HSWS Global Multidisciplinary Journal
ISSN: 3107-6823, Vol. 02 (02), April – 2026, pp 42-54

HSWS Global Multidisciplinary Journal

Preparing the AI ready Workforce for Industry 5.0 and Need of AI-First approach for Digital Transformation in Education

Amrendra Kumar, Ajay[1] and Kumbhar, Manisha[2]

[1]Sinhgad Institute of Management (SIOM), Pune, India

[2]Suryadatta Institute of Management and Mass Communication, Pune, India

Abstract

The rapid advancement of Artificial Intelligence (AI) and disruptive digital technologies is transforming industries, work environments, and the competencies required in the future workforce. The emergence of Industry 5.0, characterized by human-centric innovation, intelligent automation, and collaboration between humans and machines, demands a workforce equipped with advanced digital, analytical, and cognitive skills. However, traditional education systems are struggling to keep pace with these technological changes.

This research paper examines the need for AI-focused digital transformation in education to develop an AI-ready workforce capable of meeting the demands of Industry 5.0. The study explores how integrating AI literacy, data analytics, machine learning concepts, and digital competencies into educational frameworks can enhance employability and innovation. It also highlights the importance of curriculum redesign, technology-enabled learning environments, industry-academia collaboration, and faculty upskilling.

The research aligns with the national vision of Viksit Bharat 2047, which emphasizes strengthening human capital and preparing India's youth for the future knowledge economy. The paper proposes a conceptual framework for AI-driven digital transformation in education that can support workforce readiness and sustainable economic development in the AI era.

Keywords: Artificial Intelligence (AI), Disruptive Technologies, Digital Transformation, Industry 5.0, Viksit Bharat 2047

INTRODUCTION

The global economy is undergoing a rapid technological transformation driven by Artificial Intelligence, automation, big data, and emerging digital technologies. These advancements are reshaping traditional job roles and creating new opportunities while simultaneously making certain skills obsolete. As the world moves toward Industry 5.0, the focus is shifting from purely automation-driven production to human-centric innovation, where technology augments human creativity and decision-making.

In this context, the role of education becomes crucial in preparing individuals with the competencies required to thrive in a technology-driven environment. However, many educational

institutions still rely on traditional teaching methods and outdated curricula that do not adequately address emerging technological skills.

India, with its large youth population, has a significant opportunity to develop a globally competitive workforce. The national vision of Viksit Bharat 2047 emphasizes strengthening human capital through innovation, technology integration, and skill development. To achieve this goal, educational institutions must undergo AI-focused digital transformation, integrating advanced technologies into teaching, learning, and institutional management.

This research paper explores the necessity of such transformation and proposes strategies to align educational systems with the evolving demands of Industry 5.0.

RESEARCH QUESTIONS

1. How are Artificial Intelligence and disruptive technologies transforming workforce requirements?
2. What skill gaps exist between current educational outcomes and Industry 5.0 workforce demands?
3. How can AI-focused digital transformation improve the effectiveness of educational systems?
4. What strategies can educational institutions adopt to prepare students for AI-driven industries?
5. How can policy initiatives support workforce development aligned with Viksit Bharat 2047?

RESEARCH OBJECTIVES

1. To examine the impact of Artificial Intelligence and emerging technologies on future workforce requirements.
2. To analyze the gaps between current education systems and the skills required for Industry 5.0.
3. To explore the role of AI-focused digital transformation in modernizing education.
4. To propose strategies for developing an AI-ready workforce through education reforms.
5. To identify the importance of industry-academia collaboration in workforce development.

PROBLEM STATEMENT

The rapid advancement of Artificial Intelligence (AI), automation, and digital technologies is fundamentally transforming the nature of work across industries. Organizations are increasingly adopting intelligent systems to improve productivity, efficiency, and innovation. As economies transition toward Industry 5.0, the collaboration between humans and intelligent machines is becoming essential for sustainable industrial growth.

However, many education systems continue to rely on traditional teaching methodologies and static curricula that do not adequately address emerging technological competencies. As a result, a significant skills gap has emerged between the capabilities of graduates and the requirements of modern industries. Employers increasingly seek professionals with AI literacy, data analytics

skills, computational thinking, and digital problem-solving abilities, yet these competencies are not systematically integrated into many academic programs.

AI is evolving very fast and being adopted by students and teachers in their day to day activities as well as in the teaching learning process. But, there is not any standard framework, which can be used to validate the level of AI usage can be considered as fair usage or excessive usage. The definition of fair usage of AI in academics currently varies person to person, institution to institution and authority to authority.

In India, the challenge is particularly critical due to the country's large youth population and its aspiration to become a global knowledge and innovation hub. The national vision of Viksit Bharat 2047 emphasizes strengthening human capital through technological advancement, digital skill development, and innovation-driven growth. Achieving this vision requires significant transformation in the education sector to ensure that students are equipped with the skills required for the future workforce.

Therefore, there is a pressing need for AI-focused digital transformation in education that integrates emerging technologies, industry-aligned curricula, and technology-enabled learning environments. Such transformation can play a crucial role in preparing an AI-ready workforce capable of meeting the demands of Industry 5.0 and supporting sustainable economic development.

1. LITERATURE REVIEW

Recent studies highlight the growing importance of Artificial Intelligence in shaping the future of work and education on a global scale. According to comprehensive reports by the World Economic Forum, technological advancements are expected to significantly alter job roles and career trajectories, with many traditional tasks being automated while new technology-oriented roles emerge across various industries. These profound changes require individuals to possess a diverse skill set that includes digital literacy, analytical thinking, advanced technological skills, and the ability to adapt to continuous technological evolution.

Research by UNESCO emphasizes that integrating AI into education systems can substantially enhance personalized learning experiences, improve teaching effectiveness through intelligent instructional design, and enable students to develop critical digital competencies essential for the modern workforce. AI-powered learning platforms can intelligently adapt content based on individual learning patterns, behavioral preferences, and cognitive abilities, thereby improving student engagement, motivation, and knowledge retention. Furthermore, these adaptive systems can provide real-time feedback and personalized recommendations, allowing educators to identify learning gaps and intervene promptly to support struggling students.

Similarly, comprehensive studies from the Organisation for Economic Co-operation and Development (OECD) indicate that education systems must prioritize interdisciplinary learning approaches, foster creativity and innovation, and develop robust problem-solving skills to adequately prepare students for rapidly evolving workplaces. Traditional knowledge-based education models, which emphasize rote memorization and standardized curricula, are increasingly insufficient in addressing the dynamic and complex requirements of digital economies. Educational institutions must therefore embrace innovative pedagogical approaches

that encourage collaboration, critical thinking, and practical application of knowledge across multiple disciplines.

In the Indian context, strategic initiatives by NITI Aayog have emphasized the critical importance of AI adoption across various sectors, including education, healthcare, agriculture, and governance. These forward-looking initiatives highlight the pressing need for developing indigenous AI talent, building digital infrastructure, and systematically integrating digital technologies into academic curricula at all educational levels. By fostering AI literacy and technological competency among students and professionals, India can position itself as a leader in the digital economy while creating employment opportunities and driving sustainable development across multiple sectors.

Recent Statistics on AI and Future Workforce (2024–2025)

1. According to the World Economic Forum Future of Jobs Report 2023–2024, approximately 44% of workers' core skills are expected to change by 2027 due to technological advancements.
2. AI and data-related roles are among the fastest growing jobs globally, including AI specialists, data scientists, and machine learning engineers.
3. A report by LinkedIn indicates that AI-related job postings have increased by more than 70% in the last five years.
4. McKinsey Global Institute estimates that up to 30% of current work activities could be automated by 2030.
5. India is expected to require over 1 million AI professionals by 2030 to support digital transformation across sectors.

The literature suggests that AI-enabled digital transformation in education can play a significant role in bridging the gap between academic learning and industry requirements, thereby strengthening the future workforce.

2. RESEARCH GAP

Based on the review of literature related, following are the research gap that has been identified by the researcher.

Author / Study	Focus Area	Key Findings	Research Gap
World Economic Forum (2023)	Future workforce skills	Technological change will transform job roles and require new digital skills	Limited focus on how education systems should transform to build AI-ready workforce

UNESCO (2021)	AI in education	AI can improve personalized learning and digital teaching methods	Lack of focus on workforce readiness and industry alignment
OECD (2023)	Digital skills development	Emphasizes interdisciplinary learning and digital competencies	Does not address AI-focused digital transformation in developing economies
NITI Aayog (2022)	AI strategy for India	Highlights importance of AI adoption across sectors	Limited emphasis on systematic AI integration in education curricula
Dwivedi et al. (2023)	AI adoption in organizations	Discusses opportunities and challenges of AI implementation	Limited discussion on education transformation for workforce readiness

From the literature, it is evident that while many studies discuss AI technologies, digital education, and future workforce skills, there is limited research specifically examining the role of AI-focused digital transformation in education for preparing an AI-ready workforce in the context of Industry 5.0 and India's development vision.

This research aims to address this gap by exploring strategies for integrating AI-driven learning models, digital infrastructure, and industry collaboration within education systems to support workforce development.

CONCEPTUAL FRAMEWORK

The conceptual framework illustrates how AI technologies drive digital transformation in education, leading to skill development and the creation of an AI-ready workforce. It shows the relationship between education transformation, technology adoption, and workforce readiness.

AI & Emerging Technologies

↓

AI-Focused Digital Transformation in Education

↓

Curriculum Innovation & Digital Infrastructure

↓

Skill Development

(AI Literacy, Data Skills, Critical Thinking)

↓

Industry–Academia Collaboration

↓

AI-Ready Workforce for Industry 5.0

This framework connects education transformation → skill development → workforce readiness → national economic development.

OVERVIEW

The conceptual framework presented here provides a comprehensive illustration of how Artificial Intelligence and emerging technologies serve as catalysts for digital transformation within educational institutions at all levels. This transformation, when strategically implemented with clear vision and sustained commitment, creates a cascading and interconnected effect that ultimately leads to meaningful skill development and the emergence of an AI-ready workforce capable of thriving in Industry 5.0 environments and beyond. The framework demonstrates the critical relationships between technological innovation, educational transformation, human capital development, and economic advancement at the national and global levels.

Furthermore, this framework acknowledges that digital transformation in education is not a one-time initiative but rather a continuous, evolutionary process that requires ongoing adaptation, innovation, and stakeholder engagement. It recognizes that technology alone cannot drive meaningful change; instead, technology must be coupled with pedagogical innovation, institutional commitment, teacher empowerment, and systemic reforms to create lasting impact on educational quality and workforce competitiveness.

Framework Components and Their Interconnections

1. AI & Emerging Technologies (Foundation Layer)

At the foundation of this framework lies a diverse and continuously evolving ecosystem of artificial intelligence and emerging technological innovations. This foundational layer includes machine learning algorithms, natural language processing systems, advanced data analytics tools, cloud computing infrastructure, robotics and automation technologies, Internet of Things (IoT) devices, blockchain technologies, augmented reality (AR) and virtual reality (VR) applications, and quantum computing innovations. These technologies serve as the primary drivers of change, providing the technological capabilities, computational power, and infrastructure necessary to revolutionize how education is delivered, structured, and evaluated. They enable new modes of learning, facilitate personalized educational experiences, and create opportunities for innovation that were previously impossible.

Key Elements:

- Advanced machine learning models and deep learning architectures
- Natural language processing and conversational AI systems
- Data analytics and big data processing tools

- Cloud-based computing platforms and infrastructure-as-a-service solutions
- Automation and robotic process automation (RPA) technologies
- Cybersecurity frameworks and data protection mechanisms
- Quantum computing applications and edge computing solutions
- Augmented and virtual reality technologies for immersive learning
- Blockchain for credentialing and transparent record-keeping
- IoT devices for smart classrooms and connected learning environments

2. **AI-Focused Digital Transformation in Education (Strategic Implementation)**

The second tier represents the strategic adoption, integration, and systematic implementation of AI technologies into comprehensive educational ecosystems at institutional, regional, and national levels. This is fundamentally different from merely digitizing existing content or automating traditional processes; rather, it involves a holistic reimagining and restructuring of how education is conceptualized, designed, delivered, assessed, and continuously improved. Digital transformation in education encompasses the strategic adoption of intelligent learning management systems, AI-powered adaptive tutoring platforms, immersive virtual classrooms, intelligent assessment and proctoring tools, predictive analytics for student success, personalized learning pathways, and data-driven institutional decision-making processes.

This transformation requires a comprehensive institutional approach that addresses technological infrastructure, human resources, organizational culture, change management, and stakeholder engagement. Educational leaders must champion a vision of AI-enabled education while addressing legitimate concerns about data privacy, algorithmic bias, equity of access, and the preservation of human-centric values in learning.

Key Dimensions:

- Integration of AI into pedagogical practices and instructional design
- Development of intelligent learning ecosystems that adapt to individual learner needs
- Implementation of sophisticated data analytics for continuous educational improvement
- Creation of hybrid learning environments combining online and face-to-face instruction
- Adoption of comprehensive institutional digital transformation strategies
- Transformation of educational leadership, governance, and decision-making processes
- Development of digital literacy for all stakeholders (students, teachers, administrators, parents)
- Implementation of change management initiatives to support organizational transformation
- Creation of innovation labs and centers of excellence for ongoing experimentation

3. Curriculum Innovation & Digital Infrastructure (Structural Development)

This critical layer focuses on the tangible structural, curricular, and infrastructural changes required to comprehensively support AI-driven education and ensure equitable access to

technology-enhanced learning opportunities. Curriculum innovation involves a systematic redesign of academic programs to meaningfully incorporate AI-related concepts, computational thinking, algorithmic reasoning, data literacy, and digital ethics from foundational primary education through advanced higher education programs.

Simultaneously, robust and reliable digital infrastructure—including universal broadband connectivity, adequate hardware resources, cutting-edge software platforms, cybersecurity measures, and ongoing technical support—must be established to enable seamless technology integration and ensure that no students are left behind due to digital divides. Infrastructure development must address urban-rural disparities, ensure accessibility for students with disabilities, and provide sustainable technical support systems.

Critical Components:

Curriculum Redesign:

Integration of AI and computational thinking concepts across all academic disciplines

Development of STEM/STEAM education programs with emphasis on AI and data science

Incorporation of digital ethics, responsible AI, and societal implications of technology

Redesign of assessment methodologies to evaluate 21st-century skills alongside traditional knowledge

Development of interdisciplinary and project-based learning modules

Integration of AI literacy and digital competencies in teacher education programs

Digital Infrastructure:

High-speed internet connectivity and broadband access to underserved communities

Computer labs and learning centers equipped with modern hardware

Cloud-based platforms and learning management systems with robust security

Open educational resources and digital content libraries

Cybersecurity infrastructure to protect student data and privacy

Technical support and maintenance systems for sustainable operations

Accessibility features for learners with diverse abilities

Energy-efficient and sustainable technology solutions

Teacher Preparation and Support:

Comprehensive professional development programs in AI, data science, and digital pedagogy

Certification programs for educators in AI-enabled teaching methodologies

Ongoing mentorship and peer learning communities

Resources and support for addressing digital divide and ensuring inclusive education

Recognition and incentives for innovative teaching practices

4**. Skill Development (Human Capital Formation)**

The framework recognizes that technological advancement alone is insufficient for meaningful societal progress; the strategic and comprehensive development of human capital is equally, if not more, crucial. This tier focuses on developing interconnected skill categories that prepare individuals not only to work with AI but to lead, innovate, and contribute meaningfully to society in an AI-integrated world.

a) AI Literacy and Technological Understanding:

- Foundational understanding of artificial intelligence concepts, principles, and capabilities
- Knowledge of machine learning, deep learning, neural networks, and algorithm design
- Understanding of AI applications across various domains and industries
- Awareness of AI limitations, potential risks, and responsible AI practices
- Ethical considerations in AI development and deployment
- Ability to work effectively with AI tools, platforms, and systems
- Understanding of human-AI collaboration and augmented intelligence concepts
- Data privacy awareness and cybersecurity consciousness

b) Data Skills and Analytical Competencies:

- Data collection, cleaning, preprocessing, and validation techniques
- Exploratory data analysis and statistical reasoning
- Data visualization and effective communication of insights
- Quantitative reasoning and mathematical foundations
- Understanding of databases, data structures, and data management systems
- Introduction to programming languages commonly used in data science
- Predictive modeling and descriptive analytics
- Understanding of big data technologies and distributed computing

c) Critical Thinking, Problem-Solving, and Innovation:

- Complex problem decomposition and systematic solution design

- Systems thinking and understanding of interconnected challenges
- Creative innovation and entrepreneurial mindset development
- Adaptability and continuous learning orientation
- Emotional intelligence and interpersonal competencies
- Collaborative and teamwork capabilities across diverse groups
- Leadership and change management skills
- Ethical decision-making and social responsibility

These comprehensive skill development initiatives ensure that learners are not merely passive consumers of technology but rather active creators, innovators, and responsible citizens capable of leveraging AI ethically for solving complex real-world challenges and contributing to sustainable development.

5. Industry–Academia Collaboration (Knowledge Exchange and Partnership)

Sustainable and meaningful workforce development requires establishing and strengthening strong institutional bridges and partnerships between educational institutions and industry stakeholders. This tier emphasizes strategic collaborations, meaningful internships, joint research projects, continuous knowledge exchange programs, and co-creation initiatives. Through structured industry-academia collaboration, academic curricula remain dynamically aligned with evolving industry needs and labor market demands, students gain valuable practical experience and professional networks, institutions benefit from industry insights and resources, and industries gain access to emerging talent and research capabilities.

Effective collaboration mechanisms create a virtuous cycle where industry insights inform curriculum development, student projects address real industry challenges, faculty engage in applied research, and graduates possess skills directly relevant to employer needs. This reduces skills gaps, decreases time-to-productivity for new hires, and creates innovation opportunities through collaborative research.

Collaboration Mechanisms and Initiatives:

- Joint curriculum development programs with industry experts and practitioners
- Industry mentorship programs pairing professionals with students
- Advisory boards comprising industry leaders to guide institutional strategy
- Apprenticeship and internship programs with structured learning outcomes
- Co-creation of applied research projects addressing industry challenges
- Guest lectures, workshops, and seminars led by industry practitioners
- Placement partnerships and career pathway development programs
- Scholarship and funding partnerships supporting student development
- Innovation labs and business incubation centers
- Resource sharing and access to industry tools and platforms
- Faculty sabbaticals and exchange programs in industry settings
- Industry-sponsored capstone projects and competitions
- Post-placement feedback mechanisms for continuous curriculum improvement

6. AI-Ready Workforce for Industry 5.0 (Strategic Outcome)

The final and culminating tier represents the ultimate strategic outcome: the emergence and development of a comprehensive AI-ready workforce capable of not merely thriving but leading and innovating in Industry 5.0 environments and beyond. Industry 5.0 represents the next evolutionary phase of industrial development, characterized by the intelligent integration of advanced technologies—including artificial intelligence, Internet of Things, robotics, and automation—with distinctly human capabilities including creativity, ethical judgment, emotional intelligence, and commitment to sustainable development. This paradigm emphasizes human-technology collaboration where machines augment human capabilities rather than replace human workers.

An AI-ready workforce for Industry 5.0 possesses a multifaceted competency profile that encompasses technical excellence, ethical awareness, adaptive capacity, and social consciousness. Such a workforce understands not only how to develop and deploy AI technologies but also their societal implications, ethical dimensions, and impact on different stakeholder groups. These individuals are prepared to:

- Develop, implement, and manage AI systems with technical proficiency and ethical responsibility
- Solve complex, multidisciplinary challenges using AI and data-driven approaches
- Collaborate effectively with diverse teams across organizational and geographical boundaries
- Demonstrate adaptability and continuous learning in rapidly changing technological landscapes
- Understand and address ethical implications and societal impacts of AI decisions
- Lead organizational and technological change initiatives
- Balance innovation with sustainability, equity, and social responsibility
- Contribute to responsible AI governance and policy development
- Mentor and develop others in AI competencies and ethical practices
- Drive organizational innovation and entrepreneurial initiatives

Key Components of the Conceptual Framework

1. AI-Focused Education ● AI literacy ● Data analytics ● Machine learning awareness ● Digital problem-solving skills	2. Digital Transformation in Education ● Smart classrooms ● AI-based learning platforms ● Adaptive learning systems ● Digital assessment tools
3. Skill Development	4. Industry-Academia Collaboration

● Critical thinking ● Creativity and innovation ● Interdisciplinary learning ● Digital entrepreneurship	● Internship programs ● Industry-driven curriculum ● Live projects and case studies ● Skill certification programs
5. Workforce Outcomes ● AI-ready professionals ● Innovation-driven workforce ● Enhanced employability ● Economic growth and productivity	6. Fair usage policy ● What extent of AI usage should be considered as fair usage

KEY FINDINGS AND RECOMMENDATIONS

AI-focused education must incorporate computational thinking, data literacy, and interdisciplinary learning. Educational institutions must also invest in digital infrastructure such as smart classrooms, AI-enabled learning platforms, and virtual laboratories. Faculty development programs are essential to ensure effective technology integration.

Based on the study, following are the key recommendations

- Introduce AI literacy courses across multiple disciplines.
- Strengthen digital infrastructure and technology-enabled learning environments.
- Promote industry-academia collaboration through internships and live projects.
- Implement faculty training programs focused on AI and digital pedagogy.
- Encourage government policies that support digital education transformation.

CONCLUSION

The transition toward Industry 5.0 requires an AI-ready workforce capable of collaborating with intelligent technologies. AI-focused digital transformation in education is essential to develop future skills, improve employability, and support innovation-driven economic growth. Strategic reforms in curriculum, infrastructure, and policy can help achieve these goals.

REFERENCES:

1. World Economic Forum (2023). The Future of Jobs Report 2023. Geneva: WEF.
2. UNESCO (2021). AI and Education: Guidance for Policy Makers. Paris: UNESCO.
3. OECD (2023). Education in the Age of Artificial Intelligence. Paris: OECD Publishing.
4. NITI Aayog (2022). National Strategy for Artificial Intelligence. Government of India.
5. McKinsey & Company (2023). The Future of Work in the Age of AI.
6. World Bank (2022). Digital Skills: The Key to Future Workforce Development.

7. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. (2022). Artificial Intelligence in Education: Promise and Implications for Teaching and Learning.
8. Dwivedi, Y. K., et al. (2023). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges and opportunities. International Journal of Information Management.
9. Schwab, K. (2020). The Fourth Industrial Revolution. World Economic Forum.
10. Nahavandi, S. (2019). Industry 5.0—A human-centric solution. Sustainability Journal.