, evaluation-based assistance systems, virtual reality classrooms, robotic teaching assistants, and personalized learning platforms. These tools have the potential to tailor educational content to the needs of individual learners, thereby enhancing the overall learning experience. One of the most debated aspects of AI's role in education was its ability to provide customized instructional support, deviating from the traditional one-size-fits-all approach to education. Research by Chang and Lu (2019) suggests that AI-powered technologies can significantly improve individualized learning experiences by adapting content based on students' needs, preferences, and

progress, ultimately leading to better learning outcomes.

In addition to personalized learning, Goksel and Bozkurt (2019) identified adaptive learning, customization, and diverse learning modes as crucial components in their comprehensive review of AI applications in education. This highlights the transformative potential of AI in shifting from standardized teaching methods to more dynamic, student-centric models. Abdelsalam (2014) further proposed the development of an Intelligent Tutoring System (ITS) based on the mastery acquisition technique, aiming to facilitate customized learning experiences and optimize knowledge retention. AI's integration into education is, therefore, not just a matter of technological adoption but a significant shift toward creating more interactive, efficient, and adaptive learning environments that cater to the diverse needs of students.

While the benefits of AI in education are evident, participants also raised concerns regarding the risks and challenges associated with its widespread use. There were apprehensions that an over-reliance on AI could lead to a mechanized, data-driven approach to learning that diminishes creativity, emotional intelligence, and ethical considerations. The increasing use of AI could prioritize pragmatic, knowledge-focused learning, potentially sidelining critical aspects such as artistic expression, social skills, and ethical reasoning.

One of the primary concerns was the impact of AI on social interactions. Participants noted that excessive reliance on technology, particularly mobile devices, has already been linked to behavioral, social, and emotional challenges (Choliz, 2010). The fear is that AI's expanding role in everyday life, particularly in educational settings, may further reduce meaningful human interaction. Another major concern was the possibility of AI displacing teachers and reducing employment opportunities in the education sector. As AI-driven teaching assistants and automation become more sophisticated, there is growing uncertainty regarding the future roles of educators and whether AI could eventually replace traditional teaching positions.

Supporting this concern, Picciano (2019) argued that AI-driven automation has the potential to displace professionals in various fields, including education, law, and healthcare. However, rather than completely

replacing human jobs, AI is more likely to create a shift in job roles, where individuals proficient in operating intelligent systems will be in higher demand. This indicates that the future workforce must adapt by acquiring new skills related to AI and automation. Roll and Wylie (2016) emphasized that teachers should transition into mentorship roles, focusing on guiding students in critical thinking, real-world problem-solving, and innovation rather than merely delivering information.

Beyond concerns about employment, participants also acknowledged the numerous advantages that AI brings to education, particularly in terms of efficiency, accessibility, and resource optimization. AI-powered systems have the potential to enable students to learn at their own pace, increase engagement, and improve resource allocation. By automating routine administrative tasks, AI can allow educators to focus more on direct student interaction and personalized instruction. AI-powered learning systems can help maintain learning momentum, ensure that students receive the support they need, and enable quick analysis of educational data to inform decision-making.

Some participants noted that AI could play a significant role in shaping governmental policies by predicting demographic shifts and resource needs. According to Subrahmanyam and Swathi (2018), AI-driven predictive computing can analyze student learning patterns and recommend the most effective study plans for individual learners. This feature makes AI particularly beneficial in identifying students' strengths and weaknesses, enabling the development of personalized learning strategies that promote mastery of subjects.

Additionally, AI has the capability to provide continuous coaching and reinforcement, allowing students to revisit challenging topics, repeat lessons as necessary, and receive real-time feedback on their progress. Roll and Wylie (2016) emphasized that both students and educators require more personalized support, which AI can efficiently provide. As AI continues to develop, its capacity to cater to students' unique learning needs and provide instant feedback will further enhance educational experiences, making learning more effective and adaptive to each student's progress.

Despite its numerous benefits, participants emphasized the need for regulatory frameworks and

careful oversight in AI integration within education. While AI should be used to enhance educational processes, it should not replace the human aspects of teaching and learning. Participants advocated for the establishment of oversight mechanisms at technical, legislative, and ethical levels to ensure responsible AI deployment.

Concerns were raised regarding the legal and ethical challenges AI might pose, including issues of accountability, intellectual property rights, data privacy, and security risks. Participants called for stringent regulations to govern the implementation of AI in education, ensuring that these technologies adhere to ethical guidelines and do not compromise the rights of students or educators. AI should be viewed as a tool that aids in streamlining educational processes rather than as a substitute for human educators.

Moreover, participants stressed the importance of defining clear boundaries for AI usage to prevent unintended negative consequences. They warned that integrating AI into education without proper regulation could lead to challenges such as biased decision-making, lack of transparency in AI algorithms, and ethical dilemmas concerning automated grading and student assessments. To address these concerns, policymakers must adapt legal frameworks to keep pace with technological advancements and establish clear regulations governing AI-driven educational tools.

Despite differing perspectives, the overall sentiment regarding AI in education remained optimistic. Most participants acknowledged that AI has the potential to revolutionize education and enhance learning outcomes. Educators generally viewed AI as a valuable tool for streamlining administrative tasks, reducing workload, and providing real-time feedback to students. However, some scholars expressed skepticism, focusing more on AI's limitations and ethical implications.

The mixed perceptions of AI's impact appear to be influenced by several factors, including media portrayals, expert opinions, concerns about job security, and direct experiences with AI-powered educational platforms. While some participants feared that AI might threaten traditional teaching careers, others saw it as an opportunity for educators to adopt new roles as facilitators, mentors, and innovators. AI systems are expected to enhance

efficiency and accuracy in education by reducing human error and optimizing learning methodologies. Ultimately, AI in education presents both opportunities and challenges. As AI continues to evolve, it is essential to strike a balance between leveraging its capabilities and addressing its potential risks. Policymakers, educators, and stakeholders must work collaboratively to ensure that AI integration is guided by ethical principles, legal standards, and a commitment to enhancing the quality of education. Through responsible implementation, AI can become a transformative force in education, fostering a more inclusive, effective, and technologically advanced learning environment.

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