

International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



Expanding Access to Education with Technology: Pathways to Achieve Inclusive and Equitable Education under SDG 4

Priya Tiwari¹ and Dr. Meena Sirola²

Research Scholar, Department of Education, Banasthali Vidyapith, Banasthali, Rajasthan¹ Associate Professor, Department of Education, Banasthali Vidyapith, Banasthali, Rajasthan² priyatiwari0801gmail.com

Abstract: This review paper briefly discusses the significance of Sustainable Development Goal (SDG) 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for everyone. It also examines how technology can change educational access and help achieve SDG 4. Technological advancements offer new means to get over long-standing obstacles to learning, as educational gaps continue to exist across social, economic, and geographic differences. It emphasizes the role of technology in ensuring educational equity, including how it can reach Socio-Economically Disadvantaged Groups (SEDGs) highlighted by NEP 2020 and bridge the digital divide. The study outlines significant possibilities for improving access, including online learning platforms, mobile education applications, and assistive technology for Children With Special Needs (CWSN), by examining case studies and current trends in the integration of digital tools in education. While technology presents many chances to achieve SDG 4, the paper contends that fair implementation necessitates tackling issues such infrastructural constraints, the need for context-specific solutions, and gaps in digital literacy. The present paper highlights the existing barriers to education access (e.g., geographic, economic, disability, gender) and how these prevent the achievement of inclusive education. The need and importance of technology has been emphasized in achieving inclusive education under SDG 4 and suggestions has been given to eliminate the loopholes in the path of achieving inclusive and equitable education.

Keywords: Technology, Inclusive and Equitable Education, (SDG 4) Sustainable Development Goal 4, CWSN (Children With Special Needs), Socio-Economically Disadvantaged Groups (SEDGs).

OBJECTIVES OF THE STUDY

- To briefly understand about SDGs specifically emphasizing on goal 4
- To understand the importance of technology in the light of NEP 2020
- To study the role of technology in uplifting SDG 4
- To explore various challenges and barriers in the pathway of technology
- To determine different ways of eliminate the challenges in the pathway
- The study seeks to provide a comprehension view of SDGs specifically emphasizing on the role of technology in elevating SDG 4

I. INTRODUCTION

The United Nations created the Sustainable Development Goals (SDGs) in 2015 as a global call to action with the goals of addressing urgent global crises, advancing wealth, and safeguarding the environment. These programs, which have 17 interrelated objectives, aim to fight climate change, guarantee high-quality education, advance gender equality, and end poverty. As a framework for all nations, the SDGs call for international cooperation and teamwork to guarantee that by 2030, no one is left behind. The SDGs highlight how important international collaborations are to reaching these objectives. Since each objective is related to the others, advancement in one frequently affects the others. The attainment

Copyright to IJARSCT www.ijarsct.co.in





76



International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



of the SDGs depends on collaboration between governments, civil groups, and the private sector to create resources and ensure their implementation.

Adopted by the United Nations in 2015, the Sustainable Development Goals (SDGs) are a set of 17 specific objectives designed to address global issues and advance sustainable development. In order to help everyone have a better, more sustainable future, each aim includes a specific set of objectives. Below is a list of the specific 17 goals:



Figure 1: 17 defined goals of SDGs

The primary goal of the fourth Sustainable Development Goal (SDG) is to ensure that all people have access to highquality, inclusive, egalitarian education and opportunities for lifelong learning. This aim emphasizes the critical role that education plays in fostering social and economic growth in order to meet more broad sustainable development goals. The primary goals of Sustainable Development Goal (SDG) 4 are to provide opportunities for lifelong learning for everyone and to ensure inclusive and equitable quality education. The UN states that SDG 4's primary goals are:



Figure 2: Major objectives of SDG 4

Copyright to IJARSCT www.ijarsct.co.in







International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



These goals aim to address global inequalities in education and promote inclusive, equitable, and quality education systems across the world.

TECHNOLOGY IN THE LIGHT OF NEP 2020

The significance of technology in enhancing educational outcomes is given special attention in India's National Education Policy (NEP). To improve teaching-learning and encourage access to and usage of high-quality Edtech solutions, state governments are spearheading numerous tech-based interventions.

NEP, 2020 aims to establish the National Educational Technology Forum (NETF), an independent organization that will serve as the conduit for incorporating technology into many facets of higher education and schooling. The NETF will serve the following purposes:

- To build institutional and intellectual capacities in educational technology;
- To identify strategic thrust areas in this field;
 - To propose new lines of inquiry and development;
- To advise Central and State Government agencies on technology-based interventions based on independent, evidence-based advice.

It also talks about strengthening CIET to help DIKSHA and other educational technology initiatives flourish.

- The NEP, 2020 has also recommended the following significant initiatives:
 - to conduct several pilot projects in online education;
 - to make investments in the creation of digital infrastructure;
 - to advocate for suitable online teaching-learning platforms;
 - to produce e-contents and digital repositories and their reliable distribution;
 - to concentrate on resolving the country's digital divide;
 - to employ technology to establish virtual labs for convenient and equitable access for all students;
 - to employ a large number of online tests and assessments, including 21st Century skills;
 - to train educators and provide incentives for their digital literacy;
 - to highlight the importance of blended learning;
 - to set standards as technology becomes more integrated;
 - to provide an extensive array of instructional software in all of the main Indian languages.

THE ROLE OF TECHNOLOGY IN ENSURING EDUCATIONAL EQUALITY AND EQUITY

The United Nations' fourth Sustainable Development Goal (SDG) aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." Technology plays a key role in achieving this goal, particularly in higher education, by addressing a number of challenges related to fairness, quality, access, and lifelong learning. The following are some ways that technology can help:

1. Better Access to Education

• Online Learning Platforms: Thanks to technology, colleges and universities can now provide online programs, degrees, and courses to students who might not otherwise be able to attend in-person campuses because of financial, geographic, or other constraints.

• **Distance Learning:** Students in remote locations can now access high-quality education from any location thanks to digital platforms, making it possible for them to enroll in classes that would not otherwise be available.

2. Personalized Education

• Adaptive Learning Systems: By tailoring course content to each student's pace, interests, and skill level, technologies such as artificial intelligence (AI) and machine learning can provide individualized learning experiences. This improves learning outcomes and helps meet the needs of each individual.

• Learning Management Systems (LMS): Moodle, Canvas, and Blackboard are a few examples of systems that let teachers monitor their students' progress and, if needed, offer focused interventions. It makes customized assignments, evaluations, and feedback possible.

Copyright to IJARSCT www.ijarsct.co.in







International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



3. Strengthening Inclusivity

• Assistive Technologies for CWSN: By making learning accessible to students with impairments, technologies like screen readers, speech-to-text, and captioning tools guarantee that no one is left behind.

• Language Translation and Support Tools: By providing real-time translation, enabling non-native speakers to access course materials, and promoting diversity, technology can assist students from a variety of linguistic backgrounds.

4. Educational Quality

• Engaging and Immersive Resources: Augmented Reality (AR) and Virtual Reality (VR) provide immersive learning experiences, such virtual labs or field trips, giving students practical learning opportunities that might not be feasible in conventional settings.

• **Collaboration Tools**: Real-time student collaboration is made possible by tools like Zoom, Google Meet, and Microsoft Teams, which promote international learning communities and improve the educational process through peer interactions and group projects.

5. Opportunities for Lifelong Learning

• Online Micro-Credentials and Certification Programs: Technology makes lifetime learning easier by giving professionals looking to improve their abilities easily accessible and adaptable learning possibilities. Continuous skill development is supported by platforms that give micro-credentials, badges, and certificates (e.g., LinkedIn Learning, Coursera, Udemy).

• Adaptable Learning Pathways: Students can study online at their own speed and go over the content again as needed. This encourages people to pursue lifelong learning and career advancement.

6. Constant Improvement and Data-Driven Insights

• Learning Analytics: Universities can monitor students' learning trends and pinpoint areas of difficulty by employing data analytics, which enables early intervention to enhance student outcomes.

• AI-Powered Tutoring and Support: AI-powered solutions can offer students round-the-clock assistance, including question answering, feedback, and assistance with challenging ideas, guaranteeing ongoing academic support.

7. Better Research Cooperation and Educational Materials

• **Open Educational Resources (OER):** Thanks to technology, high-quality learning materials are now available to everyone. Examples of these resources include academic papers, films, and textbooks.

• Collaborative Research Tools: Students can participate in cutting-edge research, share resources, and access a multitude of material that improves the learning process thanks to technology, which facilitates worldwide collaboration among academics.

8. Lower Expenses and More Effectiveness

• Online Degrees and Certifications: By removing the need for travel, lodging, and physical infrastructure, online education can drastically lower the cost of higher education.

• Automation and Efficiency in Administration: By automating administrative tasks like scheduling, grading, and enrolling, universities can free up more resources for instruction and learning.

9. Assistance with Varying Learning Styles

• Multimedia Learning Resources: With the help of technology, students can interact with content in a variety of formats, including interactive simulations, podcasts, videos, and infographics, which can accommodate a range of learning preferences and styles.

• Gamification: Technology can increase motivation and engagement in learning, particularly for students who find traditional techniques less appealing, by fusing aspects of game design into instructional content.

10. Encouraging Gender Equity

• **Inclusive Online Communities:** Students of all genders, especially those from underrepresented or non-binary communities, can learn and engage in secure, welcoming online environments made possible by technology. These platforms can be made to promote involvement from a variety of backgrounds and provide everyone the same chances.

• Women in STEM: In fields like science, technology, engineering, and mathematics (STEM), equal possibilities for women and girls to enter and thrive in these industries are made possible via mentorship programs, coding boot camps, and online learning platforms.

Copyright to IJARSCT www.ijarsct.co.in







International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



Higher education institutions can increase education's accessibility, inclusivity, and flexibility by utilizing technology. People from all backgrounds can more easily access chances for both professional and personal growth thanks to the integration of technological tools, which also improve quality, encourage lifelong learning, enable tailored learning experiences, and help close the educational gap. In order to fulfil SDG 4, this is essential.

III. BARRIERS IN THE PATHWAY OF TECHNOLOGY IN ACHIEVING SDG 4

A number of obstacles stand in the way of accomplishing Sustainable Development Goal 4 (SDG 4), which is to provide high-quality, inclusive, egalitarian education and to encourage opportunities for lifelong learning for everyone. This is especially true when using technology. Despite the enormous potential of technology to revolutionize education, a number of obstacles prevent its successful adoption and expansion. Among the main difficulties are:

1. Digital Divide and Inequality Access to Devices and Internet Affordability 2. Lack of Digital Literacy Skills Gap **Teacher Training** 3. Quality of Digital Content Relevance and Localization Content Gaps 4. Infrastructure and Power Supply Unreliable Infrastructure Lack of Technological Infrastructure 5. Privacy and Security Concerns Data Protection Cybersecurity Threats 6. Sustainability of Tech Initiatives Long-Term Investment Maintenance of Tools and Resources 7. Resistance to Change Cultural and Institutional Resistance Parent and Community Attitudes 8. Quality Control and Oversight Inconsistent Standards Monitoring and Evaluation 9. Language Barriers Multilingual Content Localization Issue 10. Excessive Focus on Technology Over Pedagogy Technology Alone is Not the Solution Teacher-Centered vs. Student-Centered Learning

While technology holds transformative potential for achieving SDG 4, overcoming these barriers requires a comprehensive approach. This includes addressing infrastructural gaps, promoting digital literacy, investing in teacher training, ensuring equal access, and developing policies that guarantee privacy and security. Bridging these challenges will be crucial to leveraging technology for equitable and inclusive quality education for all.

IV. SUGGESTIONS OR SRTATEGIES TO ELIMINATE THE CHALLENGES

A range of approaches leveraging innovation, digital tools, and emerging technologies are needed to improve the role of technology in achieving Sustainable Development Goal (SDG) 4, which is to ensure inclusive and equitable quality

Copyright to IJARSCT www.ijarsct.co.in





80



International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



education and promote opportunities for lifelong learning for everyone. Some of the recommendations made are as follows:

1. Expand Access to Digital Learning Platforms	2. Integrate Artificial Intelligence (AI) for
Increase internet access	Personalized Learning
Digital literacy	AI-driven platforms
Open Educational Resources (OER)	Automated feedback
	Data analytics
3. Create Immersion Learning using Virtual and	4. Support Blended Learning Approaches
Augmented Reality (VR/AR)	Hybrid models
VR/AR classrooms	Teacher training for blended learning
Field trips and practical experiences	
5. Promote Digital Inclusion for Marginalized	6. Foster Collaboration and Knowledge Sharing
Groups	Global partnerships
Support for Children With Special Needs	Collaboration platforms
Focus on gender equality	
7. Encourage Digital Pedagogy and Innovative	8. Invest in STEM Education and Future
Teaching Methods	Technologies
Gamification	STEM curriculum integration
Continuous learning tracking	Coding and programming
	Support for emerging technologies
9. Implement Digital Assessments and Tracking	10. Ensure Sustainable and Scalable Technology
Systems	Deployment
Digital assessment tools	Infrastructure investment
Continuous learning tracking	Sustainability
	Scalability

Figure 3: Table representing different strategies to eliminate the challenges

By implementing these strategies, technology can significantly enhance education systems globally, making them more inclusive, equitable, and effective in fulfilling SDG 4. The key is to ensure that technology is used as an enabler for better learning outcomes, rather than as a barrier.

V. CONCLUSION

To sum up, technology has enormous potential to advance fairness and inclusivity in higher education by removing obstacles to support, affordability, and accessibility. Through adherence to SDG 4 principles, governments and institutions can leverage technological advancements to establish more egalitarian, inclusive, and high-quality educational opportunities for all. A major contribution to the accomplishment of SDG 4 is made possible by embracing technology, which makes higher education more flexible, accessible, and accommodating of a range of student needs.

REFERENCES

- [1]. Beiter, K. D. (2021). SDG 4: Quality Education. *The Private Side of Transforming Our World–UN Sustainable Development Goals*, 2030, 125-158.
- [2]. Boeren, E. (2019). Understanding Sustainable Development Goal (SDG) 4 on "quality education" from micro, meso and macro perspectives. *International review of education*, *65*, 277-294.
- [3]. Johnstone, C. J., Schuelka, M. J., & Swadek, G. (2020). Quality education for all? The promises and limitations of the SDG framework for inclusive education and students with disabilities. In *Grading goal four* (pp. 96-115). Brill.







International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 8, June 2025



- [4]. Laurie, R., Nonoyama-Tarumi, Y., Mckeown, R., & Hopkins, C. (2016). Contributions of education for sustainable development (ESD) to quality education: A synthesis of research. *Journal of Education for Sustainable development*, 10(2), 226-242.
- [5]. Nazar, R., Chaudhry, I. S., Ali, S., & Faheem, M. (2018). Role of quality education for sustainable development goals (SDGS). *International Journal of Social Sciences*, 4(2), 486-501.
- [6]. Neves, L. (2020). Digital solutions for SDG 4. Int'l J. Educ. L. & Pol'y, 16, 265.
- [7]. National Education Policy 2020, Ministry of Education, Government of India.
- [8]. Rangel-Pérez, C., Gato-Bermúdez, M. J., Musicco-Nombela, D., & Ruiz-Alberdi, C. (2021). The massive implementation of ICT in universities and its implications for ensuring SDG 4: Challenges and difficulties for professors. *Sustainability*, *13*(22), 12871.
- [9]. Tonegawa, Y. (2022). Education in SDGs: What is Inclusive and Equitable Quality Education?. In Sustainable Development Disciplines for Humanity: Breaking Down the 5Ps—People, Planet, Prosperity, Peace, and Partnerships (pp. 55-70). Singapore: Springer Nature Singapore.
- [10]. Zhukova, O., Platash, L., & Tymchuk, L. (2022). Inclusive education as a tool for implementing the sustainable development goals on the basis of humanization of society. *Problemy Ekorozwoju*, 17(1), 114-122



