

## Chapter 14

# Digital Technologies and Education for Sustainable Development

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### Abstract

Education for sustainability has become the mechanism for creating a pool of graduates who can understand, appreciate, practice and support the achievement of Sustainable Development Goals (SDGs). In a world with diverse cultures, demographics, political ideologies, etc. faster progress towards sustainable development needs increased use of digital technologies. Integration of digital technologies like artificial intelligence (AI), metaverse, visualisation techniques, cloud computing, Internet of Things (IoT), open data repositories, geographic information system (GIS), etc. with classroom teaching can build awareness, skills, attitudes and values among students in the journey towards sustainable development and scale up the efforts towards the goals.

In this chapter, the authors have tried to bring out a list of digital technologies and the way in which they can be used in classroom teaching to ensure education for sustainability. It may be noticed that there are water-tight compartments between those who know the SDGs and those with proficiency in technology. What is also needed is integration between both silos for mapping the digital technologies with the appropriate SDGs. The teachers in the higher education system need more exposure to understand and implement this integration.

*Keywords:* Sustainable development; digital technologies; education for sustainability; integration; multi-disciplinary; classroom teaching

### Introduction

Sustainability has become a buzzword for every section of society, region and economy. At the dawn of civilisation, when the tribal and nomadic people practiced shifting cultivation, they were championing sustainability.

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Today sustainable development is like a worn-out cap because everyone wears it. Democracies, autocrats, monarchs, dictators, etc. swear by sustainable development.

The present popularity of the word sustainable development can be traced back to the report titled *Our Common Future* by World Commission on Environment and Development (Visser, 2017). Sustainability involves a better quality of life for now and the generation to come in terms of economic, social and environmental dimensions. The ambitious international community substituted the Millennium Development Goals (MDGs) (2000–2015) with 17 SDGs consisting of 169 targets (2016–2030). To gain local and global endorsement for the ideology of sustainable development, the United Nations declared 2005–2014 as the Decade of Education for Sustainable Development. Unless we prioritise our efforts, the social benefit from every rupee spend will be limited and the country will be able to achieve the goal only by 2059 (Sachs et al., 2021).

The SDGs describe the main challenges of economic development encountered by humanity. The SDG 4, Target 4.7 highlights the importance of education for sustainable development, global citizenship education and other transformations for a sustainable and peaceful future for all. Target 4.7 states: ‘by 2030 ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development’.

## **Education for Sustainability (EfS)**

EfS is a framework of teaching and learning for generating awareness and interest among students about sustainable development challenges like poverty, inequality, climate change, irresponsible consumption, etc. Such understanding of the concerns will help students to contribute towards sustainable development initiatives (Jennifer, 2005). EfS aims to integrate ecological, social and economic aspects of humanity, flora and fauna for empowering *Homo sapiens* in forging a sustainable future (Martins et al., 2006; UNESCO, 2002).

Education plays a significant role in ensuring that all students acquire the knowledge necessary to promote and practice sustainable development. This requires the commitment of teachers and researchers through effort, motivation and innovative ideas. In the process of achieving SDG 4.7, teachers and students have to develop competencies for the transition from education to education for sustainability. Teachers will be the major agents of change as they shoulder the major responsibility of imparting the necessary knowledge, skills and attitude for shaping students with sustainable development ideology.

Transforming education to education for sustainability requires a change in curriculum, pedagogy, instructional design and assessments. Stakeholders responsible for carrying forward the change will require developing certain competencies. Strong digital competencies will strengthen and enhance the

transformation. Digital technologies promise high levels of accuracy and time efficiency in the execution of tasks and data-driven decision-making. Sound knowledge of digital technologies and strong skills in their usage will enable the stakeholders including teachers, students and policymakers to efficiently execute their responsibilities in the process of change. Teachers can use them to efficiently deliver instructions and real-time assessments. Students can benefit in terms of being able to receive and understand  $24 \times 7$ , while policymakers can use them in developing curriculum, pedagogies and instructional design methods and suggest learning activities and roles for both teachers and students, which are appropriate to impart education for sustainability.

### **Digital Technologies: Immersive to Translation and Conferencing**

Digital technologies including computing devices, applications, data, internet facilities, etc. are now better accessible and affordable even for the poor. Using digital technologies is very effective as they provide opportunities for students in experiential learning. They create a powerful learning environment for students to realise the concept of education for sustainability. It can enhance the cognitive, affective and psychomotor learning of education for sustainability. Using digital technologies in learning is effective in nurturing students' abilities in understanding real-world problems/situations, and acquiring the technical knowledge and skills to develop solutions for them. The experiences and challenges during the use of technologies allow students to critically discuss solutions to problems in a real-time basis. This leads students to reflect upon their attitudes towards the society and world around them, thus a sense of belongingness and emotional involvement with their surroundings. Student education of sustainability quotient can be improved by integration of technologies into the education process. [Hochschild \(2018\)](#) acknowledged the importance of technologies like AI, blockchain, robotics, biotechnology, etc. for achieving SDGs.

Immersive technologies like virtual reality (VR), augmented reality (AR), mixed reality (MR) and extended reality (XR) based on Metaverse can be used in the teaching–learning process to conduct experiments without using live animals, plants, fruits and flowers. Further, Metaverse-based learning can replicate their daily socio-economic life through avatars representing real-life actors ([Kye et al., 2021](#)), which in turn can improve their learning outcomes ([Kemp & Livingstone, 2006](#)). There are a lot of deliberations about effectively tapping the country's demographic dividend. Skilling the graduates is an important element in minimising the disappearance of the sweet spots. Metaverse technology can help in training the youth in a digital mode without disturbing the existing ecosystem. Metaverse helps us to impart training in VR by avoiding the creation of additional physical infrastructure. Further, experiments using Metaverse can help reduce cruelty on different organisms which are on the verge of extinction. The immersive environment can help in developing Industry 4.0-induced cognitive, emotional and technological skills. Metaverse-based immersive technologies can improve the scope of the learning process in discovering environments beyond our

reach due to constraints of time, resources, funds, etc. and use the virtual world for solving everyday problems (Tlili et al., 2022). Such immersive technologies can help students to appreciate the need for protecting the life below the water and life on land, ensuring climate justice, etc.

Digital technology can be integrated for ensuring quality education in creating, delivering content and accessing content and also in learning management systems, resource allocation, scheduling activities, etc. Electronic content creation can take forms like text, audio, picture, video and animation. Content in electronic form is easy and quick to create, edit, store, replicate, share and improve. In the process, institutions will save scarce resources.

Student projects and assignments can move from conventional paper and pen mode to digital mode for achieving the SDGs. Exposure to typesetting applications such as Microsoft Word and Notepad, spreadsheet applications, document creation tools like LaTeX with advanced and sophisticated formatting facilities, presentation software such as Microsoft PowerPoint and Prezi, etc. can help students in their learning outcomes. Exposure to the use of such digital facilities will guide students in analysis, visualisation, interpretation and advocacy about various socio-economic, psychological and technological challenges in the society and economy. Using digital proficiency, students will be in a better position to convince their fellow villagers not to burn stubbles, stop female infanticide, discontinue the discharge of untreated waste into rivers and lakes, reduce the excessive use of pesticides, minimise lifestyle diseases, etc.

With classroom learning using content in text, pictures, sound, video and animations can help in creating real-world scenarios for students to understand, think and act upon. The huge amount of satellite images can be used not only for mere academic scores but also to form informed decisions like not buying fish during its breeding season, the need for protecting dunes and preventing the destruction of corals.

Educational institutions have a lot of social commitment to their catchment society. The extension cell of the institution can have great use of their volunteers who have mastery in digital technology for translation of text and voice content into other languages. Such digital facilities can be of use in imparting basic Foundational Literacy and Numeracy (FLN) to marginalised sections of society, especially the migrants. Further, translation facilities (Google Translate) will be helpful to improve institutional deliveries, immunisation programmes, sanitary conditions and hygiene, enrich scientific temper, etc. Such translation technology can also assist rural students in better understanding subjects they learn in their mother tongue. Although digital technologies exist for translations, speech and text translations across languages, there is a tremendous need for research and improvement in these areas so as to enhance the quality of translations and cover more languages. Projects involving the development of translation tools such as compiler design and parsers will ensure that learners explore and get more languages on the internet. This will also ensure that minority languages don't get extinct. More people from different linguistic backgrounds will get connected in cyberspace thereby breaking all the human barriers. Developing computer systems, software and programming tools in local languages will enable more people

to use technology, reduce the digital gap and contribute to socio-economic and cultural prosperity.

During the Covid-19 pandemic, the academic schedules of institutions were disturbed. Google Meet, Zoom, Microsoft Team, Skype, WhatsApp conference calls, etc. came to our rescue. Such facilities helped the student to clarify his/her doubts  $24 \times 7 \times 365$  with their teacher and peers. Students with exposure to such applications can help the local administration for managing disasters, build confidence among villagers during the occurrence of natural and man-made events, in giving early warnings to minimise the losses from national calamities, hold people together during emergencies, etc.

## **MOOCs, Geospatial Technologies, Collaborations and Industry 4.0**

In the new normal, classrooms are digitised with interactive touch panels, video cameras, microphones, speakers and internet connection enabling teachers to conduct classes both in virtual as well as hybrid mode. With such equipped classrooms, students can attend the best lectures delivered from any part of the world, clarify doubts in real-time, interact with world-renowned experts and Nobel laureates, etc. with great ease. Such facilities can contribute towards collaborative learning without regional, gender, caste, income, colour or language barriers.

The growth of Massive Open Online Courses (MOOCs) enables learners to learn and get certification for quality and reputed courses that are otherwise not available locally. The online proctoring software enables course-offering institutions to conduct examinations in online mode maintaining high ethical standards. The certification provided through MOOCs is emerging as an important part of Skilled Through Alternative Routes (STARs).

Online polling features can be used in the classroom and outside to understand the grasping quotient and to devise measures to improve the outcomes. Society's attitude towards the ideology of 'Reduce-Reuse-Recycle' can be easily captured through online polls and interventions can be planned to optimise the said ideology. The mood of the nation about the policies implemented to fight global warming and climate change can be evaluated from time to time.

Educational institutions train students in the effective use of bigdata in the decision-making process. Understanding the tools and techniques of data mining will help the country in identifying hidden patterns. Such patterns can reveal new growth engines for the sustainable development of cities, communities and societies.

There are a lot of reports and policy documents put up in the public domain by government departments, industry bodies and NGOs. They run into hundreds of pages that common citizens will be handicapped to read, understand and use. Such inequalities in understanding these documents and using them create an unequal society. Curriculum can be modified to teach students, even without coding proficiency, the art of visualisation and infographics. It is not merely the

normal data visualisation but also those using maps, 3D models, smart arts, animations, etc. Students with such exposures can be roped in by educational institutions, self-governing units and NGOs to create different visualisations of lengthy reports and documents based on the digital literacy of the concerned audience for which it is made. Every year governments release documents on road accidents, but such numbers are inadequate to take follow-up measures. Experts can be roped in to prepare visualisations that can give some patterns beyond numbers for stakeholders to put their acts together.

Educational institutions can acquaint students with Google Maps, uses of sensors, etc. Google Maps can help citizens in understanding routes with heavy traffic congestion and select alternate routes to reach their destination. Similarly, projects can have models made by students using sensors that can provide innovative solutions for parking, solid waste management, sensor-based irrigation, responsible consumption of energy, etc.

Familiarising students with geo-tagging software can support continuous monitoring, quicker analysis, remote observations and communication. Collecting and processing geospatial information about garbage dumps, potholes, flora, heritage sites, etc. can help governments to take appropriate policy measures. Academic projects on geotagging of plant life such as rare, medicinal and endangered species can develop feelings among learners, making them more sensitive towards life on land and water. In our study, 'Sustainability Issues of Women Street Vegetable & Flower Entrepreneurs in Goa: Need for State Interventions' (Amballoor & Naik, 2022), we used various geo-tagging facilities like carto maps, satellite maps, open-street maps, etc. to identify selling clusters for women vegetable and flower entrepreneurs in the process of calculating their sustainability index.

Deglobalisation is slowly gaining popularity after the pandemic and is being reflected through protectionist policies, friend shoring, etc. The world urgently requires partnerships, collaborations and alliances to fight global slowdown, poverty, hunger, inequality, green energy, global warming, climate change, etc. The basic theme of collaborations can be imbibed in students when they work on Google Docs, Google Sheets, Colab, etc. Training in such digital tools can prepare students to be great practitioners in the use of technology for partnerships and collaborations. These technologies enable learners from nook and corner of the world across different backgrounds to interact and work together. Viable solutions can be easily identified and transmitted to other parts of the world at the click of a button.

The lessons in 'digital twins' and Industry 4.0 will tutor students to understand and create virtual models to understand physical objects. The machinery in your firm is fitted with sensors that will send real-time data to replicate virtual machinery. The data from sensors will be processed using cloud technology. Such technologies can help the industry to plan preventive maintenance before the machinery breaks down. Such virtual models can be created across sectors for ensuring greater productivity and inclusive growth.

Exposure to Industry 4.0 will help students to analyse the changing landscape of the job market and the profiles. Understanding the skill requirements, essential

certifications and emerging jobs will help students to improve their employability quotient especially when captains of industry were going hammer and tongs on the low marketability of students.

## **Cloud Computing, Data Driven Decisions, Social Media and Internet**

Cloud computing enables the usage and sharing of computational resources from anywhere over the internet without having to own them. Infrastructure as a service (IaaS) allows users to use already existing computing infrastructure to create platforms and run applications without having to invest in creating the infrastructure. Platform and Software as a service (SaaS) have made it possible for scholars and researchers to solve problems without having to invest their time in complex coding and installations. Cloud computing has made powerful computing resources accessible and easily useable to individuals across the world. No longer has access to powerful computing limited to rich societies or countries. Any individual with a computing device such as a desktop pc or smartphone and internet connectivity can use infrastructure, platform and SaaS. Having learners learn this technology either to develop or improve it further or use only this technology will empower more individuals to have access to high-power computing resources and enable us to solve complex problems requiring high computational power such as weather forecasting, natural disaster prediction, etc. Increased use of cloud computing and computation resources can ensure greater computation equality.

Websites and web applications are very powerful ways of information dissemination. Learning website development and making students create websites for individuals such as small artisans, farmers and self-help groups in their localities will enable students to interact with the locals around and establish a connection and an understanding of the real world which otherwise the classroom teaching or a corporate workplace would have not offered. Students may be asked to develop websites for heritage places, trades, cultural aspects, cuisines and other specialties of the local places. Such projects can help put the local people and places occupy a prominent place on the global tourism map. Websites for donors of blood, food and used books will help to facilitate the transfer of resources in times of emergency to the needy. A website can be created using HTML or other web technologies. It is also now possible to design websites using online website builders which don't require the developer to have coding capabilities.

Data-driven decision-making is imperative for every economy for solving issues and challenges pragmatically and efficiently. A survey based on the questionnaire is time-consuming, costly and involves man-hours to tabulate and interpret. Online data collection tools such as Google Forms, Microsoft Forms, etc. will enable the researchers and scholars to design questionnaires that can be sent to the respondents over the internet. There are plugins available for the online data collection tools which aid in performing complex analysis, presentation and interpretation of data. Saving time and accuracy are two benefits they offer to the user. Since these

tools enable the online collection of responses, it gives equal opportunities for respondents across different geographic locations. Students can be encouraged to collect data using online data collection tools for their projects, assignments and thesis. Using online data collection tools enables the learner to reach a large number of respondents with different perspectives, cultures, demographics, social backgrounds, political affiliations, etc. making the world a global village. Such studies and reports will be inclusive, broad-based and of good ethical standards.

Social media is a form of communication over the internet. Users can have conversations, share information and create web content using these platforms. Social media includes social networking sites, blogs, micro-blogs, picture-sharing sites, video-sharing sites, instant messaging, etc. Students may be asked to create and contribute to blogs on various topics in their syllabus and also on issues concerning their locality. Blogging will enable students to post their independent views on a topic and in no time get feedback from many others. Understanding social media will help students not only in organising events but also to create innovative idea-based pages and posts on social media to advertise and manage the events.

Internet penetration and mobile ownership are very significant in India. All aspects of mobile technology are not fully exploited by its users. Students can be trained to use mobile technology as a means of family livelihood. Mobile banking, taking orders using WhatsApp messages, display of produce using Instagram, etc. can create a level-playing field for entrepreneurship to flourish. If knowledge about how to use such technologies trickles down to every household, India can minimise poverty, inequality and unemployment.

## **Image Processing, AI, Open Data Repository and Artificial Neural Network**

Teaching to create and edit movies has become easy due to the availability of advanced yet simple-to-use open-source movie-making and editing tools. The camera feature in smartphones has made capturing videos convenient and cost-effective. Students may be asked to capture videos and create movies and documentaries on nature-related concepts such as flora, butterflies and medicinal plants on the campus. Such projects will bring students from different disciplines such as botany, zoology, computer science, languages and music to come together and interact with each other. They provide an opportunity for students to go beyond the walls of the classroom and get a chance to get connected to nature, appreciate its beauty and understand its challenges. Such projects will equip the creator and their audience to understand the heartbeats of nature in a very organic way. A video-making competition will provide a platform for students to showcase innovative ideas on event management.

The machine is intelligent when it learns by itself to identify processes, patterns and resolves in the most efficient ways. A synergy between innovation and sustainability is needed through intelligent machines for designing a better future. Artificial Intelligence (AI) can be applied in many ways for improving sustainable



development. In the educational domain, AI can be used in tasks that require scheduling and allocating resources such as preparing timetables for lectures and examinations, seat arrangements and classroom allocations. Smart attendance systems with auto notification of low attendance and the ability to predict the final course/semester attendance apriori are the applications of AI for educational institutions. AI can also be used in generating question papers as per previously identified criteria such as Bloom's Technology. Prediction of a possible traffic jam and accordingly directing traffic to take alternative routes to avoid the jam is possible using AI. AI can also help accurately anticipate the demand and load on resources such as power, water, fuel, etc. and inform the authorities in advance for making necessary arrangements. It is possible to predict the possibility of a natural phenomenon such as a cyclone, tsunami, etc. Waste management can be made efficient by having waste-collecting vehicles incorporate intelligent route control systems based on routing algorithms. The garbage bins can contain a sensor-based system that informs the root control system about their status in terms of the quantity of waste they contain. Smart irrigation systems, smart gardens and smart greenhouses can be implemented using AI systems having sensors that monitor moisture and nitrogen content in the soil, humidity and temperature to predict crop needs and recommend actions. Integrating AI with drones helps farmer surveillance and hyperspectral image analysis for crop disease detection and comprehensive pest control. Systems to detect metals and e-waste in waste management are much a need in sustainable cities. Such systems work using metal detection sensors and image processing. There is a huge scope for implementing such projects at a minor scale through projects and assignments. Not all students involved in such projects need to have sound knowledge of electronics and computers. Being multidisciplinary, students from different disciplines such as chemistry, botany, computers, electronics, etc. can be a part of such projects. A small workshop or a tutorial on microcontrollers using Arduino Complete Starter Kit is enough for students from any domain to understand and implement such systems.

Digital image processing deals with the editing of digital images using a computer. It involves analysis using programming languages, image processing software and manual. Enhancing the appearance of an image by removing noise and adjusting the colour, brightness, contrast, sharpness and size of the image is a simple but very useful application of image processing. Removal and addition of a feature, combining multiple images, collage creation, designing banners, invitation cards, certificates and sketching are applications that can be done using image editing software. From aerial and satellite images, students may be asked to identify features of interest such as rivers, roads, buildings, garbage dumps, hospitals, emergency services, etc. in a village/city or infected vegetation, forest fires, etc. also changes in these feature in time, comparison of images to find out effects of natural phenomena. Studies involving simple image processions and analysis like the effect of the expansion of roads, deforestation, conversion of the green cover and soil erosion on beaches can be given to students as projects. This kind of analysis can be done by manually observing images, using image editing tools, online services such as Bhuvan and Google Earth Engine or analysing them

using programming languages like Python, Scilab, Matlab, etc. The ability to process images and use them to create documents using page layout software such as Publisher along with 2D and 3D printing can help students take projects under Desktop publishing (DTP). This experience will help develop the competencies required to be entrepreneurs in the DTP business.

An open data repository is a place that holds data for public use, visualisation and analysis. It allows users to freely submit, receive, reproduce and republish data on online mode. Examples of open data repositories include Kaggle, OpenStreetMap and Open Government Data (OGD) Platform India, Bhuvan, etc. Such data sources can help in taking data-driven decisions for achieving the SDGs. They also act as metrics to evaluate the progress in meeting the goals and provide critical information on government operations, public services, natural resources, etc. Analysis of such data from different sources can work out solutions for local, national and global issues. Making students work on open data serves as a way of training them for critical technological job skills, thereby fostering job creation. There are huge datasets for understanding pollution and identifying and conserving natural resources. These data sets can be used by any citizen for ensuring environmental sustainability in a very democratic and participatory manner. Open data repositories strengthen the connection between the students, individuals and the entities creating data. Projects and assignments involving open data from online data repositories will enable students to study and provide solutions to national and global challenges outside of their classrooms. For example, the open geodata repository Google Earth Engine contains satellite images of every location on the Earth taken over the last 40 years. Data in these images can be used to study the change in the direction of rivers, snow cover, desert, expansion of cities, reduction in forest areas, etc. over the last 40 years. These kinds of studies do not require students to know complex programming knowledge. These datasets are easy to download and there are ready tools available such as QGIS, open source software, which has inbuilt features to perform a range of analyses on such datasets at a click of a button. This will inculcate a feeling of global citizenship and belongingness within them. The main benefit of using open data is that the data available is huge and is available at the click of a button and in formats ready for analysis. As most of the repositories are owned by government and reputed organisations, the data are reliable. Students can also be asked to upload their data onto data repositories which will be accessible to any individual across the globe. This will help inculcate in students the feeling of participation on global platforms. Some open data repositories allow individuals to work in a group on a dataset with different roles such as data contributors, analysts, interpreters, programmers, etc. Working in such diverse groups will build in them the aptitude and skills to work and research problems of a bigger magnitude in a multicultural environment.

Challenges in the implementation of the 17 SDGs are difficult to handle with conventional techniques. Artificial Neural Networks (ANNs) are often used as an advanced approach to modelling the complex behaviour of systems (Gue et al., 2020). Developing an ANN and using it requires sound knowledge of fuzzy logic, mathematics and AI. Projects based on ANNs can involve students from the

domain of computer science. However, ANNs are very powerful in solving complex computation problems. ‘Clean water and Sanitation’, ‘Affordable and Clean Energy’ and ‘Sustainable cities and Communities’ are the most popular subject matter for modelling and forecasting. ANNs can be used to predict the amount of energy consumption based on factors such as the month, season, etc. and clean energy production based upon factors such as direction and speed of winds, cloudiness, seasons, etc. ANNs can also model the relationship between the quality of underground water based on the garbage dumps identified in satellite images. ANNs can also be trained to segregate dry and wet waste based on their images, moisture content and smell.

## **Database, Blockchain and Gamification**

The success of any organisation or an individual depends on the quality of decisions made which itself depends upon the quality of the information on the decision on which it is based. One major characteristic of good data is its timely availability which depends upon the efficiency of data search. Data files are stored in two ways, one is as a flat file or unstructured way and the second one is in a structured way in the form of models such as tables. Storing data in a structured way makes updates and searches efficient. Database management systems (DBMS) like MS Access, Oracle and MYSQL are excellent tools to create, update and search databases. Searching records manually in very large datasets is a herculean task. Handling databases becomes easy and efficient with the use of Structured Query Language (SQL). SQL contains simple statements in English called queries used to create, update and delete databases, tables, records and values. Making students learn a DBMS with SQL will enable them to handle complex and large-volume databases more efficiently. They will master the skills of creating databases, storing, searching, updating, deleting, generating reports and presenting data in multiple ways. These skills will help to organise data systematically so as to facilitate easy and quick data retrieval in their workplace.

The awareness of blockchain technology (BCT) is another technology that can contribute to education for sustainability. [Rocamora and Amellina \(2020\)](#) have identified 24 different areas in BCT that can be applied to achieve SDGs. BCT can be used for climate change mitigation by bringing about more transparency in tracking carbon emissions and trading ([Chapron, 2017](#)). The technology can improve trust, transparency and confidence in issues related to climate finance ([UNFCCC, 2021](#)). Other applications include timestamped authentication of digital identities of people below the poverty line for their entitlements, verifying academic certificates for students and BCT-based e-markets can be used for reducing exploitation and discover better prices for self-help groups and small and marginal farmers ([Mattila et al., 2022](#)).

The method of gamification can have a lot of scope for improving education for sustainable development. The simulated gaming environment can be a powerful instrument to generate interest among students and citizens in the SDGs and to bring about crucial behavioural changes ([Rodrigo, et al., 2021](#); [Souza](#)

et al., 2020). The games like *The World's Future*, *Go Goals*, *World Rescue*, *Oil Springs*, *For People and Planet*, etc. can be of immense utility, for building awareness, encouraging experiential learning and promoting social engagement about SDGs. The gamification technology can be used to impress upon the students the benefits of eco-friendly tourism, protecting dunes, afforestation, responsible consumption, safeguarding micro-living organisms, sustainable tourism, organic farming, etc.

## Conclusion

Integrating technology with the learning process for creating sustainable development has many benefits. Such blending can lead to a trans-disciplinary approach to address societal challenges. It will also equip students and teachers to shift their focus from what of thinking to how. Today, different departments/schools in academic institutions are working in silos and there is no common language for communication. It is emerging as the biggest stumbling block in our efforts to achieve SDGs. The stakeholders have to plan elaborate programmes for teachers to understand, appreciate and implement integration between digital technologies and classroom teaching. Such integrations will open new vistas for research, benefitting all communities and sections. The quality of life and the happiness index of society can be improved. The world will witness social justice, peace, climate justice, collaboration, sustainable development, lesser inequality and poverty and so on.

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