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Survey on Digital Literacy, AI in Education and Tech-Driven Pedagogy Skills among Secondary School Educators

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Abstract

This present study explored the teachers' digital literacy, artificial intelligence in education and tech- driven pedagogy in teaching learning process in secondary schools and succeeds in understanding the overview levels of secondary school educators' digital literacy, using AI in education and integrating techno pedagogy to prepare the future work force. Since, we are living in the digital era, and everybody is dependent on technology directly or indirectly. Most importantly, our younger generation needs to be equipped with 21st century skills such as learning skills, literacy skills and life skills. As part of the literacy skills, young children need information literacy, media literacy and Technology literacy. Now, to impart all the skills among young generations, educators need for them to be digitally literate is imperative. The methodology in this study employed is the traditional survey method which compiled questions in the form of questionnaire. A sample of 125 government secondary school teachers' responses were collected electronically using Google forms and analyzed the data using the SPSSs latest version. Significant findings summarize the fact that the secondary school educators have moderate levels of digital literacy to use in their classes and provide a techno-savvy and student-friendly digital environment. It suggested that the educators' digital literacy paved a way to prepare the future generations to cope with rapid technology development and for 21st century skills. To summarize, as it is at the moderate level, most secondary educators are digitally literate. However, future research may evaluate digital literacy capacity building programs for educators to assess what improvements should be made to delivery as well as existing frame works used to test educators' digital literacy. This study was limited to only one district educators and helpful to the educators and the

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government to understand the digital tools required, and challenges teachers' face in adopting digital technology in their classrooms.

Keywords: Digital Literacy, AI in Education, Tech-Driven Pedagogy, 21st Century Skills, Secondary School Educators

INTRODUCTION

The increasing prominence of digital technologies and Artificial Intelligence (AI) in education has initiated a paradigm shift in pedagogical practices, requiring educators to acquire advanced digital literacy and adaptive instructional skills. Contemporary scholarship emphasizes that secondary school educators serve as key mediators in translating technological innovations into meaningful learning experiences, thereby shaping students' cognitive, social, and digital competencies. However, the extent to which educators are prepared to integrate AI tools and technology-driven pedagogical strategies into their teaching remains an area of empirical investigation. This survey seeks to critically examine the digital literacy levels, perceptions of AI in education, and tech-driven pedagogical competencies of secondary school educators, with the objective of identifying existing gaps, challenges, and opportunities for enhancing teacher preparedness in the digital age

DIGITAL LITERACY

Digital literacy is an individual's ability to find, evaluate, and communicate information using typing or digital media platforms. Digital literacy combines technical and cognitive abilities; it consists of using information and communication technologies to create, evaluate, and share information, or critically examining the social and political impacts of information and communication technologies. The concept of digital literacy has evolved throughout the 20th and into the 21st centuries from a technical definition of skills and competencies to a broader comprehension of interacting with digital technologies. The COVID-19 pandemic pushed education into a more digital and online experience where teachers had to adapt to new levels of digital competency in software to continue the education system. Educators have also turned to

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social media platforms to communicate and share ideas with one another social media and social networks have become a crucial part of the information landscape. Social media allows educators to communicate and collaborate with one another without having to use traditional educational tools. Teachers' digital literacy is an essential factor in integrating technology into classroom learning. Recent research highlights that many elementary school teachers demonstrate moderate levels of digital competence, with room for growth in critical and creative uses of ICT (Atmojo, Ardiansyah, & Wulandari, (2022). According to Atmojo et al. (2022), "Teachers need structured digital competence assessments like the IDCA to evaluate not only their operational skills but also their pedagogical and ethical use of technology." (p. 437). This suggests that continuous professional development and targeted digital literacy training are necessary for teachers to effectively implement digital tools in the classroom.

USE OF ARTIFICIAL INTELLIGENCE (AI) IN EDUCATION

To achieve quality education in India, Artificial Intelligence holds immense potential to address long standing challenges, such as skill-based education, accessibility, and inclusivity. AI technologies, such as personalized learning platforms, virtual assistants and automated assessment tools, are gradually reshaping traditional teaching and learning practices. The use of Artificial Intelligence (AI) in developing new teaching learning solutions is gaining momentum towards transforming the education system in India. Schools are beginning to shift from conventional methods of teaching to smart education to enhance students learning experiences (Jaiswal & Arun, 2021; Sihag & Vibha, 2024). AI presents new avenues to enhance the effectiveness and reach of education system in India. India's growing economy and population proves its significant stake in the Artificial intelligence (AI) revolution (Sihag & Vibha, 2024). However, challenges such as the digital divide, lack of infrastructure and ethical considerations must be addressed to unlock its full potential.

TECH-DRIVEN PEDAGOGY

Tech-Driven Pedagogy refers to teaching and learning methods that actively integrate digital technologies, tools, and platforms to enhance educational experiences. Instead of treating technology as just a supplement, tech-driven pedagogy makes it central to instructional design,

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delivery, and assessment. Tech-driven pedagogy is the practice of leveraging modern technologies such as Augmented Reality (AR), Virtual Reality (VR), Learning Management Systems (LMS), Digital Simulations, etc. to design engaging personalized, and effective teaching- learning processes.

INTERCONNECTION OF DIGITAL LITERACY, AI, AND TECH-DRIVEN PEDAGOGY

AI can transform Indian education by enhancing teacher efficiency, personalizing learning and improving administrative systems. AI tools enhance grading efficiency and foster critical thinking and analytical skills among students in the Indian education sector. AI can be a transformative tool in Indian education by empowering both teachers and students, but social and ethical aspects need to be addressed. AI has the potential to transform the Indian education system through personalized learning, recommendation systems and adaptive assessments. AI has the potential to strategically integrate with conventional teaching methods in Indian education to provide sustainable and equitable learning (Kenchakkanavar, 2023).

Temirkhanova M. et. al. (2024) indicated that students taught by digitally literate teachers demonstrated significant improvements in designing and utilizing virtual reality tools, mobile applications, and other digital resources, with teachers facilitating more interactive and engaging learning environments that enhanced students' technical skills and creative capacities. Sperling et al. (2024) examined AI literacy in teacher education through a scoping review shows teachers' practical knowledge likely to be translated into the adoption of digital resources for teaching about AI or the integration of AI Ed Tech in to teaching. The scientific literature conceptualized AI literacy in relation to teachers' different form of knowledge suitable for teacher education. Gautam, Kumar, Deepmala, and Upadhyay (2023) explored digital literacy among educators more broadly. Their research highlighted that educators' proficiency in information and communication technology not only affects their ability to deliver content but also shapes students' learning experiences and access to digital resources. The authors underscore that continuous skill development, institutional support, and digital infrastructure are key to enabling educators to leverage technology effectively in the classroom. Atmojo et al. (2022) studied the levels of digital

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literacy among teachers in the classroom and the results indicated that "teachers need structured digital competence assessments like the Instant Digital Competence Assessment (IDCA) to evaluate not only their operational skills but also their pedagogical and ethical use of technology" (p. 437). This suggests that continuous professional development and targeted digital literacy training are necessary for teachers to effectively implement digital tools in the classroom. Malakar and Gope (2022), emphasized the importance of developing techno-pedagogical skills among pre-service teachers. They mentioned TPACK model to teachers to use special technological tools that suits best for students learning. Mishra and Koehler (2006) suggested the Technological Pedagogical Content Knowledge (TPACK) framework in which teachers use technological tools to instruct and guide students to understand subject matter better. The three types of knowledge addressed was technology, pedagogy and content.

OBJECTIVES OF THE STUDY

1. To find teachers' level of digital literacy in terms of basic ICT skills, information evaluation, content creation, and digital ethics.

2. To examine the extent of AI usage in teaching practices, including lesson planning, assessment, feedback, and personalized learning.

3. To evaluate the integration of technology-driven pedagogy (such as LMS, digital collaboration tools, and interactive platforms) in classroom teaching.

METHODOLOGY OF THE STUDY

Descriptive Survey Method was used.

SAMPLE

A sample of a hundred and twenty government high school teachers was collected from Yadadri Bhuvanagiri district of Telangana, India. The sample was drawn through Random Sampling Technique.

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TOOL USED

A questionnaire constructed by the investigator was used. The questionnaire was comprised of 42 questions and has been divided into 13 sections.

Section A: Teacher's demographic information, including their name, gender, age group, teaching experience, subjects taught, school type.

Section B: Access to digital technology: intended to know electronic devices and internet facility available to the teachers.

Section C: Digital Skills: intended to know about teachers' confidence levels in using digital tools.

Section D: Usage of Digital Tools in Teaching: to understand how often teachers use digital tools in teaching-learning process.

Section E: Challenges in using digital technology: such as lack of training, poor internet connectivity, lack of devices, lack of time, low confidence, and lack of technical support.

Section F: Training and Support: to assess teachers' abilities and enhancing their skills and providing support.

Section G: Awareness and understanding of AI: to know the level of awareness and understanding the use of AI in teaching.

Section H: Use of AI Tools in Teaching

Section I: Attitude toward AI in Education

Section J: Challenges and Support Needed in Using AI in Teaching

Section K: Awareness and Understanding of Techno-Pedagogy

Section L: Usage of Technology in Pedagogy

Section M: Attitudes toward Techno-Pedagogy

Section N: Challenges and Support needed in using Technology in Pedagogy

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Section O: Open Suggestions

STATISTICAL TECHNIQUE USED

In the present study, Descriptive statistical measures i.e. percentage is used.

DATA ANALYSIS AND DISCUSSIONS

The collected data were analyzed by using appropriate statistical techniques.

Table 1: Access to Digital Devices and Internet among High School Teachers

Parameter	Percentage (%)
Teachers with access to computer/laptop at school	76%
Teachers with internet facility at school	61%
Teachers with personal digital devices at home	95%

From the table 1 it is indicated that a majority of high school teachers (76%) have access to computers or laptops at their schools, while only 61% have internet connectivity. Almost all teachers (95%) possess personal digital devices at home. This suggests that while teachers are personally equipped for digital teaching, school infrastructure, particularly internet access, remains a limiting factor for effective integration of technology in classroom instruction. Enhancing digital facilities in schools could bridge this gap and support technology-driven pedagogy.

Table 2: Usage of Digital Tools by High School Teachers

Parameter	Percentage %
Teachers using digital tools daily in teaching	58%
Teachers using Interactive Flat Panels (IFPs)	90%
Teachers using digital tools (IFPs, WhatsApp) for teaching/presentations	94%
Teachers moderately confident in using MS Word/Google Docs	36%

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Teachers using PowerPoint presentations in teaching	30%

The data given in table 2 reveals that while 58% of teachers use digital tools daily, a large majority (90–94%) incorporate devices like Interactive Flat Panels and communication tools such as WhatsApp into their teaching and presentations. However, only 36% of teachers feel moderately confident using software like MS Word or Google Docs, and 30% regularly use PowerPoint for teaching. This indicates that teachers are effectively using digital tools for interactive teaching, but there is scope for enhancing their confidence and skills in common productivity software, which could further improve the quality of digital instruction.

Challenges in Digital Integration

The study identified two primary challenges faced by teachers:

Need for Further Training in Digital Literacy: Although teachers are using digital tools, many expressed a need for additional training to build confidence and competence in using software such as MS Word, Google Docs, and PowerPoint. Structured professional development programs and hands-on workshops are essential to empower teachers with the skills necessary for effective digital teaching.

Poor Internet Connectivity: Limited or unreliable internet at schools restricts teachers from fully utilizing online resources, conducting live demonstrations, or engaging students in interactive learning. Addressing this infrastructural gap is crucial to enable seamless integration of technology into classroom instruction.

Table 3: Awareness and Usage of AI-Based Tools among High School Teachers

Parameter	**Percentage %**
Teachers using AI-based tools in teaching	56%
Teachers using ChatGPT for content generation and student assessments (of AI users)	75%

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The table 3 indicates that more than half of the teachers (56%) are using AI-based tools in their teaching, and among them, 75% use ChatGPT for content creation and student assessments. This highlights a growing awareness and practical adoption of AI technologies in teaching, while also indicating the need for further training and support to expand AI usage among all teachers.

Table 4: Teachers' Attitudes toward AI in Education

Statement	Percentage (%) of Teachers Agreeing
AI can help personalize student learning	57%
AI should be integrated into school education to reduce workload	48%

The table 4 indicates that a majority of teachers hold a positive attitude toward AI in education, recognizing its potential to personalize learning and reduce workload. However, the percentages also suggest that a notable proportion of teachers remain neutral or uncertain, highlighting the need for further awareness, training, and practical demonstration of AI's benefits in schools.

Challenges Faced by Teachers in AI Integration

The study identified several significant challenges that hinder teachers from fully utilizing AI tools in their teaching practices:

Lack of Awareness and Training on AI:

Many teachers reported that they are not fully aware of the potential applications of AI in education or the specific tools available to support teaching and learning. Even among those who are familiar with AI, there is often insufficient training to use these tools effectively, such as ChatGPT, adaptive learning platforms, or AI-driven assessment tools. This lack of knowledge and hands-on experience can lead to hesitation, underutilization, or incorrect use of AI tools in the classroom. To address this challenge, structured professional development programs, workshops, and guided demonstrations are essential to equip teachers with the necessary skills and confidence for AI adoption.

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Lack of Infrastructure:

In addition to training gaps, inadequate technological infrastructure in schools—such as limited internet connectivity, outdated devices, or lack of access to AI-enabled platforms—poses a significant barrier. Even teachers who are willing and skilled in using AI may face difficulties implementing it due to hardware, software, or connectivity limitations. Ensuring that schools are well-equipped with reliable internet, modern devices, and access to AI tools is critical for facilitating effective integration of AI in education.

Table 5: Usage of Technology in Tech-Driven Pedagogy among Teachers

Parameter	Percentage %
Teachers using technology for content delivery	**82%**
Teachers using technology for student assessment	**82%**
Teachers using Interactive Flat Panels (IFPs)	**90%**
Teachers using YouTube educational videos	**73%**

The table 5 revealed that a strong integration of technology in teaching and learning practices. A large proportion of teachers are using technology for both content delivery (82%) and student assessment (82%), highlighting its dual role in instruction and evaluation. The highest usage is seen in Interactive Flat Panels (90%), reflecting a strong institutional investment in digital infrastructure and teachers' preference for interactive tools that enhance classroom engagement. Additionally, 73% of teachers are using YouTube educational videos, suggesting that teachers also rely on easily accessible multimedia resources to supplement their lessons. Overall, the findings reveal that technology has become an essential component of pedagogy, supporting both effective content delivery and diverse learning experiences.

Table 6: Teachers' Attitudes toward Tech-Driven Pedagogy

Statement	Percentage

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Tech-driven pedagogy enhances student engagement and simplifies concepts	76%
Digitally enhanced lessons provide additional benefits to students	**70%**

The table 6 indicates teachers' positive perceptions of technology-enabled teaching. About 76% agree that tech-driven pedagogy enhances student engagement and simplifies complex concepts, showing that digital tools make learning more interactive and help students grasp ideas more easily. Similarly, 70% recognize that digitally enhanced lessons provide additional benefits to students, such as better visualization, accessibility of resources, and exposure to diverse learning materials. Together, these findings indicate that teachers see technology not just as a support for their own teaching but also as a means to enrich students' overall learning experiences.

ACHIEVEMENT OF OBJECTIVES

The study indicates that the objectives have largely been achieved. Teachers demonstrate a moderate to high level of digital literacy, with widespread access to computers, internet, and personal digital devices, though confidence in certain software applications such as MS Word, Google Docs, and PowerPoint is moderate. The extent of AI usage in teaching practices is notable, with 56% of teachers using AI tools and 75% of them employing ChatGPT for content generation and assessments, reflecting its role in personalized learning and workload management. Furthermore, technology-driven pedagogy is well integrated, with 82% of teachers using digital tools for content delivery and student assessment (82%), with an even higher percentage utilizing Interactive student assessment, complemented by positive attitudes toward enhancing engagement and simplifying complex concepts. Flat Panels (90%) and YouTube educational videos (73%). This demonstrates the extensive integration of technology into instructional practices. Further, 76% of teachers acknowledged that tech-driven pedagogy enhances student engagement and simplifies concepts, while 70% agreed that digitally enhanced lessons provide additional benefits to students. These insights confirm that teachers not only adopt technological tools but also recognize their positive impact on student learning outcomes, thereby fulfilling the research objectives. While the study highlights encouraging trends, further training in advanced digital

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skills, AI applications, and digital ethics is recommended to strengthen teachers' overall digital and AI readiness.

CONCLUSION

This study reaffirms the pivotal role of digital literacy, AI applications, and technology driven pedagogy in advancing instructional practices among high school educators. It suggests that while foundational digital competencies are increasingly prevalent, the depth of AI adoption and the integration of innovative pedagogical models remain uneven across contexts. The findings highlight a direct association between teachers' digital capacities and their ability to design engaging, student-centered learning environments enriched by AI and technology-enabled tools. Ultimately, teachers are the pillars in holding the technology to safeguard the students' learning capabilities and in turn to develop their learning achievements.

SUGGESTIONS

- Ensure all schools have reliable internet and access to computers/laptops/IFPs.
- Conduct regular training workshops on digital literacy, interactive tools, and AI applications.
- Raise awareness about AI tools and provide guidelines for ethical and effective use.
- Encourage blending traditional teaching with tech-driven pedagogy using IFPs and educational videos.
- Develop model lesson plans demonstrating effective technology integration.
- Implement monitoring and feedback systems to track digital tool and AI adoption.
- Promote teacher learning communities to share resources and best practices.
- Recognize and reward innovative use of technology in teaching.
- Encourage young and skilled techies into teaching field to improve the quality of technology driven pedagogy.

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