The Effect Of Educational Technology On Education And Sustainable Development

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Abstract: Quality education is one of the pillars in the United Nations 2030 Agenda for Sustainable Development, which aims to ensure inclusive and equitable quality education and promote lifelong learningopportunities for all, in this study the role of educational technology in teaching is examined using a questionnaire which explored the role of information and communication technologies in teaching and sustainable development. The results of the study indicated that the responses of the students indicated that the use of technology in education helps to improve the educational process also to achieve the sustainable development goals. The study also came out with some recommendations to help in the integration of educational technology.

Keywords: Educational Technology; Sustainable Development goals and E- learning.

1. Introduction

Sustainable human development is a modern subject of interest that has gained relatively great importance recently, that can be measured in any country through a range of indicators, including education indicators and the extent of the spread of knowledge and their role in building sustainable human development. Sustainable development is characterized by rationality, development, and qualitative improvement of people's lives[1-10].

In broad terms, sustainability is an attempt to reconcile growing concerns about a range of environmental issues with socio-economic objectives. The so-called three pillars of economic, social and environmental sustainability are not necessarily in alignment, and often create situations that are deemed complex and perplexing, with lack of clarity about the problems, and different interests creating tensions[11, 12]. Sustainability, as seen from five different perspectives in published literature, is captured in Figure 1.
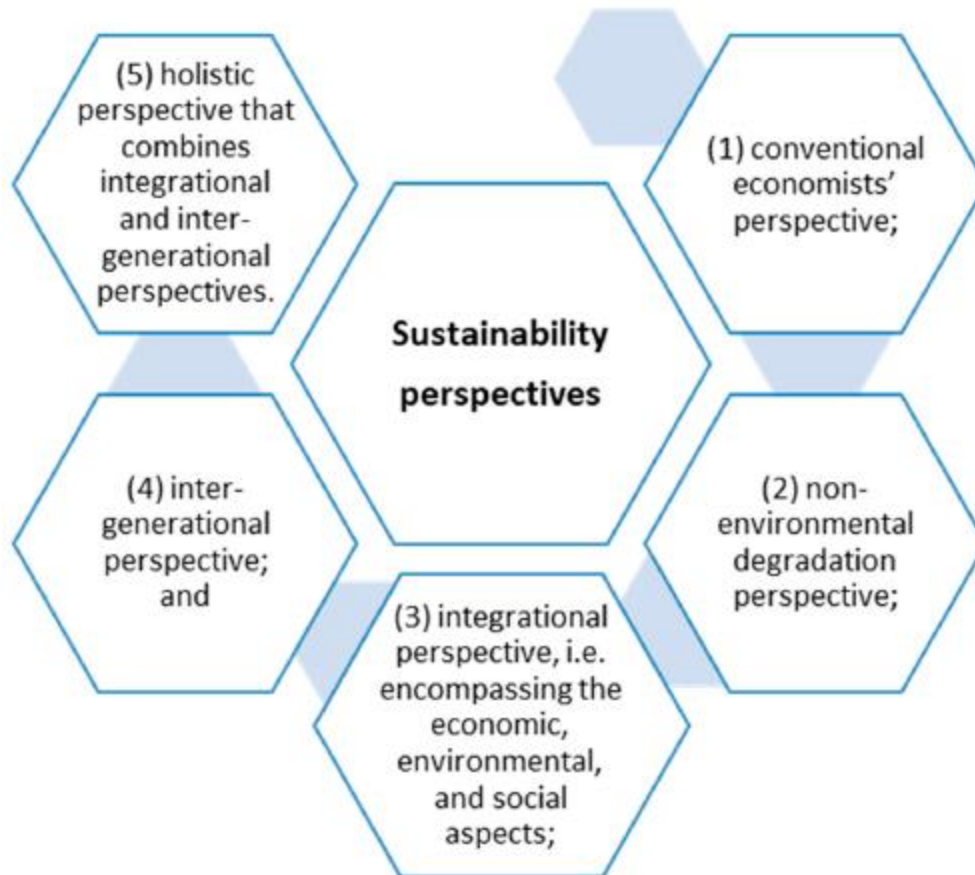
Figure 1: Sustainability as seen from five different perspectives in published literature [11, 12].

Technology is the backbone of development and is a gateway to the levels of the progress that we all seek. It is reflected in the evolution of all aspects of human activity and knowledge. It played over the years a crucial role in the rise of countries and the formulation of the present and future trends.

The education technology, which is an integrated educational process based on the delivery of knowledge and science to students and the effective use of technology in education[1, 2].

Where the problem is the lack of awareness of the importance of sustainable development, also the ability of society to continuous self-development, including: educational technology, such as showing educational films or using the computers, also integrating and involving the Internet in academic curricula. In fact, the use of the Internet in the educational process is one of the factors that help to establish students' knowledge and provide them with new skills[3, 5].

Figure 2: Sustainable Development Goals[13].

The United Nations Sustainable Development Goals (SDGs) are targets for global development adopted in September 2015, set to be achieved by 2030. All countries of the world have agreed to work towards achieving these goals which are presented in figure 2. The sustainable development goals 4 has ten targets which are measured by 11 indicators(see figure 3). The seven "outcome-oriented targets" are: free primary and secondary education; equal access to quality pre-primary education; affordable technical, vocational and higher education; increased number of people with relevant skills for financial success; elimination of all discrimination in education; universal literacy and numeracy; and education for sustainable development and global citizenship[11, 14-16]. The three "means of achieving targets" are: build and upgrade inclusive and safe schools; expand higher education scholarships for developing countries; and increase the supply of qualified teachers in developing countries.

Indicator
4.1.1 Proportion of children and young people (a) in Grade 2 or 3; (b) at the end of primary education; and (c) at the end of lower secondary education achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex
4.2.1 Proportion of children under 5 years of age who are developmentally on track in health, learning and psychosocial well-being, by sex
4.2.2 Participation rate in organized learning (one year before the official primary entry age), by sex
4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex
4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill
4.5.1 Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated
4.6.1 Proportion of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex
4.7.1 Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment
4.a.1 Proportion of schools with access to: (a) electricity; (b) the Internet for pedagogical purposes; (c) computers for pedagogical purposes; (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single-sex basic sanitation facilities; and (g) basic handwashing facilities (as per the WASH indicator definitions)
4.b.1 Volume of official development assistance flows for scholarships by sector and type of study
4.c.1 Proportion of teachers in: (a) pre-primary education; (b) primary education; (c) lower secondary education; and (d) upper secondary education who have received at least the minimum organized teacher training (e.g. pedagogical training) pre-service or in-service required for teaching at the relevant level in a given country, by sex

Figure 3: Education for Sustainable Development (SDG) 4 global indicators[17].

Several years after the launch of the sustainable development goals, growing voices called for more emphasis on the need for technology and internet connectivity within the goals. In September 2020, the UN Broadband Commission for Sustainable Development called for digital connectivity to be established as a "foundational pillar" for achieving all the sustainable development goals. In a document titled "Global Goal of Universal Connectivity Manifesto", the Broadband Commission said: "As we define the 'new normal' for our post-COVID world, leaving no one behind means leaving no one offline[18].

The SDGs are based on the premise that current needs should be met without compromising resources. This implies using technologies in an eco-responsible manner or directly choosing to use sustainable technologies. The latter are those for which less energy and fewer limited resources are used in their manufacturing, sales, and consumption processes, those which do not pollute

directly

or indirectly and those that can be reuse

The advanced use of digital technology has also had an impact in the field of education:

the catalogue of competencies that define a twenty-first century teacher has grown larger and the traditional understanding of literacy has taken on a new meaning.

This competence is divided, in turn, into three indicators, that, in general terms, focus on: the ability to save energy through ICT, to make adequate use of them so as to extend their

useful life and to be able to establish channels of dissemination within the educational community

itself for sustainable purposes. All this requires promoting the use of ICT while adopting a respectful

and committed approach to the environment.The educational technology means the practice and application of technologies (in the form of techniques, tools, processes, resources, etc.) to facilitate, support, and enhance learning, performance, and instruction.While educational technology has emerged as a recognized profession and discipline in the last 50 years, it is a complex, interdisciplinary, and dynamic enterprise. This study deals with technology in education, including the reasons, importance and objectives.

2. Study Questions

The study attempts to answer the following questions:

1. Does the Internet help to attract the attention of students?
2. Does the Internet allow flexibility in learning?
3. Has technology helped to improve education?

3. Study Scope

The study is limited to the impact of educational technology in the Kingdom of Saudi Arabia.

4. Study Definitions

Technology ("science of craft", from Greekτέχνη, techne, "art, skill, cunning of hand"; and -λογία, -logia) is the sum of any techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation[19].

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, morals, beliefs, and habits. Educational methods include teaching, training, storytelling, discussion and directed research. for students; In addition to developing their attitudes and ideas; Teaching methods vary; There is traditional education; e-mail.

E-learning theory describes the cognitive science principles of effective multimedia learning using electronic educational technology.Educational technology (commonly abbreviated as EduTech, or EdTech) is the combined use of computer hardware, software, and educational theory and practice to facilitate learning. When referred to with its abbreviation, EdTech, it is often referring to the industry of companies that create educational technology

5. Literature Review

The study of Bos AS et al, [20] demonstrate the influence of augmented reality (AR) used as a tool for educational content in student concentration when compared with the use of traditional teaching and learning technologies. User attention was monitored through an electroencephalography sensor while performing an educational task using either an AR or a traditional interface. This presented favorable results, since it was possible to identify an increase in student attention during the interaction with the AR application, as opposed to its conventional counterpart.

The study of Bedenlier et al, [21] which is a systematic review of 42 peer-reviewed arts and humanities articles published between 2007-2016, indexed in four international databases. The results indicate that most research has been undertaken in language learning, predominantly in East Asian countries, with limited grounding of research in theory. This review found that educational technology supports student engagement, with behavioral engagement by far the most prevalent dimension. Affective engagement was the lowest observed dimension, with affective disengagement the most prevalent negative dimension. Blogs, mobile learning, and assessment tools were the most effective at promoting engagement.

A framework was developed by Kioupi and Voulvoulis in [11] that redefines ESD as a tool that can deliver the transformation required for society to reach a sustainable state, see figure 3. Using the SDGs as end points for this state, and through a participatory approach, education stakeholders and learners work together to construct a common vision of sustainability, identify the competences needed, and develop appropriate pedagogies and learning strategies. The proposed framework allows for the development of evaluation tools that can support educational institutions to monitor and manage their progress in transforming societies towards sustainability[11]. Figure 4 shows the proposed framework which contains the main following steps:

(1) A participatory vision of sustainability.

(2) Enabling conditions for sustainability.

(3) Competences for sustainability transformation.

(4) Pedagogies and learning strategies for ESD.

(5) Monitoring and evaluation of ESD competences and distance from sustainable state.
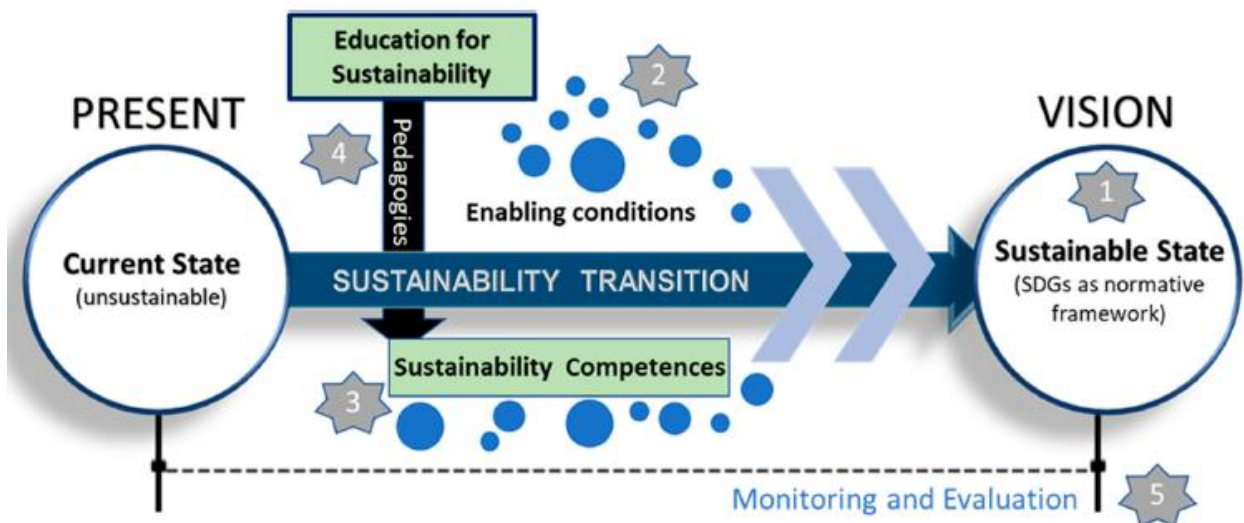
Figure 4: The proposed Educational framework for sustainability transformation and main steps[11].

The study of Akbaba-Altun[22]aimed to identify the perception of school principals towards technology and their experience in using computers and the relationship between them, and the study population consisted of all the principals of public primary schools in turkey who were 124 male and female directors; To collect the data, the researcher developed a measure of the trend towards technology as well as a questionnaire to identify the experience of managers in the use of computers the results of the study showed that school principals have a positive attitude towards technology, but they still are reluctant to take advantage of them in their daily work. And that all schools were equipped with computers. There is also no statistically significant relationship between school principals' trend towards technology and their experience in using computers.

The study of Baena-Morales [2]indicated that work of teaching is fundamental for achieving Agenda 2030, which defends the importance of improving quality in education (Sustainable Development Goal SDG 4), gender equality (SDG 5) and responsible consumption (SDG 12). The study analyzed teachers' self-perceived digital competence as regards their eco-responsible use of technology.

The study of Burbules et al, [3]argued for a different orientation toward thinking about new technologies in education: not just as tools or delivery systems, but as a set of resources and affordances that provide an opportunity to rethink our educational aims, methods, and institutions. If we are to end unsustainable thinking and practice, we will need a transformed system of education to guide us into a prosperous and sustainable future.

6. Methodology

The descriptiveanalytical method was applied, it usually includes collecting data, analyzing it and drawing conclusions.

- **Study Population**

This study included Al-IbtikaryaSchool in Riyadh, the questionnaire was distributed 20 students from the middle and high school students.

- **Study sample and tools:**

A questionnaire consisted of 11 items (closed ended questions) was distributed on january-2020 to explore the students' opinions on integrating technology in education and its effect on the field of the sustainable development.

Table 1: Questionnaire questions.

Questions	Yes	No
Has technology helped advance education?	95%	5%
Are the goals of sustainable development important in society?	80%	20%
Does the use of technology in education help increase students' awareness of sustainable development?	90%	10%
Does the use of technology in education increase students' interest in the subject matter?	75%	25%
Do you prefer to use the technology in the educational subjects?	90%	10%
Do you want to have your own device available for the lesson?	89%	11%
Is technology important in facilitating the daily life of the person?	84%	16%
Do you see any negative effects of technology in increasing the demands of life?	79%	21%
Has the use of technology in education contributed to preserving and sustaining resources?	81%	19%

7. Results

The responses of the students indicated that the use of technology in education helps to improve the educational process also the presence of educational technology is growing in the classroom. The new generation of kids come ready to work with these new technologies, which play an important role in children's learning and acquiring various cognitive knowledge so that educational technology must be incorporated into future curricula. The application of educational technology enhances skills and cognitive characteristics. With the help of new technology comes an explosion of learning and receiving new information, especially on mobile devices.

The use of educational technology in teaching provides better interaction with students, better reception of information because the students receive knowledge visual, auditory, and kinesthetic way. Among other things, an educational technology motivates students to work independently where the student is more motivated to return to learning and working because modern technical equipment is widely available at any given moment.

8. Conclusion and Recommendations

In this study the role of educational technology in teaching was examined using a questionnaire which explored the role of information and communication technologies in teaching and sustainable development. The obtained results indicated that the responses of the students indicated that the use of technology in education helps to improve the educational process also to achieve the sustainable development goals.Considering the above results, the authors proposed the following recommendations:

1. Spreading awareness among students of the sustainable development goals.
2. Conducting interactive activities in the classroom
3. Allowing the discussion during the lessons.
4. The society in general must have a spirit of cooperation in achieving the goals of the Ministry of Educationto achieve the Kingdom's Vision 2030.
5. Activating modern and technical strategies during the classes.
6. Collaboration between teachers and society to achieve sustainable development goals by improving the quality of education by the application of modern technology and strategies.

References

[1] Sung A, Leong K and Cunningham S. Emerging technologies in education for sustainable development. 2020.
[2] Baena-Morales S, Martinez-Roig R and Hernádez-Amorós M J. Sustainability and Educational Technology—A Description of the Teaching Self-Concept. Sustainability, 2020, 12(24): 10309.
[3] Burbules N C, Fan G and Repp P. Five trends of education and technology in a sustainable future. Geography and Sustainability, 2020, 1(2): 93-97.
[4] CHI Y. Educational technology as a key enabler for achieving the Sustainable Development Goal 4. KDI School, 2018.
[5] Rudinger B J and O'Neil J K. Technology-Enhanced Learning and Education for Sustainable Development. Encyclopedia of Sustainability in Higher Education, 2019: 1911-1918.
[6] Sachs J D. From millennium development goals to sustainable development goals. The Lancet, 2012, 379(9832): 2206-2211.
[7] Assembly G. Sustainable development goals. SDGs Transform Our World, 2015, 2030.
[8] Sachs J D, Schmidt-Traub G, Mazzucato M, Messner D, Nakicenovic N and Rockström J. Six transformations to achieve the sustainable development goals. Nature Sustainability, 2019, 2(9): 805-814.
[9] Moyer J D and Hedden S. Are we on the right path to achieve the sustainable development goals? World Development, 2020, 127: 104749.
[10] Nilsson M, Chisholm E, Griggs D, Howden-Chapman P, McCollum D, Messerli P, Neumann B, Stevance A-S, Visbeck M and Stafford-Smith M. Mapping interactions between the sustainable development goals: lessons learned and ways forward. Sustainability Science, 2018, 13(6): 1489-1503.

[11] Kioupi V and Voulvoulis N. Education for sustainable development: A systemic framework for connecting the SDGs to educational outcomes. Sustainability, 2019, 11(21): 6104.

[12] Lozano R. Envisioning sustainability three-dimensionally. Journal of cleaner production, 2008, 16(17): 1838-1846.

[13] Sustainable Development Goals https://sdg-tracker.org/.

[14] Castellanos P M A and Queiruga-Dios A. From environmental education to education for sustainable development in higher education: a systematic review. International Journal of Sustainability in Higher Education, 2021.

[15] Kroll C, Warchold A and Pradhan P. Sustainable Development Goals (SDGs): Are we successful in turning trade-offs into synergies? Palgrave Communications, 2019, 5(1): 1-11.

[16] Allen C, Nejdawi R, El-Baba J, Hamati K, Metternicht G and Wiedmann T. Indicator-based assessments of progress towards the sustainable development goals (SDGs): a case study from the Arab region. Sustainability Science, 2017, 12(6): 975-989.

[17] SDG U. Sustainable development goals. The energy progress report. Tracking SDG, 2019, 7.

[18] ITUwebsite. Broadband Commission calls on world leaders to prioritize universal connectivity as fundamental to sustainable development & global recovery. https://www.broadbandcommission.org/press-release-sept-2020/. September 18, 2020.

[19] ÇOKLAR A N and BOZYİĞİT R. DETERMINATION OF TECHNOLOGY ATTITUDES AND TECHNOSTRESS LEVELS OF GEOGRAPHY TEACHER CANDIDATES. lnternational Journal of Geography and Geography Education(44): 102-111.

[20] Bos A S, Herpich F, Kuhn I, Guarese R L, Tarouco L M, Zaro M A, Pizzato M and Wives L. Educational technology and its contributions in students' focus and attention regarding augmented reality environments and the use of sensors. Journal of educational computing research, 2019, 57(7): 1832-1848.

[21] Bedenlier S, Bond M, Buntins K, Zawacki-Richter O and Kerres M. Facilitating student engagement through educational technology in higher education: A systematic review in the field of arts and humanities. Australasian Journal of Educational Technology, 2020, 36(4): 126-150.

[22] Akbaba-Altun S. Information technology classrooms and elementary school principals' roles: Turkish experience. Education and Information Technologies, 2004, 9(3): 255-270.