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Harnessing Emerging Technologies for Scalable, Global, Ethical & Equitable Education for Sustainability

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Abstract

New and emerging technologies offer significant potential for rapidly accelerating the delivery of education for sustainability that is scalable, global, inclusive, ethical and equitable. Driven by the emergence of the digital revolution, information and communications technologies (ICTs) and internet connectivity, technologies including e-learning platforms, virtual learning environments and artificial intelligence (AI) will play a crucial role in advancing innovation in sustainability education and driving progress towards the achievement of the United Nations Sustainable Development Goals. Strong multi-stakeholder partnerships that foster solidarity and cooperation between governments, international organisations, non-governmental organisations, technology companies, educational institutions and civil society are urgently needed in order to effectively deliver on the technology infrastructure, services and capabilities required for sustainable development education. True to the United Nations Declaration on Human Rights and the promise to "Leave No One Behind", education should be accessible to all. By taking an ethical, just and human rights-based approach to narrowing the digital divide, digital infrastructure and technologies can help to broaden access to education for sustainable development globally.

1. Technology for Sustainability Education & the Sustainable Development Agenda

In the United Nations Strategy on New Technologies, Secretary General António Guterres stated that "without a stepped-up, smart and responsible use of technology, we will fail to reach the Sustainable Development Goals and we will miss opportunities to prevent conflict and sustain peace" (United Nations, 2018). This message has never been truer and especially in the context of education for sustainability globally.

The Agenda 2030 United Nations Sustainable Development Goals (SDGs), also known as the Global Goals, are a call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity (UNDP, 2023). Education will be critical in ensuring that the SDGs are realised and as part of this, it is imperative that learners are enabled and empowered to drive sustainable development at pace and scale globally. Education for Sustainable Development (ESD) recognises that sustainable development must encompass education, and education must integrate sustainable development (UNESCO, 2020; Dollin et al., 2022). The importance of ESD is also recognised in the Paris Agreement.

Article 26 of the United Nations Universal Declaration on Human Rights states that "everyone has a right to education and that education should be free, at least in the elementary and fundamental stages". It also states that technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit (United Nations, 2023). Under the United Nations SDGs, SDG 4 strives to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all by the year 2030 (UNDESA, 2023). Within this, a number of targets are defined. These include ensuring that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes; ensuring equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university; increasing the number of people with relevant skills for employment, decent jobs, and entrepreneurship; ensuring that all learners acquire the knowledge and skills needed to promote sustainable development; and substantially increasing the supply of qualified teachers in developing countries (UNDESA, 2023).

2. Technologies for Sustainability Education - Fostering Scalable, Global & Inclusive Education

In recent times, we have seen a paradigm shift in our educational systems in that technology has now become central to them. The digital revolution, the rapid emergence of information and communication technologies (ICTs), and internet connectivity have been a primary driver of this change. In the year 2023, it is expected that 15 billion devices will be connected to the Internet of Things, and this number is expected to double by 2030 (Transforma Insights, 2022). A major driver of this trend will be the rapid expansion of 5G coverage, which will result in devices communicating and transferring information with greater speed than ever (WEF, 2023).

There has been a significant increase in online and hybrid learning opportunities through virtual learning platforms and massive open online courses (McKinsey, 2022). This has made accessibility of educational

resources much easier for many, especially in remote locations. The adoption and use of technology in education has also generated new pedagogies which now require the use of digital platforms and virtual learning environments. The Covid-19 pandemic has accelerated this further (Souza et al., 2022).

"Digital technology has become a social necessity to ensure education as a basic human right, especially in a world experiencing more frequent crises and conflicts" according to UNESCO (2023). Technologies have the potential to play a crucial role in advancing sustainability education and drive progress towards the achievement of the United Nations SDGs. With their ability to foster global connectivity, facilitate information exchange, and encourage collaboration across nations and cultures, technologies offer promising solutions for delivering scalable, inclusive, and effective sustainability education (Haleem et al., 2022). From e-learning platforms and interactive digital tools to augmented reality, virtual reality, artificial intelligence (AI), digital twins and the metaverse, technology can provide educators and learners with new and innovative ways of engaging with sustainability issues which in turn can promote sustainable development (Haleem et al., 2022; UNESCO, 2020; UNESCO, 2023). These also allow for the global exchange of experiences, knowledge and expertise and therefore shared understanding.

As an example of best practice, the Sustainable Development Solutions Network (SDSN) is a global initiative which mobilises expertise and knowledge from academia, civil society, and the private sector to develop and promote practical solutions for sustainable development (SDSN, 2023). This includes addressing poverty, inequality, and climate change. The network comprises member institutions from over 150 countries. The SDG Academy, which represents the education and training portfolio of the SDSN, provides a large number of online education and training courses and programmes through e-learning platforms (SDG Academy, 2023). The SDSN and SDG Academy work closely with the United Nations and other organisations to support the implementation of the SDGs through the delivery on online education in order to promote a sustainable and prosperous future for all.

3. Equitable Access to Sustainability Education Through Digital Technologies

The digital divide is pervasive across many regions in the world and is an anathema to achieving the SDGs. The Global Connectivity Report highlights that one-third of humanity remains offline while many users only have basic connectivity (ITU, 2022). Consequentially, developing the digital infrastructure, services and capabilities necessary to utilise technology meaningfully is essential for achieving the SDGs. Now, more than ever there is need to accelerate our collective efforts to ensure the necessary infrastructure and capabilities are available to citizens wishing to avail of the plethora of knowledge and expertise available globally. Moreover, AI and other digital technologies are transforming the way we work, the way we learn and ultimately the way we engage with each other (DETT, 2022). As we continue to strive towards a learning society, the SDGs are central to this ambition (Tindemans and Dekocker, 2020).

The Just Digital Framework is an approach which articulates a new way of considering the advancement of the SDGs by providing a focus on how the digital revolution can be achieved ethically (O'Sullivan et al. 2021; Clark et al., 2022). We go further to suggest that in a post-COVID world, the reframing of educational opportunity must ensure that digital platforms play a leading role in the access to and dissemination of knowledge to all that eliminates all barriers to access. Moreover, central to our view is the premise that the co-creation of assets (content, pedagogy etc) is core to this approach as it creates a powerful dynamic of continuous learning and feedback across the many stakeholders.

4. Partnerships to Accelerate the Delivery of Technology for Sustainability Education

In order to fully realise the potential of technologies for sustainability education globally, strong multi-stakeholder partnerships between governments, international organisations, non-governmental organisations, technology companies, educational institutions and civil society are needed. The tried and tested Triple Helix model which brings together governments, academia and industry requires reframing to encompass more stakeholders and wider participation among all relevant and willing actors. True to the United Nations Declaration on Human Rights and the promise to "Leave No One Behind", education should be accessible to all, and digital infrastructure and technologies can help to broaden this access. However, policy changes and funding mechanisms are required to achieve this. Without this coalition of the willing as well as effective financing, progress in building digital infrastructure and the technological capacity as well as sustainability education capacity will remain sedentary and ineffective. By working together, stakeholders can collaborate to develop and implement effective strategies for developing and leveraging technology for enhancing education and driving progress towards the SDGs. Such partnerships can also ensure that technological innovations are developed in a way that is accessible, equitable, and inclusive, so that all educators and learners, regardless of their backgrounds, have the opportunity to benefit.

5. Key Recommendations

New and emerging technologies offer significant potential for rapidly accelerating the delivery of education for sustainability that is scalable, global, inclusive, ethical and equitable.

There is an urgent need for more research on how technologies can be harnessed to advance sustainability education and drive progress towards the achievement of the United Nations Sustainable Development Goals and the Paris Agreement.

Multi-stakeholder partnerships between governments, international organisations, non-governmental organisations, technology companies, educational institutions and civil society should be prioritised in order to effectively deliver on the technology infrastructure, services and capabilities required for sustainable development education.

By taking an ethical, just and human rights-based approach to narrowing the digital divide, digital infrastructure and technologies can help to broaden access to education for sustainable development globally.

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