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Impact of Digital Education on Attainment of SDG 4

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Abstract

The Sustainable Development Goals are targeted at global and regional development, and the SDG 4 is particularly focused on the integration of quality and equal education that is accessible to all. The study aims to observe and examine the implications that digital education holds on the development and attainment of the fourth goal under the SDGs. The study had selected a secondary qualitative data collection and thematic analysis for the study, with particular focus to India. The research findings indicated that India is on a path to attaining SDG 4 with an emergent and positive approach and integration of digital education and integration of digital technologies and supporting infrastructure for the success of digitally enabled quality and equal education for all.

Keywords: SDG, sustainable development goals, SDG 4, digital education, technology, quality

Introduction

The Sustainable Development Goals (SDGs) lay out targets necessary for a better world. The fourth goal under the SDGs (hereinafter SDG 4), focuses on securing an "inclusive and equitable quality education and promoting lifelong learning opportunities for all" (UNICEF, 2025). The goal outlines several targets, agendas and potential means for achieving this, and includes digital innovations and solutions for learning for achieving the goals. As of recently there is an emergent trend of education through online learning platforms and among other forms of education sources, with around 733.3 million users worldwide in 2023, and predicted to reach 837.9 million by 2025 (Statista, 2025).

The demand for a quality education is a factor of necessity that drives the principle of SDG 4 and the development of digital innovations as support for achieving that demand is becoming increasingly evident for multiple countries. Under the initiative of SDG plans particularly SDG 4, the United Nations works on contributing and assisting governments of multiple Nations for instance to add knowledge to the key global crisis of quality, relevance, and equity within education (UN SDG, 2024). Several countries join forces to achieve the goal of digital learning being used as an integral measure for achieving the target of quality and inclusive education particularly since the pandemic. That has been a global recognition for sustainable development of education as a means of providing quality and equity in education that requires inclusion of infrastructure development. Integration of investment in infrastructure education and teacher training alongside policy equal opportunity of education for all communities (UN, 2025). The intention of attaining SDG 4 is identified as essential for the commitment of quality education being achieved by SSC digital technology in education by connecting all the schools to the internet. Endorsements of digital literacy target education funding and teaching staff training are all considered to act as collections to the obstructions within learning gaps and to guarantee a future optimistic and equitable system for education that is accessible by all.

From singular initiatives to maintain tools and programs creating and developing connections along with assisting in addressing both domestic and global issues, digital technologies have undergone significant development. Digital innovation has the potential to accelerate the achievement of SDG 4 for education and innovative universal access to education, potentially indicating its influence to

enhance, transform, and supplement education (UNESCO, 2025). The research study aims to investigate the impact that digital education has on the development and achievement of the SDG 4.

Research Aim and Objectives

The aim of the research is to examine the influence of digital education upon the development and attainment of SDG 4. The following research objectives intended to work on contributing towards the evaluation of the same objective through different elements.

- To investigate the influence of the emergent trend of digital education on the development of quality and equal provision of education.
- To recognise any obstructions that arise from digital technology integration for equal and quality education target of SDG 4
- To evaluate the strategies and future opportunities that digitalisation of education holds for equal education achievement under SDG 4

Literature Review

Sustainable Development Goal 4 and education

Education sustainability necessitates the development of systems that are not only efficient in providing high-quality instruction but also inclusive and equitable, guaranteeing that everyone has access to educational opportunities throughout their lives. According to Edwards-Fapohunda and Adediji (2024), the United Nations' SDG 4 intends to guarantee inclusive, equitable, high-quality education and to encourage opportunities for lifelong learning for everyone. In the context of education, sustainable development highlights the importance of lifelong learning and the critical role that accessibility plays in fostering it. Quality education becomes a necessity in the perspective of its importance to build a better future for all in association to the necessity of sustainability within all sectors that includes education.

As education revolutionises and digital changes come into function, there are also applications of innovation in the SDG 4, Goal 4 of the SDGs mandate that by 2030, all member states must endeavour to guarantee inclusive, equitable, high-quality education and encourage opportunities for lifelong learning for everyone (Hadjeris, 2021). And particularly the "goal 4.7" prioritizes education that embraces global citizenship and other admirable objectives of human rights, gender equality, peace, and cultural diversity. This section of SDG 4 is more likely to be hampered by the shift to online instruction in developing nations than by the difficulty of achieving this goal, as the study noted. The global service sector of higher education has seen substantial transformation, especially in developing nations. In addition to that, higher education institutions are becoming increasingly regarded to provide higher-quality of education for the sake of sustainable growth. As noted in a study by Tien *et al.* (2022), it is noted by the World Bank that, the World Bank's 2030 Sustainable Development Agenda and Sustainable Development Goal 4, otherwise SDG 4, both heavily emphasize the importance of "quality education". However, the study noted the existence of challenges and the lack of developing countries lagging behind on the integration of sustainability practices in higher education institutions.

In studies and literature, it is seen that the SDGs extended the emphasis to include tertiary education in addition to primary and secondary education. In the study by Chankseliani and McCowan (2021), it can be seen that specifically SDG 4 demands that everyone has equal access to tertiary education, inclusive of university level education, in order to support opportunities for lifelong learning. However, the study further notes that, because of their contributions to innovation, knowledge creation, and human development, universities also play a significant role in achieving the SDGs as a whole. Higher education has been perceived as a tool for societal modernization, and access to quality education could support a large-scale attainment for it through the compliance of the SDG 4. It is possible to accelerate sustainable progress by integration and provision of educational opportunities. The fourth Sustainable Development Goal seeks to expand learning opportunities to act as a catalyst for meaningful changes in sustainable development (Adipat and Chotikapanich,

2022). High-quality educational opportunities are said to boost people's respect for others and sense of dignity. As per the noted study, access to a high-quality education encourages social mobility and helps level the playing field. Moreover, access to high-quality education could be capable of addressing environmental crises like global warming. It is essential that young people have access to education since it gives them the skills and information they need. Studies often note that inclusivity in education can be credited with a society's stability and the prosperity of its digital institutions, with the development of the fourth industrial revolution and digital transformation on the rise.

Emergence of digital education trends

The rise of online networking technologies and the development and integration of information and communication technologies (ICTs) by the turn of the twenty-first century have helped to expand open, distance, and digital education. As per a study by Zawacki-Richter and Bozkurt (2023), online learning is starting to be recognized as the new face of distance education. New ICTs have expanded the capacity that emerged with digital solutions and increased the affordance for collaborative online learning and teaching. However, the COVID-19 pandemic was a catalyst for many changes around the world, including in the field of education. It caused emergency remote instruction in educational institutions, which in turn sparked the growth of blended-hybrid and online distance learning.

The global COVID-19 pandemic brought with it work, remote learning, distancing, and lockdowns. Higher education systems were impacted, leading to a fundamental change in instructional strategies, classroom environments, and formats of exams (Mospan, 2023). The conditions under which the world's higher education systems entered the COVID-19 pandemic varied, and higher education globally split into prepared and experienced against the majorly unprepared and inexperienced educational systems in a mode of “digitally-based distance learning”. “EdTech”, as in educational technology, and other digital tools, such as language apps, online learning software, video conferencing platforms, and virtual tutoring, have greatly increased the use of higher education. Consequently, the higher education systems in economically developed nations with universities offering MOOCs and distance learning were definitely better equipped to handle the shift to digitally-based education and had specific experience instructing online.

The globalized knowledge-intensive economy and the digital age have led to a demand for overall, flexible, customised, and socially collaborative educational experiences from 21st-century learners. In order to achieve these goals, distance education (DE) has combined theory and practice and, when appropriate and pertinent, has used educational technologies (Bozkurt and Zawacki-Richter, 2021). Due to its dynamic nature, DE necessitates a comprehensive, multifaceted understanding of the field's past and present development in order to see past trends and predict future opportunities and needs. Additionally, the field of DE has been a major change agent in the digital transformation of higher education, and it demonstrated its worth during the COVID-19 pandemic's disruption of instruction. The popularity of tablets and smartphones is also associated with the new way of living, adding to the trend of digital learning to become more “mobile”, literally speaking, given an increase of mobile learning further on emerged. Studies such as Rak-Młynarska (2022) note that the market for mobile learning products grew to 5.3 billion dollars globally in 2012 and is still expanding. Digital education has recently entered a trend that entails utilizing a personal computer, tablet, or phone while at work or school. Lastly, educators are increasingly adopting blended learning, which blends in-person instruction with online resources. Additionally, innovations such as classrooms using digital tools more frequently as a result of growing “BYOD” trends (bring your own device), digital workspaces, and instructional materials on audio-visual media, and gamifying education through technology, alongside immersive learning through multiple technological applications had also increased a democratising effect on education.

Digital education driving SGD 4 attainment

SDG 4 already aims to address digital technologies, which are considered crucial for advancing digital transformation and increasing educational accessibility (Clark *et al.* 2022). According to COVID-19, access to the digital realm is essential for achieving the SDGs, including access to education, and for advancing SDG 4 through continuing education in times of crisis. It is also essential for gaining access to fundamental, economic, social, and cultural rights.

The educational landscape has changed dramatically as a result of the quick development of technology, especially in the area of distance learning, that can further add on to the goals of sustainable attainment of quality and inclusive education. Over the last few decades, distance learning has undergone a significant transformation from its early origins in correspondence courses and early online platforms. The need to offer adaptable, easily accessible education to a multicultural and international student body has propelled this development (Edwards-Fapohunda and Adediji, 2024). Reducing inequality and fostering social inclusion can be achieved by addressing gaps in educational access through the integration of sustainable practices, and achievement of SGD 4, and in a sense, DE achieves that in an open and lifelong opportunistic manner. Reducing educational disparities is a critical change that must be prioritized in order to accomplish SDG 4 that aims to guarantee equitable, inclusive, and "quality education for all". And this is even more so applicable for uncertain situations such as the pandemic, where distance education becomes a sole means of achieving the target. One of the main obstacles to accessible distance learning has been identified as the absence of digital equipment (Durrani *et al.* 2023). Restrictions on device access prevented students from participating in online sessions, resulting in educational disparities between wealthy and underprivileged students. Different schools have had different levels of coverage and quality in their online resources, which have been impacted by things like parental education and household income. Additionally, a major challenge has been modifying educational materials for students with disabilities or special educational needs, making it evident for digital technology to be accessible for all in terms of education. Quality education is the focus of SDG4, which aims to guarantee inclusive and equitable education, encourage opportunities for lifelong learning for everyone, and provide universal access to high-quality higher education. To reach SDG4, information and communication technology, otherwise ICT, use is prioritized. M-learning, or mobile technology integration in education, is thought to be a particularly suitable way to improve education in underdeveloped nations (Maketo *et al.* 2023). The way teaching and learning are conducted is being redefined by the sharp rise in the use of connected mobile devices on a global scale. The ubiquitous learning paradigm, which is founded on the ideas of mobility, collaboration, instantaneous learning, and active participation, is made possible by the portability of mobile technologies. Mobile technologies are beginning to play a bigger role in education.

Methodology

The present paper is conducted as a Qualitative research study due to the presence of nominal and non- quantifiable information that required a more descriptive and elaborate discussion that statistical findings is not possibly as suitable to provide for in this study. The research follows a secondary data collection method for the accumulation of the findings from published and existing sources with qualitative and descriptive information. The data analysis is done through the integration of a thematic analysis conducted in relation to the research objectives and collected data. The research has followed a secondary data collection method as a suitable data collection methodology for the purpose of the research study strategy being qualitative research study. The data is collected on the basis of an inclusion and exclusion criteria as addressed in Table 2. In the case of Table 1, thematic coding based on objectives had been selected and determined for the concept of theme that would be covered in each theme of the thematic analysis hence coded and

developed. The inclusion and exclusion criteria has been applied particularly for the decided theme developed for the research findings.

Table 1: Thematic Coding

No.	Thematic Code (Objective based)	Associated Keywords	Concept of Theme
1	Influence of the emergent trend of digital education on the development of quality and equal provision of education.	Trend, Digital education, Quality education, provision	Digital education took place with the expansion of Information and communication technology (ICT) development and integration, as well as online networking technologies (Zawacki-Richter and Bozkurt, 2023).
2	Obstructions that arise from digital technology integration for equal and quality education target of SDG 4	Obstruction, challenges, digital technology, equality, quality, education, SDG 4	Challenges in the case of digital technology integration have an impact on the people that are dependent on adopting the techniques and technology, the use of ICTs have an impact on teaching (Rangel-Pérez *et al.* 2021).
3	Strategies and future opportunities that digitalisation of education holds for equal education achievement under SDG 4	Strategies, opportunities, digital, education, SDG 4, achievement, digitalisation	Achieving the SDGs, including access to education, and advancing SDG 4 through crisis-advanced continuing education depend on the digital sphere. Additionally, it is necessary to obtain economic, social, cultural, and fundamental rights (Clark *et al.* 2022).

Table 2: Data exclusion and inclusion process

Themes	Data Extraction	Data Inclusion
THEME 1: Digital education innovations and integrations for quality education	Data and information that was inaccessible or restricted were not selected. Particular factual information not related to India or Indian states had been excluded. Data not related digital education and related innovation and interventions were avoided	The collection and extraction of data included selection from publicly accessible government reports, statistical datasets and research articles that had related information regarding the study. Information regarding digital education integrations specific to India and Indian states had been selected for an in-depth and more specific research purpose.
THEME 2: Quality education as a driver for digital technology enabled SDG 4 attainment	Restricted or inaccessible data and information were not chosen. Specific facts that had nothing to do with India or Indian states had been left out. Data not associated with SDG 4 were treated as not eligible.	Openly available government reports, statistical datasets, and research articles with pertinent information about the study were chosen as part of the data collection and extraction process. For a more thorough and focused research purpose, information unique to India and Indian states was chosen for observing the impact of SDG 4 in terms of achieving quality education
THEME 3: Opportunities and actions integrated into SDG 4 attainment	Information and data that were restricted or unavailable were not chosen. Specific factual data unrelated to India or Indian states had been left out. Findings unrelated to SDG 4 were avoided from being included	The process of gathering and extracting data involved choosing online available government reports, statistical datasets, and research articles that contained pertinent information about the study. Data unique to India and Indian states had been chosen for a more focused and in-depth study goal in understanding the connection of interventions in India applicable for SDG attainment.

Results and Discussion

Results: Thematic analysis

Theme 1: Digital education innovations and integrations for quality education

Digital education evolved over the years, revolutionising how the students are engaged with educational content and access learning resources. Rise in the integration of digital technologies,

education moved beyond traditional classroom settings for a wide array of blended and online learning models. Technological integration in education gives students an engaging experience of learning by allowing them to remain interested in the subject without getting distracted (Valverde-Berrocoso *et al.* 2021). The shift of SDG 4 aims to ensure the equitable and inclusive quality of education. Adaptation of digital methodologies, tools and performance has contributed to expanding access for bridging gaps in education equity, enhancing learning outcomes and expanding access to education. Integration and innovation of digital education for quality education require an investment in pedagogy, training and technology. Technology integration into the classroom is now required, not an option. In addition to improving the educational process, this integration gets students ready for the demands of the contemporary world.The most significant innovation in digital education is the rise of online learning platforms. These platforms offer affordable and free courses to make quality education accessible for global students. Online platforms have decentralised education through enable learners for access to high-quality content from prestigious institutions. Organisations and universities collaborate to create courses which cater for several learning needs from fundamental literacy skills to advanced technological competencies. Given the shifting global landscape and new demands, the Indian government is doing everything it can to guarantee equity and quality in higher education. The Indian government, however, has introduced "Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM)" to encourage access, equity, and quality in education, particularly in higher education, in between scientific and technological advancements (Bhesera and Bika, 2024). Numerous SWYAM online courses in the fields of science, technology, engineering, management, law, education, and the arts and humanities are available to the students. Although the SWAYAM online courses are free, there is a minimum fee required to take the proctored exam and receive a certificate.

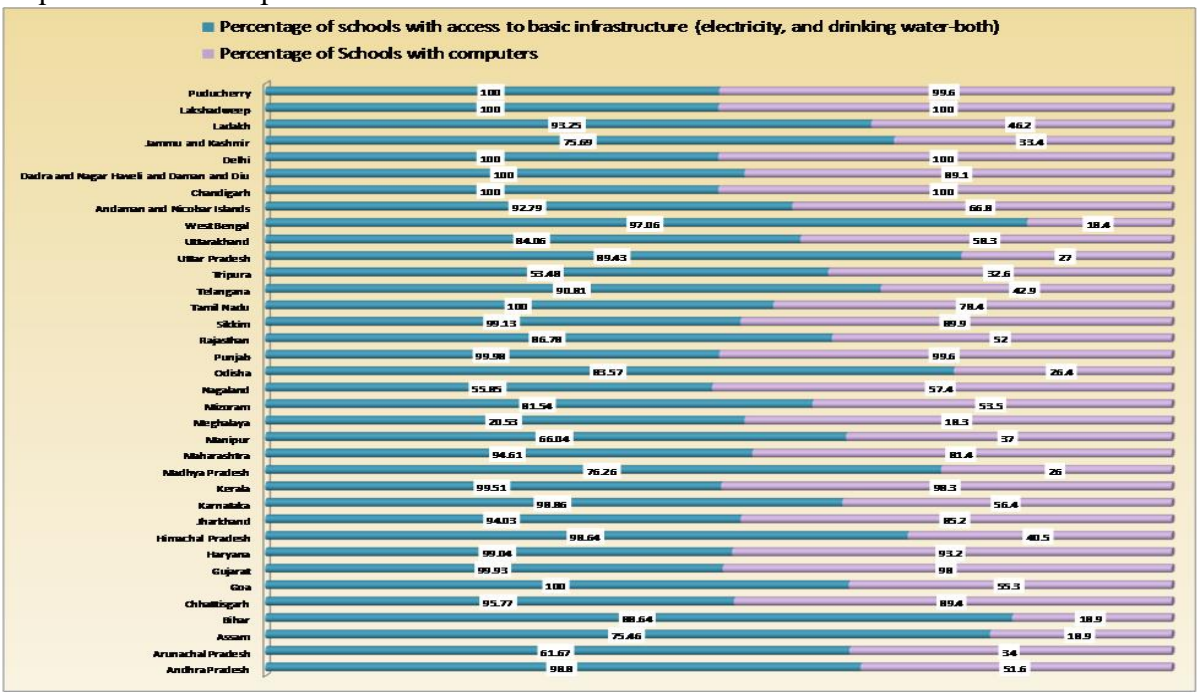

Figure 1: Percentages of schools with basic infrastructure and computer access (state-wise)
(Source: Self-developed based on Gov. in, 2024)

The data provide a percentage of schools with basic computer access and infrastructure. There are many states in India that score achievers score 100, such as Chandigarh, Tamil Nadu Delhi etc. India scored 88.65 in basic infrastructure and 47.5 in computer access, which shows there is a need to work on the dynamic of computer access in every educational dynamic (Gov. in, 2024). Integration of learning management systems like Google Classroom, blackboards and others transformed a way for educators to interact with students and manage their courses. It is important

for every education sector to have access to a computer and a proper network for further development criteria. This learning management system can easily facilitate a structured experience of learning by allowing the educator to track progress, engage students in an interactive learning dynamic and provide feedback. Digital classrooms like video conferencing tools including Microsoft Team and Zoom help ensure that learning dynamics contribute towards economic and geographical barriers.

Transitioning to digital textbooks, ICT and "Open Educational Resources (OER) and practices (OEP)" from the traditional textbook made learning material which is more affordable and accessible. Platforms like India National Digital Library and OER provide free content for education that further helps in reducing financial barriers for students. According to UNESCO's recommendation, member states should create national policies for the adoption of OER and OEP. These policies should cover things like developing strategies and guidelines for integrating OER into educational institutions or helping educators create and share OER materials (Tlili *et al.* 2023). Diksha platform (Digital Infrastructure for Knowledge Sharing), in Indian is promoting digital education and currently spans grades 1–12 and is offered in 32 Indian languages (Kar, 2023). The platform is adaptable and dynamic, with multiple solutions created to meet the requirements of various UTs and states. The widespread adoption of OEP and OER are aligns with the goal of SDG 4 to ensure equitable and free access to the educational resources.

Theme 2: Quality education as a driver for digital technology enabled SDG 4 attainment

Quality education is the foundation for subtle development which fosters economic growth, innovation and critical thinking. SDG 4 aims to ensure the equitable and inclusive quality of education and also promote lifelong opportunities for learning for everyone, the digital technology plays an essential role in accelerate progress. However, the integration of innovation and digital tools helps in enhancing the need for important skills in the 21st century, better learning outcomes, and ensures broader access and delivery of quality education.

The development of digital technology presents a chance to give students the right learning synchronisation so they can become "Scientists of the Future" who can learn across subject boundaries (Qureshi *et al.* 2021). The widespread use of digital resources in recent years has made it easier for students and academicians to acquire new skills through digital devices and the Internet of Things (IoT). IOTs adjust to the new methods of interacting with machines and data, and higher education must embrace the newest related technologies.

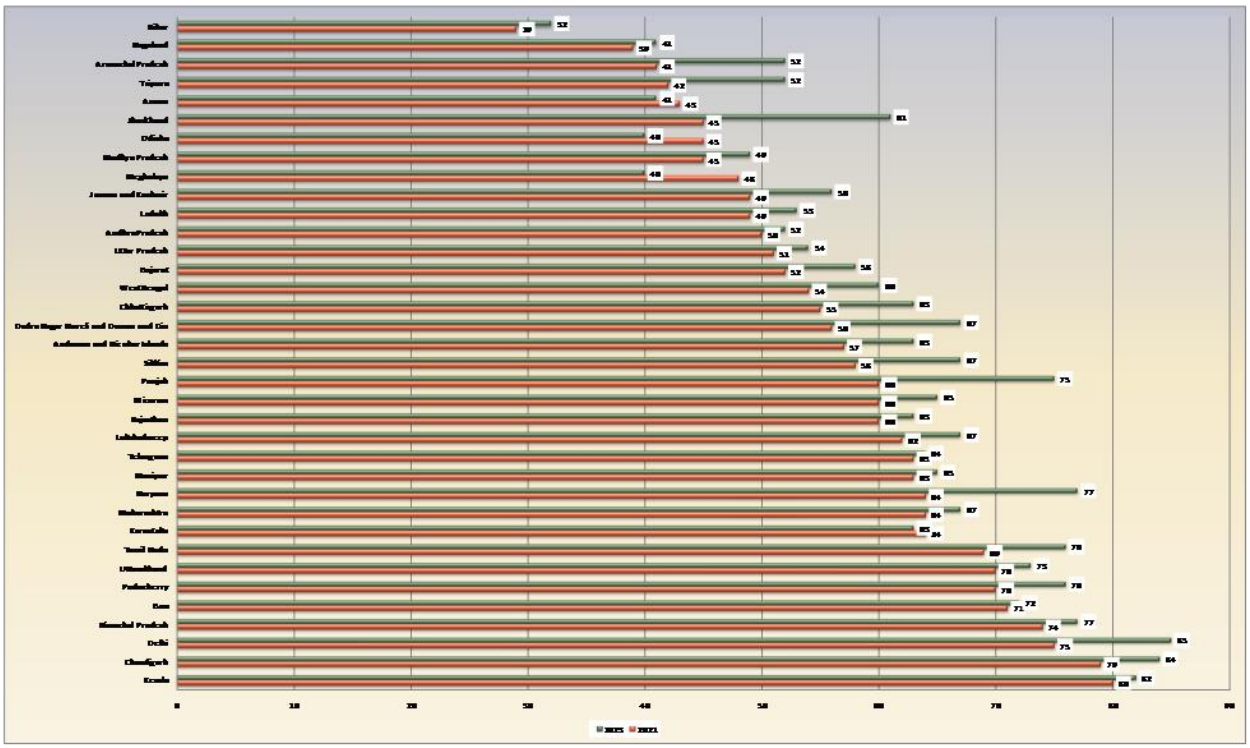

Figure 2: Quality education index state-wise comparison, 2021 and 2023
(Source: Developed based on Gov. in, 2024; Jaganmohan, 2022)

For Indian states and union territories, the Sustainable Development Goal (SDG) index score for quality education (SDG 4) as of 2021 falls between 80 and 29. Chandigarh led the union territories with a score of 79, while Kerala had the highest score of 80 (Jaganmohan, 2022). The SDG index score classifies the progress made in providing quality education, ensures equitable and inclusive quality education and promotes a lifelong learning opportunity for everyone. The primary way to quality education is to enable digital technology-driven SDG 4 attainment through the expansion of e-learning platforms. Different platforms just as SWAYAM provide a diverse form of learning resources across different disciplines which cater to learners of every age. This platform breaks financial and geographical barriers and allows students from underserved and remote areas access to a high-quality education. These SDG 4 goals assist in the reduction of inequalities and disparities in the dynamic of education in both terms, whether it is quality or access.

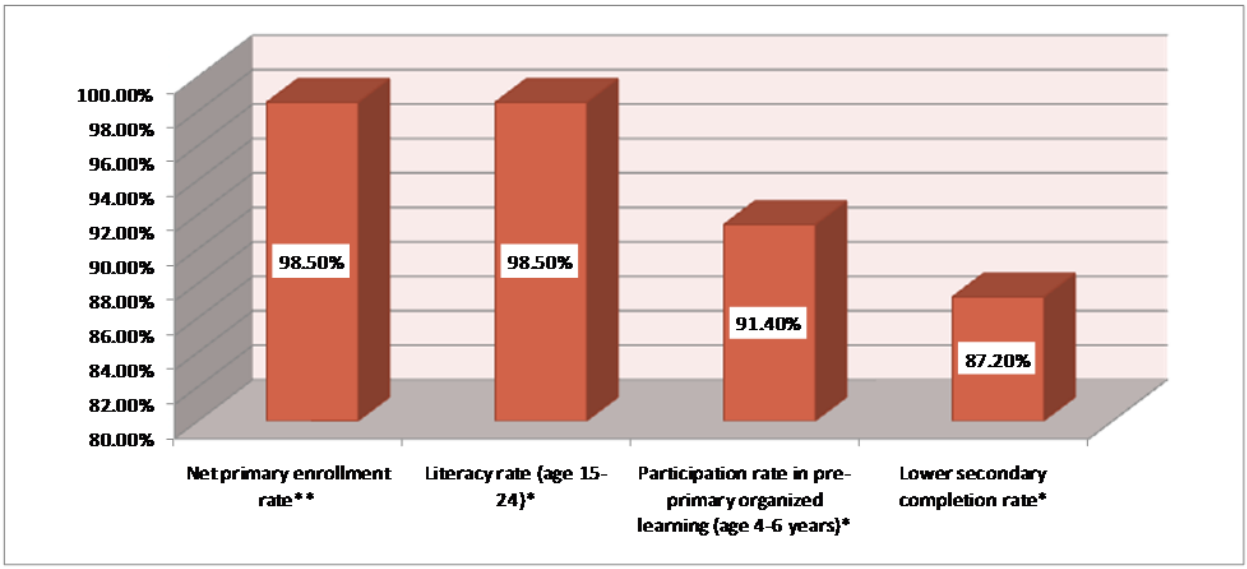

Figure 3: National performance in quality education by indicator
(Source: Developed based on Statista.com, 2024)

India's performance in the SDG indicator for education quality improved in the ratings for 2024. Although the country improved the targets of SDG for net primary enrolment rate in 2023, it also lagged in lower secondary completion with a value of over 87% as of 2022 (Statista, 2024). However, there are also different regulatory support and policy frameworks that play a critical role in facilitating a successful accumulation of educational digital technology. The government established policies for digital education to help address issues like equitable access, content quality and data privacy. Collaboration among educational institutions, technological providers and policymakers is important for developing an inclusive and sustainable ecosystem for digital education. Different online tools and ICT contribute to improve the learning outcomes while ensuring that the quality of education is maintained in different learning opportunities. These tools and systems support a personalised path of learning which enables the students to learn at their own pace.

Theme 3: Opportunities and actions integrated into SDG 4 attainment

SDG aim to ensure equitable and inclusive education quality and promote lifelong opportunities for learning. Recently digital education emerged as a power tools and provides every opportunity to access quality education to transform the traditional way of education and address learning gaps. One of the significant opportunities in the achievement of SDG 4 is an expansion of the infrastructure of digital education. There are many government schools are there who invest in broadband connectivity and have access to the different technological dynamics for their students. Though their implementation and reach are still uneven, important government initiatives like DIKSHA, PM e-Vidya, and BharatNet have set the foundation for growing digital education (Gupta and Saranya, 2024). In addition to highlighting the importance of infrastructure investment and teacher training, the National Education Policy (NEP) 2020 offers a progressive framework that emphasizes blended learning, coding, and vocational training.

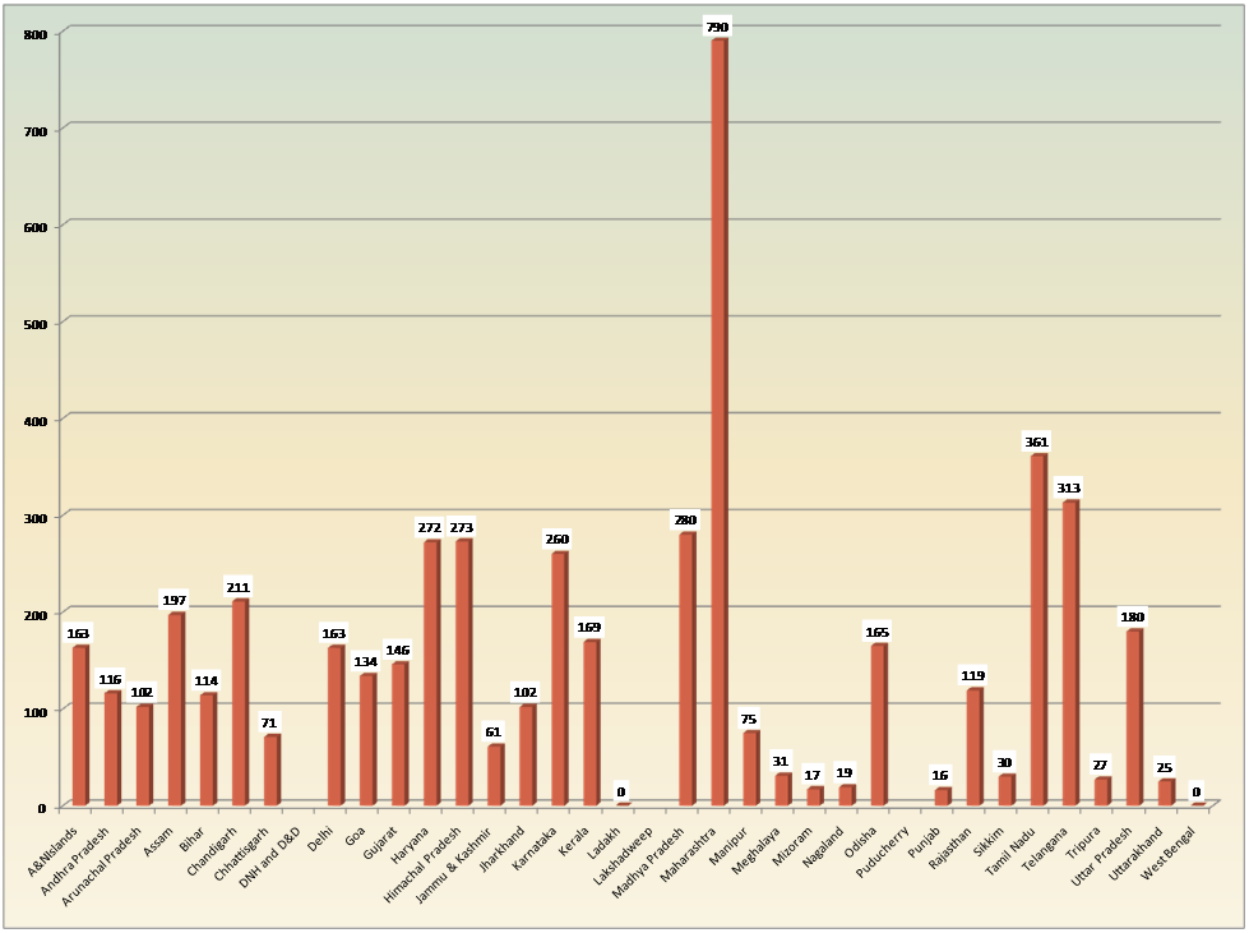

Figure 4: Integration of Textbook digitalisation, state-wise
(Source: Developed based on Gov. in, 2021)

Despite several initiatives towards digitalisation in educational terms, challenges remain in achieving universal education by implementing digital technologies. The digital divide continues as a major obstacle for millions of students in low-income rural areas who lack access to digital devices and reliable connectivity to the internet. As per the data of Gov. in, (2021), Ladakh and West Bengal scored lower in the integration of textbook digitalisation. For addressing this dynamic, governments invest to public-private partnerships which support a subsidised services of internet, and affordable technological solutions, such as community learning centres and low-cost tablets. Initiatives like One Laptop Per Child (OLPC) already made strides to bring digital access for different underserved communities. The OLPC program was first marketed as an idealistic means of promoting social change by integrating play, freedom, and connectivity-focused features into a kid-friendly laptop (Meza-Cordero, 2022). Scaling this initiative can also further help to accelerate the progress of SDG 4.

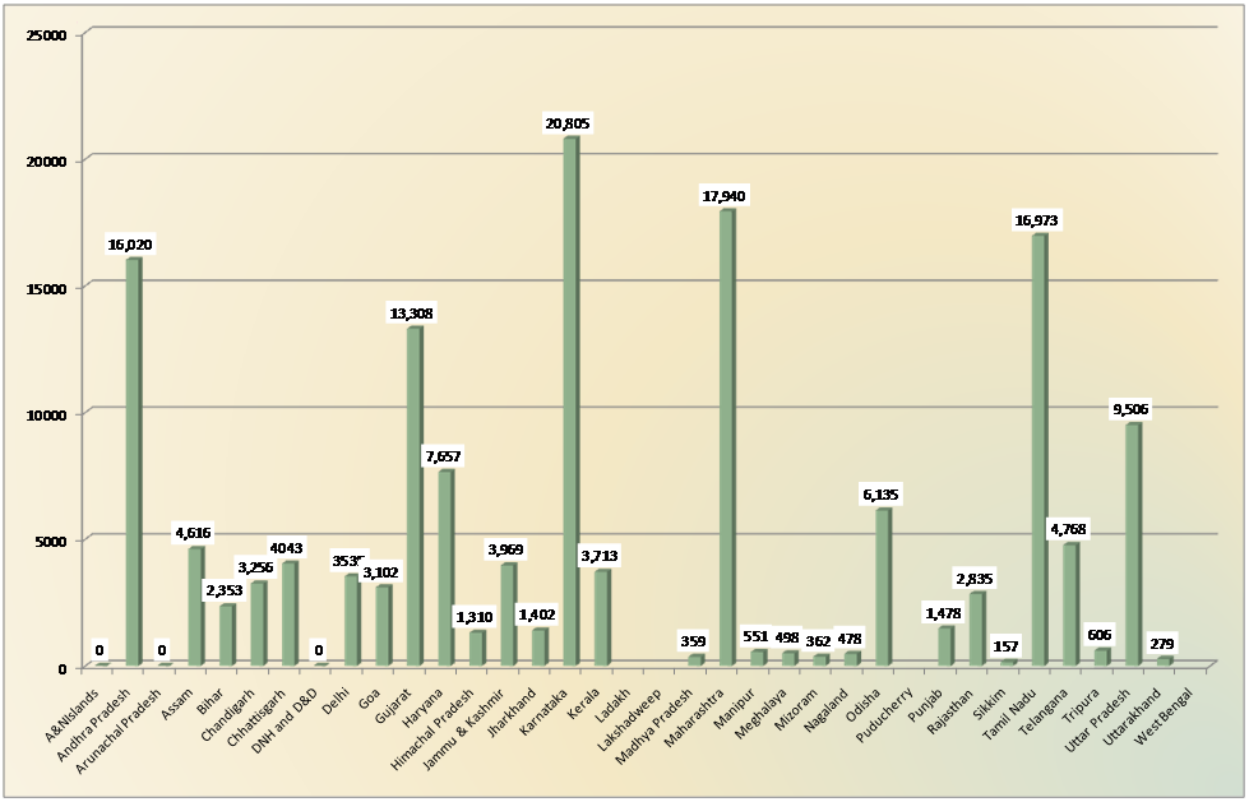

Figure 5: Contribution and uploads of E- content under the Vidya Daan program, state-wise
(Source: Developed based on Gov. in, 2021)

Projects like India's BharatNet and PM e-Vidya program focus on connecting learning centres and remote schools with reliable services internet which bridges the digital divide and also helps in prevents millions of the people from accessing online education dynamics. Although issues with scalability, inclusivity, and quality assurance still exist, the emergence of EdTech platforms like Byju's and Vedantu demonstrates the revolutionary potential of digital tools in education. With the goal of requesting contributions in the form of digital content to support e-learning, VidyaDaan was introduced in April 2020. Together with the CBSE and NCERT, Assam, Goa, Kerala, Odisha, UP, Punjab, Maharashtra, Gujarat, Telangana, and Chandigarh are effectively sourcing content for VidyaDaan (Basu, 2024). Karnataka, Maharashtra, Tamil Nadu, Gujarat, and Andhra Pradesh are among some major states that contribute and upload of E- content under the Vidya Daan program (Gov. in, 2021). Through leveraging several opportunities and fostering effective actions, the global community accesses SDG 4 attainment and develops a knowledge-driven, inclusive and innovative society.

Discussion

Technology is a major factor in determining how education will develop in the fast-paced world of today. In order to ensure that everyone has access to educational opportunities throughout their lives, systems that are not only effective at delivering high-quality instruction but also inclusive and equitable must be developed. SDG 4 of the UN aims to ensure inclusive, equitable, high-quality education and to promote opportunities for lifelong learning for all people (Edwards-Fapohunda and Adediji, 2024). Sustainable development emphasises the value of lifelong learning and the vital role that accessibility plays in promoting it in the context of education. Digital technologies, which are thought to be essential for promoting digital transformation and expanding educational accessibility, are already addressed in SDG 4. For achieve the SDGs, including access to education, and to further

SDG 4 through continuing education during emergencies, COVID-19 asserts that having access to the digital world is crucial.

Universities and organisations work together to develop courses that address a range of learning requirements, from basic literacy skills to sophisticated technological competencies. Open, distance, and digital education have grown thanks to the emergence of online networking technologies and the advancement and integration of information and communication technologies (ICTs) by the turn of the twenty-first century. Online education is beginning to be acknowledged as the new face of distance learning (Zawacki-Richter and Bozkurt, 2023). In addition to increasing the affordance for collaborative online learning and teaching, new ICTs have expanded the capacity that arose with digital solutions. Nonetheless, the COVID-19 pandemic sparked a number of global shifts, including those in the educational sector. It led to emergency remote instruction in schools, which in turn spurred the expansion of online and blended-hybrid distance learning. Between advances in science and technology, SWAYAM promotes quality, equity, and access in education, especially in higher education.

Mobility, collaboration, instantaneous learning, and active participation are globalized concepts that are made possible by the portability of mobile technologies and M-learning. One particularly effective strategy for achieving SDG 4 in developing countries is the integration of mobile technology into the classroom (Maketo et al., 2023). According to the research findings, India's BharatNet and PM e-Vidya programs are focused on providing dependable internet access to learning centers and remote schools, bridging the digital divide and preventing millions of people from accessing online education dynamics. EdTech, or educational technology, has the potential to revolutionize education with its contributions in education quality and e-learning.

There are still obstacles in the way of implementing digital technologies to achieve universal education, even with a number of initiatives aimed at digitizing education. The findings noted that in the case of India, millions of students in low-income rural areas who do not have access to digital devices or dependable internet connectivity, the digital divide remains a significant barrier. The lack of digital equipment has been identified as one of the primary barriers to accessible distance learning (Durrani et al., 2023). Due to limitations on device access, students were unable to engage in online classes, which led to educational gaps between affluent and disadvantaged students. Depending on factors like household income and parental education, different schools have had varying degrees of coverage and quality in their online resources.

In the Indian context, the SDG index score in the findings shows the advancements made in delivering high-quality education, guarantees inclusive and equitable quality education, and encourages everyone to have access to opportunities for lifelong learning. Enhancing e-learning platforms to facilitate digital technology-driven SDG 4 attainment is the main strategy for achieving high-quality education. Digital workspaces, instructional materials on audio-visual media, classrooms using digital tools more frequently due to growing BYOD trends, gamification of education through technology, and immersive learning through multiple technological applications have all increased the democratizing effect of education (Rak-Młynarska, 2022). Additionally, using a phone, tablet, or personal computer at work or school is now considered digital education. Blended learning, and combines online resources with in-person instruction, is becoming more and more popular among educators. The findings have presented that digitalisation has been taking an impactful precedence in the achievement of SDG 4 in India.

Conclusion

In conclusion, it could be observed that India, in its journey for successfully integrating SDG 4 into the infrastructural development for delivering quality and equal education to all, has prioritised applying digital technologies and interventions focusing on digital education. In conclusion to the study it could be noted that SDG 4 has potential of achievement under the application and success of digital education and digital transformation of the educational sector in India. ICT and EdTech

are becoming increasingly popular modes of executing distance and digital education that could achieve the target of quality education under this goal. The digitalisation of textbooks and educational equipment are some of the more initial steps that the Indian government has implemented as a way to quality education being digitized and be made inclusive for all.
The findings further suggested an increasing improvement of education quality and equity among different Indian states throughout recent years with a trend of improvement prominent, technology and digital integration within the infrastructure of the educational sector in India is more applicable for giving the goal of quality education through the target of an inclusive and advanced means for education for all in a flexible and efficient manner. Digitalisation of education is an integration for securing compliance towards the achievement of SDG 4 in an inclusive and open accessible manner. Education models such as blended learning and digital e-learning alongside mobile learning are some of the integrated measures that have become emergent in the field of education and good contribute towards the goal of achieving success in securing quality education for all.

Limitations

The study faced a potential limitation in terms of focusing particularly on the accumulation of data through secondary sources of existing information. The research has been very insightful in the particular aspect of observing the situation of SDG 4 achievement through the application of digital education as a potential solution for it. The insightful findings and outcomes had been informative on Indian context. However, the lack of the study was potentially the lack of primary data to assess the actual level of success or failure. Moreover, the study had been particularly done on an Indian basis there is not as much comprehension to the same findings being generalized in aspects of other countries. Hence more research could be done in prospect of this research subject.

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