

Redefining Learning: A Study of 21st-Century Innovations for the Impact of SDG 4

Namreen Asif V. A.¹ & D. Bindhu²,

¹Research Scholar, Institute of Management & Commerce, Srinivas University, Mangalore India-575001, ORCID ID:0000-0001-8533-4488; E-mail ID: namreenasif39@gmail.com

²Research Scholar, Institute of Management and Commerce, Srinivas University, Mangalore, India, ORCID ID:0000-0003-3714-3331; E-mail ID: bindhuranjith11@gmail.com

ABSTRACT

This study explores how modern ideas and tools are changing the way we learn, with a focus on achieving Sustainable Development Goal 4 (SDG 4) - Quality Education. We look at things like new technology, different teaching methods, and government policies to see how they're helping more people get a good education. By looking at real examples and research, we show how things like personalized learning online, virtual reality, and free educational resources are making education better and more accessible for everyone. We also talk about the challenges, like making sure everyone has access to technology and dealing with cultural differences. Our study isn't just about what's happening now, but also about what we can do in the future to make education even better. We hope our research can help policymakers and educators make smart choices to improve education for everyone, making the world a better place for all of us.

Keywords: Redefining Learning, 21st-Century Innovations, Education Transformation, SDG 4, Quality Education

1. INTRODUCTION

In the rapidly evolving landscape of education, the quest for achieving Sustainable Development Goal 4 (SDG4) has ushered in an era of transformative innovation. The paper at hand embarks on a comprehensive exploration, capturing the essence of this educational metamorphosis titled "Redefining Learning: Journey Through 21st Century Innovations for SDG4 Impact." The 21st century presents an intricate tapestry of challenges and opportunities that demand a paradigm shift in how we approach education (Ojokheta, 2020). With the formidable goal of ensuring inclusive and quality education for all, SDG4 serves as a compass guiding educational reforms toward a future that is both equitable and sustainable (Mochizuki, 2019). This paper navigates through the myriad innovations that are reshaping the educational landscape, offering insights into how these advancements are not only revolutionizing learning experiences but also acting as catalysts for achieving the broader objectives of sustainable development. Our journey through these innovations spans diverse domains – from cutting-edge technologies that enhance accessibility to novel pedagogical approaches that cater to the unique needs of learners (Diemer, et al., 2020). By critically examining these educational transformations, we aim to illuminate the pathways that lead to the realization of SDG4, transcending traditional boundaries and embracing a future where education is a dynamic force for positive change (Filho, et al., 2020). This paper is not merely an exploration of technological novelties but a nuanced examination of the intersection between innovation, education, and sustainable development (Ossiannilsson, 2023). Through compelling narratives, case studies, and empirical evidence, we delve into the real-world impact of these innovations, illustrating how they contribute to the overarching mission of SDG4 (Ramaswamy, et al., 2021). As we unfold the chapters of this paper, the overarching theme is clear: Redefining Learning is not just a lofty ideal but an imperative response to the exigencies of our times. We invite readers to engage in this scholarly journey, exploring the multifaceted dimensions of educational innovation and its profound implications for the transformative impact on SDG4. Together, let us navigate

the evolving landscape of learning and contribute meaningfully to a future where education is not only a catalyst for individual growth but a cornerstone for sustainable global progress.

2. MEANING OF SDG4 & EDUCATION

SDG4 stands for Sustainable Development Goal 4, which is one of the 17 global goals established by the United Nations in the 2030 Agenda for Sustainable Development. Each goal addresses a specific aspect of global challenges to create a more sustainable and equitable world by the year 2030.

SDG4: Quality Education: The primary focus of SDG4 is to ensure inclusive and equitable quality education for all. This goal recognizes the transformative power of education in breaking the cycle of poverty, promoting economic growth, fostering social inclusion, and contributing to sustainable development. The targets associated with SDG4 encompass various aspects of education, including access to early childhood development, primary and secondary education, technical and vocational training, and higher education. It also emphasizes the importance of ensuring that education is of high quality, and relevant, and promotes lifelong learning opportunities (Collazo Exposito & Granados Sanchez, 2020) .

In summary, SDG4 aims to guarantee that everyone has access to quality education at all levels, fostering skills, knowledge, and values needed for personal and societal development. Achieving SDG4 is seen as a critical enabler for achieving other sustainable development goals, as education plays a fundamental role in creating a more just, equitable, and sustainable global society (Mladenovic, 2023).

3. LITERATURE REVIEW

The Review in this paper highlights the importance of adopting an ecological perspective in higher education, reformulating language teaching approaches, and integrating sustainable development goals into curricula. They emphasize the need for innovative business models, interdisciplinary education on sustainability, and international collaboration in research education to address global challenges effectively.

S. N0	Contribution	Reference
1	This paper examines learning from an ecological perspective, with a focus on higher education. Learning is viewed as a process that involves interdependent epistemic, social, and affective relationships. Knowledge, identity, and agency are the collective achievements of entire ecosystems. Learning is a multimodal, cross-contextual process that affects both the learner and their environment. It examines how an ecological perspective can shape key concepts in learning and education research, such as knowledge co-construction and epistemic agency, the role of knowledge resources, and the trans-contextuality of learning in today's knowledge society. The discussion concludes with opportunities for incorporating an ecological perspective into education and learning research in higher education. This reconceptualization suggests new ways to improve and analyses education's transformative potential. Further research is needed to better understand how learners create the necessary epistemic spaces for meaningful learning, as well as their agency and relationship with their surroundings.	(Aru et al., 2017)
2.	This article describes a pedagogical initiative that seeks to improve the efficiency and functionality of Spanish teaching and learning in the United States. The central goal of this initiative is to reformulate curricular and programmatic approaches in light of current social, cultural, and linguistic practices. More specifically, it combines and builds on insights from current theoretical and practical developments to do the following: (1) reconcile the currently conflicting educational goals of Spanish heritage language and foreign language teaching in the United States; (2) create a more sophisticated and efficient educational substructure than what is currently available to	(Omwami et al., 2022)

	language learners of all profiles and levels; and (3) guide resource allocation to avoid. A rationale is provided, and the organization and processes involved in the initiative's implementation are described, as well as the potential academic, social, and community benefits of such a reformulation.	
3.	SDG 4 on education covers all stages of formal education, vulnerable groups, teacher supply and training, and scholarship provision, going beyond just primary education access. Based on the author's field experience in India, this chapter examines areas of learning that may be overshadowed by SDG 4 targets and indicators. Concerns arise from an examination of the SDG vision for education, deviations from previous global agendas, issues with specific indicators, and the financial and legal status of education.	(Comyn, 2018)
4.	System change is a new methodology that addresses complex social problems by examining the connections between systems. This thesis examines how system change can help achieve the SDGs of education quality. The case study of ICF on education and disabilities is analyzed using qualitative methodology and semi-structured interviews. After double-coding and analysis, four key elements of contribution are reported, along with strengths, weaknesses, and key performance indicators.	(Canabate, et al., 2021)
5.	As global environmental crises evolve, higher education curricula must incorporate Education for Sustainable Development (ESD) to address them. The Sustainable Development Goals (SDGs) aim to promote global sustainability. The University of South Africa's College of Education is updating its ESD curriculum to address current global environmental issues. This chapter examines the recurrence of a course module on environmental education in relation to SDGs. We used a document analysis approach to examine SDG inclusion, Africanization, and content contextualization. The review found that the module lacked coverage of SDGs and made little effort to contextualize the content for African audiences. The chapter suggests incorporating these aspects into the module and related ESD course modules for recirculation.	(Hanis et al., 2023)
6.	The 2030 Agenda for Sustainable Development has raised expectations for global metrics. Expectations are based on two assumptions: global data demand will lead to increased domestic data supply, and global and domestic data needs are closely aligned. After reaching the halfway point of the SDGs, this paper analyses their assumptions in light of recent educational developments. The article emphasizes the importance of considering the opportunity costs of producing globally comparable data, as well as conducting an empirical analysis of the resources required to strengthen education information systems and domestic statistical capacity.	(Shaw et al., 2021)
7.	Large-scale comparative literacy and numeracy surveys enable international organizations (IOs) to create new realities and reshape themselves through collaborative quantification and standardization practices. This article aims to show how the dominance of global measurement regimes has had far-reaching consequences for how international organizations (IOs) such as the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the	(Aldhaen, 2023).

	<p>Organization for Economic Cooperation and Development (OECD), and the World Bank interact, as well as the environments these new interrelationships create. How can we make sense of this emerging reality? The author of this article investigates how large IOs interact in their efforts to meet the targets of the United Nations' fourth Sustainable Development Goal (SDG 4), which is focused on education. According to the study, the SDGs are not a standalone performance measurement exercise, but rather part of a much larger monitoring programmes that has a unique internal logic, structure, and hierarchies. The study demonstrates that SDG 4 is a significant case of transnational education governance, specifically the infrastructures and interdependencies of IOs in the construction of education data within the SDG framework. The objective is to provide insights into the labour and infrastructure involved in the collaborative creation of metrics. Drawing on declarations, agreements, and reports, as well as empirical findings from a series of interviews with key actors from all major IOs and civil society, the author employs Bourdieusian theory to argue that quantification has facilitated symbolic governance of the education policy domain. As a result, the collaborative effort to meet the SDG 4 targets represents the rise, and to a large extent, dominance, of the transnational field of measurement in education.</p>	
8.	<p>This paper seeks to determine which business model in higher education that supports SDG 4 is appropriate for the post-pandemic period. To that end, it introduces the "Blockchain Business Model for Higher Education" (BBM-HE) and a transformed business model canvas framework based on existing literature, concepts, theories, and findings relating to the majority of the pressing issues in higher education addressed by the current study. Secondary data is used in the qualitative research design to identify these issues through inductive content analysis of online reports. This study is unique in that it takes an "adaptive" approach to meeting the needs of the post-pandemic higher education landscape, which includes changes to the core elements of higher education, the integration of blockchain technology into the entire system, and a stronger approach to sustainability practice through sustainability tokens. The proposed model aims to provide a road map for all stakeholders, particularly "decentralized" higher education institutions of the future and "employable skills-seeking" proactive students all over the world, as opposed to the former "solely degree-focused and affluent" consumers of educational offerings. This study adds to the higher education literature in the areas of business models, blockchains, pandemics, and sustainability.</p>	(Kathi et al., 2022)
9.	<p>Sustainable development is now a key focus in university curricula. As the world strives to achieve the 17 United Nations Sustainable Development Goals (SDGs) by 2030 and adhere to the 2015 Paris Agreement framework, educational landscapes have evolved. University curricula now include lessons on sustainable development and sustainability, preparing students to lead in co-creating solutions for a better world. This paper provides background information on Singapore, a small city-state in Southeast Asia, and how its national constraints aligned with the UN SDGs have shaped its agenda and education landscape, including higher education. The following section discusses curriculum initiatives focused on sustainable development and sustainability at a Singaporean university. Our initiatives and projects aim to</p>	(Evans, 2019)

	provide relevant university education that meets local, regional, and global demands. We priorities interdisciplinarity and sustainability.	
10.	This position paper was written at the beginning of an SNF-funded project on research education in the social sciences. We propose a preliminary model for an international learning and teaching environment for PhD students in education. The model is based on research and open education, virtual and scientific mobility, and the knowledge economy as a whole. It has five components. The article addresses pedagogical and technological issues, proposes a dual tutoring system for PhD students, promotes virtual scientific mobility, and is linked to equitable economic and institutional environments. The paper interprets SDG 4 broadly, arguing that early integration of young researchers into international scientific networks can help address global educational challenges effectively.	(Zailan et al., 2019)

4. ROLE OF SDG4 & EDUCATION

The role of SDG4 and education is multifaceted, spanning social, economic, environmental, and global dimensions. It is a powerful driver for positive change, contributing to the overall well-being of individuals and societies while advancing the aspirations of sustainable development. Sustainable Development Goal 4 (SDG4) focuses on ensuring inclusive and quality education for all. Education plays a pivotal role in advancing various dimensions of sustainable development and is a key enabler for achieving the broader set of Sustainable Development Goals (SDGs) (Shava, et al., 2021). Here are some key roles of SDG4 and education in the context of sustainable development:

- **Foundation for Development:** Quality education serves as the bedrock for personal and societal development. By providing individuals with knowledge, skills, and competencies, education empowers them to lead productive and fulfilling lives.
- **Eradication of Poverty:** Education is a powerful tool for poverty eradication. It equips individuals with the skills needed for gainful employment, entrepreneurship, and economic participation, breaking the cycle of poverty and contributing to economic development.
- **Health and Well-being:** Education is linked to better health outcomes. It enables individuals to make informed decisions about their health, promotes healthy lifestyles, and facilitates the understanding of preventive measures and healthcare practices.
- **Gender Equality:** SDG4 emphasizes achieving gender equality in education. By ensuring equal access to education for all genders, it addresses social inequalities, empowers women and girls, and contributes to broader gender equality objectives.
- **Reducing Inequalities:** Education is a key driver in reducing inequalities within and among countries. It promotes social inclusion, bridges gaps in access to opportunities, and helps create a more equitable society.
- **Peace and Justice:** Education fosters a culture of peace, tolerance, and understanding. It plays a crucial role in conflict prevention and resolution by promoting dialogue, respect for diversity, and the values of human rights.
- **Environmental Sustainability:** Education is essential for creating environmentally literate citizens. By promoting awareness and understanding of environmental issues, it contributes to sustainable practices and responsible stewardship of natural resources.

- **Innovation and Economic Growth:** Quality education is a catalyst for innovation and economic growth. It nurtures creativity, critical thinking, and problem-solving skills, which are essential for driving technological advancements, entrepreneurship, and overall economic prosperity.
- **Global Citizenship:** Education nurtures a sense of global citizenship by fostering an understanding of interconnectedness and interdependence. It encourages individuals to engage with global challenges, contribute to international cooperation, and work towards a more sustainable world.
- **Monitoring Progress:** SDG4 serves as a key indicator for monitoring progress towards achieving the broader set of SDGs. Education is both a goal in itself and a means for achieving other sustainable development objectives, making it a crucial element in the global agenda for a more sustainable future (Kim, et al., 2022).

5. CONCEPTUAL FRAMEWORK ON INNOVATIONS IN EDUCATION CONTRIBUTES TO THE BROADER GOALS OF SUSTAINABLE DEVELOPMENT

In this conceptual framework, educational innovations (independent variable) are expected to influence the quality of the learning experience (mediating variable), which, in turn, impacts the overall achievement of SDG4 in the realm of education (dependent variable). Analyzing the relationships between these variables can provide insights into how innovations in education contribute to the broader goals of sustainable development. By examining how changes in the independent variable (Educational Innovations) may influence the mediating variable (Quality of Learning Experience), and subsequently impact the dependent variable (SDG4 Impact in Education), a comprehensive understanding of the relationships and outcomes in the context of 21st-century learning innovations for sustainable development can be gained (Adegbamini & Adesanmi, 2018). These variables can serve as a basis for empirical research, data collection, and analysis to evaluate the effectiveness of educational innovations in contributing to SDG4.

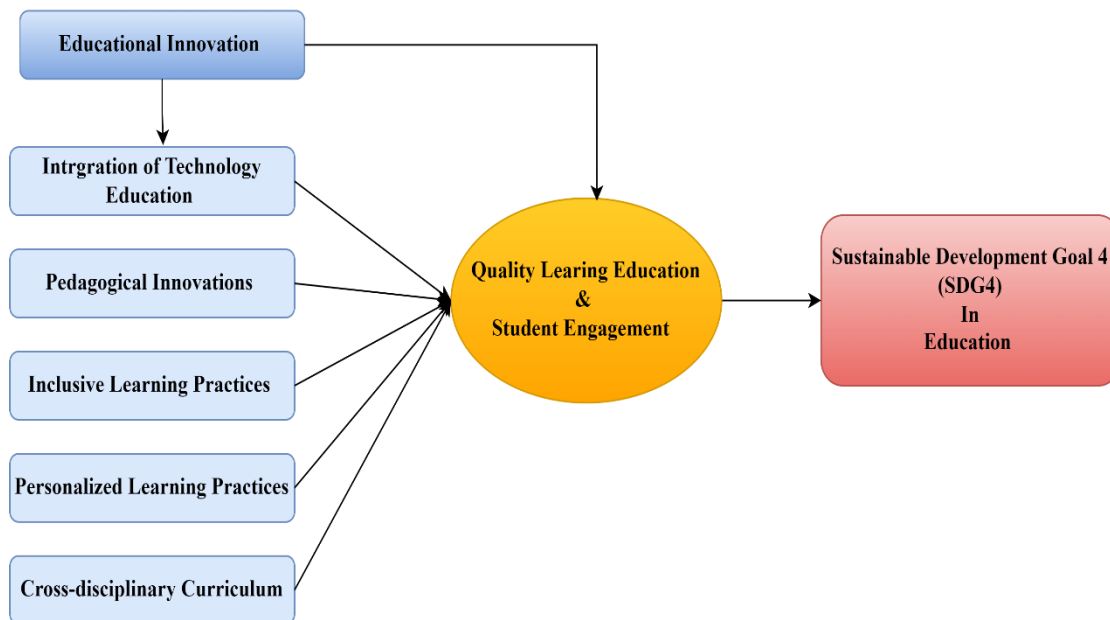


Fig1: Innovations in education contribute to the broader goals of sustainable development
 Source: Compiled by Researcher

1. **Educational Innovations:** The variable that is manipulated or introduced to observe its effect on other variables. In this context, educational innovations represent the interventions, strategies, or technologies introduced to redefine the learning experience in the 21st century.
2. **Quality of Learning Experience:** The variable that helps explain the relationship between the independent variable and the dependent variable. Quality of learning experience mediates the impact of educational innovations on the ultimate outcomes related to SDG4. It encompasses factors such as engagement, adaptability, and inclusivity in the learning process.
3. **SDG4 Impact in Education:** The variable that is influenced or impacted by changes in the independent variable. SDG4 impact on education is the outcome variable, reflecting the extent to which educational innovations contribute to the achievement of Sustainable Development Goal 4. It may include metrics related to increased access to education, improved educational quality, and enhanced global citizenship (Hirju & Georgescu, 2023).

6. CHALLENGERS SDG4 & EDUCATION IN 21ST CENTURY

Addressing these challenges requires concerted efforts from governments, international organizations, educators, communities, and other stakeholders. A holistic and inclusive approach, focusing on both policy and implementation, is essential for making meaningful progress towards SDG4 in the 21st century. While progress is being made toward Sustainable Development Goal 4 (SDG4) on quality education, numerous challenges persist in the 21st century. Addressing these challenges is crucial for achieving inclusive and equitable education for all (Khushik & Diemer, 2018). Here are some key challenges for SDG4 and education:

1. Access Disparities:

- **Geographical Disparities:** Access to quality education remains unequal, with rural and remote areas often lacking adequate educational infrastructure and resources.
- **Gender Disparities:** Gender-based discrimination continues to limit educational opportunities for girls in some regions, perpetuating gender inequality.

2. Quality of Education:

- **Teacher Shortages and Quality:** Shortages of qualified teachers, coupled with insufficient teacher training, impact the overall quality of education.
- **Outdated Curriculum:** Many educational systems struggle to adapt quickly to changes, resulting in outdated curricula that may not align with the evolving needs of the workforce.

3. Inequality and Inclusivity:

- **Socioeconomic Disparities:** Students from marginalized socioeconomic backgrounds often face barriers to accessing quality education, contributing to cycles of poverty.
- **Special Needs Education:** Inclusive education for students with special needs remains a challenge in many places, limiting their participation in mainstream classrooms.

4. Infrastructure and Resources:

- **Inadequate Infrastructure:** Insufficient school facilities, including classrooms, libraries, and sanitation facilities, hinder the learning environment.
- **Lack of Educational Resources:** A shortage of textbooks, learning materials, and technology limits the effectiveness of teaching and learning.

5. Conflict and Crisis:

- **Displacement of Students:** Conflict and crisis situations disrupt education, leading to the displacement of students and limiting their access to learning opportunities.
- **Psychosocial Impact:** Students affected by conflict may experience trauma, affecting their mental health and ability to engage in education.

6. Digital Divide:

- **Limited Access to Technology:** The digital divide exacerbates inequalities, with many students lacking access to the internet and digital devices needed for online learning.
- **Digital Literacy Gaps:** Inadequate digital literacy skills among students and educators hinder the effective use of technology in education.

7. Policy and Governance:

- **Policy Implementation:** Despite well-defined policies, challenges in policy implementation, including corruption and bureaucratic hurdles, can hinder progress.
- **Insufficient Funding:** Inadequate funding for education systems limits the ability to improve infrastructure, teacher quality, and overall educational outcomes.

8. Cultural Barriers:

- **Cultural Norms and Practices:** Cultural barriers may impede certain groups, particularly girls, from accessing education, perpetuating societal inequalities.
- **Lack of Cultural Relevance:** Education systems may lack cultural relevance, making it challenging to engage students from diverse backgrounds.

9. Economic Factors:

- **Poverty and Education:** Economic barriers, including the cost of education and the need for child labor in impoverished communities, contribute to high dropout rates.
- **Inadequate Employment Opportunities:** Limited economic opportunities after graduation can discourage students from pursuing higher education.

10. Global Coordination:

- **Lack of International Cooperation:** Inconsistent global coordination and collaboration hinder efforts to address cross-border educational challenges and achieve SDG4.
- **Political Instability:** Political instability in certain regions may disrupt long-term planning and investment in education (Graham et al., 2021).

7. OPPORTUNITIES OF SDG4 & EDUCATION IN 21ST CENTURY

Embracing these opportunities requires collaboration among governments, educational institutions, businesses, and communities to build a resilient and responsive educational ecosystem that aligns with the goals of SDG4 in the 21st century. Opportunities in Sustainable Development Goal 4 (SDG4) and education in the 21st century abound, driven by advancements in technology, changing educational paradigms, and a global commitment to inclusive and quality education (Regmi, 2023). Here are some key opportunities:

1. Technology-Enhanced Learning:

- **Online Education Platforms:** The rise of digital platforms allows for the delivery of education globally, reaching learners in remote areas and providing access to diverse courses.
- **Interactive Learning Tools:** Educational technologies, including virtual reality and gamified learning, enhance engagement and cater to various learning styles.

2. Inclusive Education:

- **Diversity and Inclusion Initiatives:** Opportunities exist to create inclusive educational environments that cater to diverse student populations, including those with special needs.
- **Cultural Competency Programs:** Educational institutions can develop programs that foster cultural understanding and global citizenship.

3. Lifelong Learning:

- **Continuing Education Opportunities:** The 21st century emphasizes the need for continuous skill development. Opportunities for lifelong learning through online courses and workshops are readily available.
- **Professional Development Programs:** Institutions and businesses can collaborate to offer tailored professional development opportunities, ensuring a skilled workforce.

4. Global Collaboration:

- International Partnerships: Collaborative initiatives between educational institutions globally provide opportunities for knowledge exchange, joint research, and cross-cultural learning experiences.
- Student Exchange Programs: Opportunities for students to participate in exchange programs promote cross-cultural understanding and enhance global perspectives.

5. Entrepreneurship Education:

- Innovation and Entrepreneurship Programs: Educational institutions can integrate entrepreneurship education, fostering creativity, problem-solving, and a spirit of innovation.
- Incubators and Start-up Support: Opportunities exist to establish incubators and support systems for student entrepreneurs, encouraging the development of new ventures.

6. Open Educational Resources (OER):

- Open Access Learning Materials: The availability of open educational resources provides opportunities for cost-effective and widely accessible educational materials.
- Collaborative Content Creation: Opportunities exist for educators and institutions to collaboratively create and share educational content, contributing to a global knowledge pool.

7. Teacher Professional Development:

- Teacher Training Programs: Ongoing professional development opportunities for educators ensure they are equipped with the latest teaching methodologies and technologies.
- Peer Learning Communities: Establishing communities where teachers can share best practices and learn from one another fosters a culture of continuous improvement.

8. Education for Sustainable Development (ESD):

- Environmental Education: Opportunities exist to integrate environmental education into curricula, promoting sustainability awareness and responsible citizenship.
- Community Engagement Projects: Educational institutions can engage in community-based projects that address local sustainability challenges, creating real-world learning experiences.

9. Government and Policy Support:

- Policy Advocacy: Opportunities exist for educators and stakeholders to advocate for policies that prioritize and support inclusive, quality education.
- Government Investments: Increased government investments in education create opportunities for infrastructure development, teacher training, and curriculum enhancement.

10. Data-Driven Decision-Making:

- Educational Analytics: Opportunities arise for utilizing data analytics to assess student performance, identify learning trends, and tailor educational interventions for better outcomes.
- Personalized Learning: Leveraging data to personalize learning experiences allows for adaptive teaching methods that cater to individual student needs (Hanemann & McKay, 2015).

Findings:

1. New technologies like computers and the internet are helping students learn in new and exciting ways. They can access information quickly and learn at their own pace.
2. With the help of technology, teachers can create lessons that fit each student's needs. This means students can learn in a way that works best for them.
3. Virtual reality and online classes are making it possible for students to learn from anywhere. This is especially helpful for students who can't go to school in person.
4. Many educational resources are now available for free online. This means students from all backgrounds can access quality learning materials without having to pay.
5. Not everyone has access to technology or the internet, which can make it hard for some students to benefit from these new ideas. Making sure everyone has equal access to education is still a big challenge.

6. By continuing to innovate and improve education, we can help more people get a good education and reach their full potential. This will not only benefit individuals but also contribute to building a better society for everyone.

Conclusion:

In conclusion, new ideas and innovations are revolutionizing education and working towards achieving Sustainable Development Goal 4 (SDG 4) - Quality Education. Technologies like computers and the internet, along with personalized learning and virtual classrooms, are making learning more accessible and effective than ever before. However, challenges still exist, particularly in ensuring equal access to these innovations for all students. Bridging the digital divide and addressing issues of equity are crucial for realizing the full potential of these advancements in education. Looking ahead, it's important to continue embracing new ideas and technologies while also focusing on inclusivity and accessibility. By working together, we can create a future where quality education is available to everyone, ultimately leading to a more prosperous and equitable society for all.

References:

- Adegbami, A., & Adesanmi, O. (2018). Nigeria's educational system and sustainable development goals' attainment: 'A wild goose chase'. *J. Contemp. Asia*, 5(1), 217-233.
- Aldhaen, E. (2023). Education skills for digital age toward sustainable development—analysis and future directions. *Development and Learning in Organizations: An International Journal*, 37(3), 11-14.
- Aru, S., Capineri, C., & Riccaboni, A. (2017). Redefining higher education for sustainability. Strategies, barriers and practices. *Culture Della Sostenibilità*, 10(20), 73-90.
- Cañabate, D., Bubnys, R., Nogué, L., Martínez-Mínguez, L., Nieva, C., & Colomer, J. (2021). Cooperative learning to reduce inequalities: instructional approaches and dimensions. *Sustainability*, 13(18), 10234.
- Collazo Expósito, L. M., & Granados Sánchez, J. (2020). Implementation of SDGs in university teaching: a course for professional development of teachers in education for sustainability for a transformative action. *Sustainability*, 12(19), 8267.
- Comyn, P. J. (2018). Skills, employability and lifelong learning in the Sustainable Development Goals and the 2030 labour market. *International Journal of Training Research*, 16(3), 200-217.
- Diemer, A., Khushik, F., & Ndiaye, A. (2020). SDG 4 “quality education”, the cornerstone of the SDGs: Case studies of Pakistan and Senegal. *Journal of Economics and Development Studies*, 8(1), 9-32.
- Evans, R. (2019). Education 2030 & Adult Learning: Global Perspectives and Local Communities—Bridges or Gaps? *Andragoška spoznanja*, 25(3), 3-21.
- Graham, M. A., Stols, G. H., & Kapp, R. (2021). Integrating Classroom Technology: South African Mathematics Teachers. *Computers in the Schools*, 38(3), 189-213.
- Hanemann, U., & McKay, V. (2015). Lifelong literacy: Towards a new agenda. *International Review of Education*, 61(1), 265-272.

Hanis, F., Singh, D., Mansor, Z., & Norman, H. (2023). A Conceptual Framework: Cultural Based Approach in Collaborative Online Learning in Primary Schools. *Journal of Information Systems and Digital Technologies*, 5(2), 69-89.

Hirju, I., & Georgescu, R. I. (2023). The Concept of Learning Cities: Supporting Lifelong Learning through the Use of Smart Tools. *Smart Cities*, 6(3), 1385-1397.

Kathi, S., Naidu, A. R., & Rangaiah, B. (2022). A critical analysis of India's national education policy (2020): Insights into educational transformation. *Journal of Positive School Psychology*, 6(9), 4561-4567.

Khushik, F., & Diemer, A. (2018). Critical analysis of education policies in Pakistan: A sustainable development perspective. *Social Science Learning Education Journal*, 3(09), 01-16.

Kim, J. Y., Seo, J. S., & Kim, K. (2022). Development of novel-engineering-based maker education instructional model. *Education and Information Technologies*, 27(5), 7327-7371.

Mladenović, J. (2023). Lifelong learning for sustainable development–student's perspective. *Vallis Aurea (International Journal Vallis Aurea)*, 9(2), 39-52.

Mochizuki, Y. (2019). Rethinking Schooling for the 21st Century: UNESCO-MGIEP's Contribution to SDG 4.7. *Sustainability: The Journal of Record*, 12(2), 88-92.

Ojokheta, K. (2020). Developing a National Strategic Framework for Implementing Lifelong Learning Component of SDG 4-Education 2030 Agenda in Nigeria. *Journal of Pedagogy, Andragogy and Heutagogy in Academic Practice/ISSN: 2708-261X*, 1(2), 79-94.

Omwami, E. M., Gambino, A., & Wright, J. (2022). Pedagogical practices in the context of the global COVID-19 pandemic: Implications for inclusive quality education for all. *Annual Review of Comparative and International Education 2021*, 42(1), 163-180.

Ossiannilsson, E. (2023). The intersection of sustainable education and sustainable cities: A path towards a brighter future. *Education@ ETMA*, 2(3), 1-14.

Ramaswamy, M., Marciniuk, D. D., Csonka, V., Colò, L., & Saso, L. (2021). Reimagining internationalization in higher education through the United Nations sustainable development goals for the betterment of society. *Journal of Studies in International Education*, 25(4), 388-406.

Regmi, K. D. (2023). Meritocratic lifelong learning: Responsibilisation of marginalised adults for their learning as neocolonial contract. *International Journal of Lifelong Education*, 42(4), 406-423.

Shava, G. N., Ndlovu, S., Mathonsi, E., Hleza, S., & Tshuma, N. (2021). Achieving quality and education for sustainable development in higher education management the Zimbabwean experiences. *International Journal of Research and Innovation in Social Science*, 5, 679-689.

Shaw, R., Sakurai, A., & Oikawa, Y. (2021). New realization of disaster risk reduction education in the context of a global pandemic: Lessons from Japan. *International Journal of Disaster Risk Science*, 12, 568-580.

Shulla, K., Filho, W. L., Lardjane, S., Sommer, J. H., & Borgemeister, C. (2020). Sustainable development education in the context of the 2030 Agenda for sustainable

development. *International Journal of Sustainable Development & World Ecology*, 27(5), 458-468.

Zailan, S. N. S., & Dahlan, A. R. A. (2019). Redefine Malaysian university of the future business models in the digital age: Humanising higher education program for orphans and youth from poor families. *International Journal of Computer Science and Information Technology Research*, 7(4), 150-160.
