



# Impact of e-learning on future-ready skill development among Indian youth

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Received 13 March 2026; Accepted 22 Apr 2026; Published 18 May 2026

DOI: <https://doi.org/10.64171/JSRD.5.S2.83-87>

## Abstract

The growing integration of digital technologies in education has transformed the process of skill development among Indian youth. In an era characterised by Artificial Intelligence, automation, and Industry 4.0, e-learning has emerged as an important platform for developing future-ready skills and enhancing employability. The present study examines the impact of e-learning on future-ready skill development among Indian youth and evaluates its contribution to workforce preparedness, digital literacy, upskilling, and lifelong learning. The study is descriptive in nature and is based on secondary data collected from government reports, research publications, and policy documents.

The findings reveal that government-supported digital learning initiatives have significantly expanded access to skill development opportunities. According to official data, more than 1.40 crore candidates had been trained or oriented under the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) by December 2023. Similarly, enrolment on the SWAYAM platform increased from approximately 31 lakh learners in 2017 to over 72 lakh learners by the end of 2023, reflecting the growing acceptance of digital learning. In addition, over 2.5 crore learners have enrolled in courses offered through NPTEL, India's largest online learning platform.

The study indicates that e-learning has improved access to industry-relevant knowledge, reduced geographical barriers to education, and enabled continuous upskilling and reskilling. It has also contributed to enhancing employability and supporting lifelong learning among young people. However, challenges such as digital divide, inadequate infrastructure, and varying levels of digital literacy continue to influence learning outcomes. The study concludes that strengthening e-learning ecosystems is essential for building a skilled, adaptable, and future-ready workforce in India.

**Keywords:** E-Learning, Future-Ready Skills, Indian Youth, Employability, Digital Skill Development

## Introduction

The rapid advancement of digital technologies has transformed the global education landscape and significantly influenced the way knowledge and skills are acquired. In the twenty-first century, the emergence of Artificial Intelligence (AI), automation, cloud computing, big data analytics, and Industry 4.0 has created an increasing demand for new and advanced competencies. As a result, traditional education systems are facing challenges in keeping pace with evolving industry requirements. In this context, e-learning has emerged as an effective and flexible approach to skill development, enabling learners to acquire industry-relevant knowledge and competencies irrespective of geographical and time constraints. India, with one of the largest youth populations in the world, is uniquely positioned to benefit from digital learning initiatives. According to the United Nations, more than 65 per cent of India's population is below the age of 35 years, making human capital development a critical priority for sustainable economic growth. However, despite this demographic advantage, India continues to face significant challenges related to employability and workforce preparedness. The World

Economic Forum reported that of the nearly 13 million individuals entering India's workforce annually, only a limited proportion possess the skills required by industries. Similarly, the International Labour Organization (ILO) reported in 2023 that approximately 47 per cent of Indian workers are underqualified for their jobs, highlighting the need for continuous skill development and reskilling.

Recognising the importance of workforce development, the Government of India has launched several initiatives to promote digital learning and skill acquisition. The establishment of the Ministry of Skill Development and Entrepreneurship (MSDE) in 2014 marked a significant step towards creating a skilled workforce. One of the flagship programmes, the Pradhan Mantri Kaushal Vikas Yojana (PMKVY), was introduced in 2015 to provide industry-relevant training and certification. According to official records, more than 1.40 crore candidates had been trained or oriented under PMKVY by December 2023. These initiatives reflect the government's commitment to improving employability and preparing youth for emerging labour market requirements.

The development of digital learning platforms has further accelerated skill development efforts in India. The SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) platform, launched by the Ministry of Education, provides free online courses across diverse disciplines. Enrolment on SWAYAM increased from approximately 31 lakh learners in 2017 to over 72 lakh learners by the end of 2023, indicating the growing acceptance of online learning. In 2024, the Government launched SWAYAM Plus, a platform specifically designed to enhance employability through industry-oriented and job-centric courses developed in collaboration with organisations such as Microsoft, Cisco, and L&T. These initiatives aim to bridge the gap between academic learning and industry expectations.

Another important development is the Skill India Digital Hub (SIDH), launched in 2023 as a comprehensive digital platform integrating skilling, education, employment, and entrepreneurship services. The platform uses digital technologies and Artificial Intelligence to provide personalised learning pathways, certification opportunities, and employment-related services. Similarly, the National Programme on Technology Enhanced Learning (NPTEL), managed by the IITs and IISc, has emerged as India's largest online learning platform, with more than 2.5 crore cumulative enrolments across engineering, science, management, and humanities courses. The significance of e-learning has become even more pronounced in the era of rapid technological transformation. According to a report by Accenture, India could potentially forgo nearly USD 1.97 trillion in cumulative GDP growth by 2028 if skill development fails to keep pace with technological progress. Furthermore, the National Skill Development Corporation (NSDC) reported that only around 2.3 per cent of India's workforce has received formal vocational training, underscoring the urgent need for scalable and accessible learning solutions.

E-learning offers several advantages in addressing these challenges. It provides flexibility, affordability, accessibility, and opportunities for lifelong learning. Digital learning platforms enable learners to acquire future-ready skills in emerging areas such as Artificial Intelligence, cybersecurity, data analytics, cloud computing, and digital marketing. Moreover, e-learning has contributed to narrowing educational disparities by providing access to quality learning resources for women, rural learners, and economically disadvantaged groups.

In this context, the present study examines the impact of e-learning on future-ready skill development among Indian youth. It seeks to analyse how digital learning platforms contribute to employability, workforce preparedness, and continuous skill enhancement. The study also explores the opportunities and challenges associated with e-learning in developing a skilled, adaptable, and competitive workforce capable of meeting the demands of a technology-driven economy.

### Objectives of the study

The present study aims to examine the impact of e-learning on future-ready skill development among Indian youth in the

context of rapid technological transformation and changing workforce requirements. It seeks to understand how digital learning platforms contribute to skill acquisition, employability, and workforce preparedness.

The objectives of the study are:

- To examine the role of e-learning in developing future-ready skills among Indian youth.
- To analyse the contribution of digital learning platforms towards employability, upskilling, and reskilling.
- To identify the opportunities and challenges associated with e-learning in enhancing skill development.

### Research methodology

The study is primarily based on secondary data obtained from government publications, research articles, policy reports, books, magazines, and credible online sources. Relevant information relating to digital learning initiatives, skill development programmes, online learning platforms, and youth employability has been collected, compiled, and critically analysed. The study seeks to understand the role of e-learning in enhancing skill acquisition, supporting upskilling and reskilling, and improving workforce readiness in an increasingly digital and technology-driven environment.

### Review of literature

The growing importance of e-learning in education and skill development has attracted significant attention from researchers across the world. Existing studies suggest that digital learning platforms have transformed traditional modes of education by offering flexible, accessible, and learner-centred opportunities for knowledge and skill acquisition.

Bates (2019) <sup>[2]</sup> observed that e-learning enhances learning accessibility and promotes continuous skill development by enabling learners to access educational resources beyond geographical and time constraints. Similarly, Anderson (2020) <sup>[1]</sup> highlighted that online learning supports lifelong learning and helps individuals adapt to changing labour market requirements. The study emphasized the role of digital platforms in developing workforce competencies required in the knowledge economy.

In the Indian context, Sharma and Aggarwal (2021) <sup>[15]</sup> found that e-learning has significantly contributed to skill enhancement and employability among youth by providing access to industry-oriented courses and professional certifications. Kumar and Singh (2022) <sup>[9]</sup> reported that digital learning platforms facilitate upskilling and reskilling by enabling learners to acquire emerging technological skills in areas such as Artificial Intelligence, data analytics, and cloud computing.

Several studies have also examined the role of government initiatives in promoting digital skill development. Research indicates that programmes such as Skill India, PMKVY, SWAYAM, NPTEL, and Skill India Digital Hub have expanded access to quality education and vocational training. However, UNESCO (2022) <sup>[17]</sup> and the International Labour Organization (2023) highlighted challenges such as the digital divide, inadequate infrastructure, and varying levels of digital

literacy, which continue to affect learning outcomes. Overall, the literature suggests that e-learning has become an important instrument for developing future-ready skills and improving employability among Indian youth.

**Impact**

E-learning has emerged as a significant contributor to future-ready skill development among Indian youth by expanding access to quality education and industry-relevant training. The growing adoption of digital learning platforms has enabled learners to acquire competencies required in a technology-driven economy. According to the Ministry of Education, enrolment on the SWAYAM platform increased from approximately 31 lakh learners in 2017 to more than 75 lakh learners in 2024. Similarly, NPTEL recorded over 2.5 crore cumulative enrolments by 2024, reflecting the increasing demand for online technical and professional education. Government initiatives such as PMKVY have also trained more than 1.40 crore candidates, enhancing employability and workforce preparedness.

E-learning has facilitated upskilling and reskilling in emerging fields such as Artificial Intelligence, data analytics, cloud computing, cybersecurity, and digital technologies. It has reduced geographical barriers to learning and provided flexible educational opportunities to students, working professionals, and learners from remote areas. The increasing participation in digital learning demonstrates its effectiveness in developing future-ready skills, improving employability, and supporting lifelong learning among Indian youth. Consequently, e-learning has become an important component of India's skill development ecosystem and human capital formation.

**Data analysis**

To understand the impact of e-learning on future-ready skill development among Indian youth, selected indicators relating to digital learning participation and skill development initiatives have been analysed. The data indicate a significant expansion of e-learning platforms and skill development programmes in India over the last decade.

**Growth of digital learning and skill development in India (2015–2024)**

Table 1

Year	PMKVY Beneficiaries (Cumulative, Crore)	SWAYAM Enrolment (Lakh)	NPTEL Enrolment (Lakh)
2015	0.20	-	15
2016	0.45	-	22
2017	0.65	31	35
2018	0.82	38	50
2019	0.95	45	75
2020	1.05	52	110
2021	1.18	60	150
2022	1.28	66	190
2023	1.40	72	230
2024	1.40+	75+	250+

**Source:** Ministry of Skill Development and Entrepreneurship (MSDE), PMKVY Dashboard, SWAYAM Annual Reports, NPTEL Statistics, Government of India Reports.

The data indicate a substantial expansion in digital learning and skill development initiatives in India over the last decade. The cumulative number of beneficiaries trained under PMKVY increased from approximately 20 lakh in 2015 to over 1.40 crore by 2023, reflecting the growing emphasis on workforce skill development. Similarly, enrolment on the SWAYAM platform increased from 31 lakh learners in 2017 to more than 72 lakh learners by 2023, demonstrating increasing acceptance of online education among students and working professionals. The most remarkable growth has been observed in NPTEL enrolments, which increased from around 15 lakh learners in 2015 to more than 2.5 crore cumulative enrolments by 2024. This trend highlights the growing demand for technology-enabled learning and industry-relevant courses. The COVID-19 pandemic further accelerated the adoption of digital learning platforms, resulting in a sharp increase in online learning participation after 2020.

**Trend**

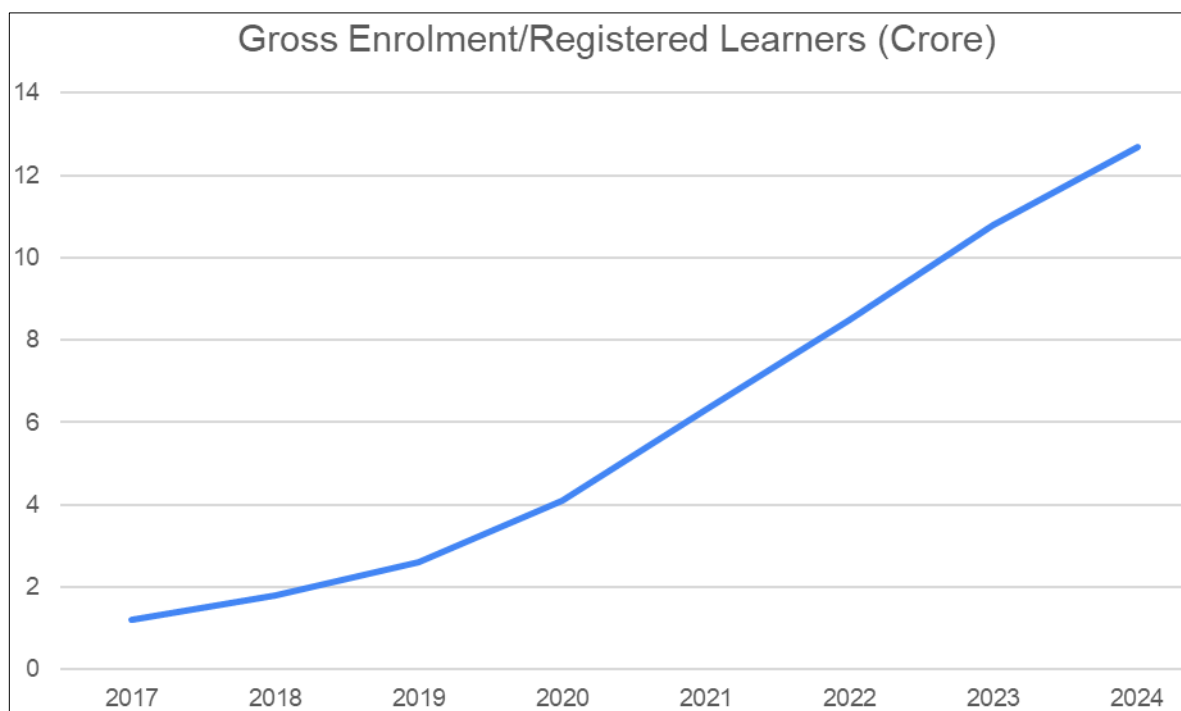
The trend reveals a substantial increase in gross enrolment across major digital learning platforms in India during 2017–2024. The total number of learner registrations increased from approximately 1.2 crore in 2017 to 12.7 crore in 2024, indicating a more than tenfold expansion in digital learning participation. The growth accelerated particularly after 2020 due to increased internet accessibility, widespread adoption of online education, and the expansion of government-supported e-learning initiatives. Platforms such as SWAYAM, NPTEL, DIKSHA, PMKVY, and Skill India Digital Hub have played an important role in enhancing access to education and skill development opportunities. The continuous increase in learner enrolment reflects the growing acceptance of e-learning as a means of acquiring future-ready skills, improving employability, and supporting lifelong learning among Indian youth. Overall, the trend demonstrates the increasing significance of digital learning in India's education and skill development ecosystem.

**Trend in Gross Enrolment on Major Digital Learning Portals in India**

Table 1

Year	Gross enrolment/Registered learners (crore)
2017	1.2
2018	1.8
2019	2.6
2020	4.1
2021	6.3
2022	8.5
2023	10.8
2024	12.7

**Source:** Compiled from SWAYAM, NPTEL, DIKSHA, PMKVY, Skill India Digital Hub (SIDH), Ministry of Education and MSDE Reports (Various Years)



**Source:** Compiled from SWAYAM, NPTEL, DIKSHA, PMKVY, Skill India Digital Hub (SIDH), Ministry of Education and MSDE Reports (Various Years).

### Findings

The study reveals that e-learning has become an important medium for future-ready skill development among Indian youth. The increasing enrolment on platforms such as SWAYAM, NPTEL, and Skill India Digital Hub reflects the growing acceptance of digital learning. The analysis indicates that e-learning has improved access to quality education, industry-relevant knowledge, and skill development opportunities across geographical boundaries. It has significantly contributed to upskilling and reskilling in emerging areas such as Artificial Intelligence, data analytics, cloud computing, and digital technologies. The study also finds that digital learning enhances employability and supports lifelong learning. However, challenges such as inadequate digital infrastructure, unequal internet access, and varying levels of digital literacy continue to affect the effectiveness of e-learning initiatives.

### Suggestions

To strengthen the impact of e-learning on skill development, efforts should be made to improve digital infrastructure, particularly in rural and underserved regions. Greater emphasis should be placed on developing industry-oriented and practical learning content aligned with current labour market requirements. Collaboration among educational institutions, industry partners, and government agencies should be enhanced to ensure the relevance of digital courses. Programmes promoting digital literacy and technology access should be expanded to reduce learning disparities. Additionally, continuous updating of online curricula and greater focus on emerging technologies will help equip Indian youth with the competencies required for future employment opportunities.

### Conclusion

E-learning has emerged as a significant enabler of future-ready skill development among Indian youth in an increasingly digital and knowledge-driven economy. The study highlights that digital learning platforms have expanded access to education, facilitated continuous upskilling and reskilling, and improved the acquisition of industry-relevant competencies. Initiatives such as SWAYAM, NPTEL, PMKVY, and Skill India Digital Hub have contributed substantially to enhancing employability and workforce preparedness. The growing participation of learners in online education reflects the increasing importance of technology-enabled learning in addressing evolving labour market requirements. Despite challenges related to digital infrastructure, internet accessibility, and digital literacy, e-learning offers considerable opportunities for inclusive and lifelong learning. Therefore, strengthening digital learning ecosystems and ensuring equitable access to quality online education will be essential for developing a skilled, adaptable, and competitive workforce capable of contributing to India's long-term socio-economic growth and development.

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