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ICT in higher education for sustainable development in India: Perspective from NEP 2020

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Abstract
This study is examined from a theoretical perspective of the importance of Information and Communication Technology (ICT) in education, where the focus is largely on the system of analyzing Learning Outcome, for the means of improving teaching and learning environment in higher education. The study suggested that with advanced technology, has yet not being very successful in meeting the demands of Infrastructure facilities placed by the faculty members, the academicians are increasingly involved in administrative tasks, rather than the teaching and learning, and research activity. The application of Information and Communication Technology (ICT) does not focus on technology that adds value to education and promotes Quality Education for Sustainable Development. The New Education Policy 2020 has envisaged for the promotion of Information and Communication Technology (ICT) in Education for Sustainable Development. The paper focus on the steps taken into consideration by the government of India for the promotion of Information and Communication Technology (ICT) in Higher Education for Sustainable Development, and the outcome would be of how these recommendations could be implemented at the grassroot level of Higher Education system in India.

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Introduction

The increasing rate of information and communication technologies (ICTs) has development a widespread implementation across all sectors of the economic and social life bringing about a radical change in the way one's work, think, learn and communicate. A broad definition of information and communication technologies is concerned with the difference between traditional technologies such as radio, television, video, DVD, computers) and new modern technologies such as video conferencing, e-mail, cellular telephones, weblogs, Web 2.0, and other social networking software. The educational system, worldwide, face the challenge of preparing individuals, who needs to be equipped with the necessary skills and competencies to transform current unsustainable practices. Teachers are incited to switch from roles of being knowledge transmitters to towards taking more active roles as curriculum developers, knowledge constructors and transformative learning outcomes.

The major focus for shaping the 21st century Higher Education is to

1. The development and intermingling of Information and Communication Technologies (ICT);
2. The increasing demand for new Educational Approaches that foster transformative and lifelong learning and,
3. The reorientation of Educational curriculum to label Sustainable Development.

Thus, Information and Communication Technologies can be a context for Education for Sustainable Development. More precisely, Education for Sustainable Development should integrate into the higher educational Institution to provide a context for Information and Communication Technologies in education. Such as, social, economic and environmental issues which can provide meaningful and challenging contexts for developing a wide range of Information and Communication Technologies skills. Education for Sustainable Development methods are conducive with constructivist and transformative learning theories, which can provide a context and rationale for using technological based learning tools such as concept mapping, modeling, social networking, etc.

Education for sustainable development

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[1]. Education for Sustainable Development should concentrate on many different components of Higher Education. United Nations Educational, Scientific and Cultural Organization. considered the challenges of Education for Sustainable Development and states that it needs: 'to integrate the principles, values, and practices of sustainable development into all aspects of education and learning' as well as that 'this educational effort will encourage changes in behavior that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations' (UNESCO, 2005)[2].Reflecting these challenges UNESCO set the focus more intensively on cross-sectional learning settings including informal and non-formal education and applying that is games, online education, blended learning, usage of Internet, social networks etc. Thus, the creation of an infrastructure for knowledge exchange as well as efforts to foster competences on the educational application of digital media had seem to be an urgent task of Education for Sustainable Development regarding the innovation of sustainable educational landscapes.

Higher Educational Institutions is trying to take initiative for initiating and implementing use of Information Communication Technology, to facilitate with real practice of learning and teaching, which effectively can improve and change the system of Higher Education Institutions. The 21st century Information Communication Technology platforms Artificial Intelligence, Internet of Things, Massive Open Online Course (MOOC) , Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) , Augmented reality (AR) and Virtual Reality (VR) sharpen the critical thought process of learners and researchers and answers to all the queries related for enhancing of sustainable productive Information Communication Technology and digital technology facilitate quality education, and providing good study material, and better learning opportunities to students who are located at geographically remote and rural areas.

[1]Verma, S. (2017) [4]. Ict integration in education for sustainable development. *International Journal of Recent Trends in Engineering and Research*, *3*(5), 347-349. https://doi.org/10.23883/ijrter.2017.3233.xdmjy

[2]UNESCO WORLD SUMMIT (2005) [5], Outcome document, 15 September 2005

These learners and researchers have meagre or nil accessibility and availability of direct learning resources. Impacts of Massive Open Online Courses (MOOCs) and Small Private Online Courses (SPOCs) are well appreciated as they promote skill-based learning to unlimited numbers of executives and students as well in all streams of knowledge. Implementing the innovative strategies into practice opens doors to enhance learning, earning and raise economic standard of living in the society at a fast rate compared to traditional (face-to-face) education. Higher Educational Institutions are quite serious to adopt the technologies having more sustainable, adaptable, and productive approaches initiated by all stakeholders and society at large.

Need of Information Communication Technology in Education for Sustainable development

The Teachers of the new curriculum to be retrained in the use of Information Communication Technology to create and develop creativity to cater for different needs of individual learners. The need for proper management of information in technologies in higher Education, the policies of the country have to put information and guidance, it has brought up with relevant recommendations to meet the demands of the society at large. it is very well known that the government policies and indicatives will be having information policy in place will go a long way to assist to be able to properly manage the system of information just like any other developed countries. On the issue of language, it observed that a number of initiatives are taking place to facilitate the use of ICTs in other languages for those people who are not literate in English could also have access to it.

Review of literature

Dwivedi, V. J., & Joshi, Y. C. (2021) [1] in his study states, Artificial Intelligence and Augmented-Virtual Reality present both opportunities and challenges for rural and remote areas in developing and underdeveloped countries. The responsibilities of the leadership of HEIs to promote ICT-integrated pedagogy, staff-training and up-grading of infrastructure are discussed. Prevailing trends, approaches, hurdles, and future requirements of ICT-infrastructure, usage and training are presented based on analysis of data collected through qualitative survey research conducted in India for a population of 583 multidisciplinary respondents. 89.7 percent of respondents are highly qualified with research degrees having experience of 12-35 years. The results are expected to motivate policymakers to enhance sustainable productivity by promoting ICT-digital technologies. The authors discovered lack of motivation, willingness, training opportunities, and facilities as barriers to adopting ICT at Higher Educational Institutions.

Moodly, A. L., & Adu, E. (2014) [2]. This study examined from a theoretical perspective the importance of ICTs in education, in the context of education for sustainable development (ESD). More specifically, it also focused on the system of analyzing intended learning outcomes (ILOs) as a means of improving teaching and learning. The study suggested that with advanced technology, cognizance has not been taken of the demands placed on the faculty members, who as academicians are increasingly involved in administrative tasks, rather than the core business of teaching and learning, community engagement and research. It concluded that the application of ICTs does not necessarily add value to the maxim of Education for Sustainable Development, or education in general. The focus has to be on technology that adds value to the education experience, and

Faculty needs to guard strongly against administrative processes and procedures that threaten to overwhelm and detract from the value of teaching and learning.

González-Zamar, M., Abad-Segura, E., López-Meneses, E., & Gómez-Galán, J. (2020) [3]. In their study states that educational technology in the context of a sustainable higher education must achieve the internalization of ethics and the sustainable development of humanity. The main objective of this study is to, at a global level, examine the research during the period 2000–2019 on the management of ICTs for sustainable education in the context of higher education. Global research trends on this topic during the period 2000–2019 have been analyzed. Consequently, bibliometric techniques have been applied to a sample of 1814 articles selected from the Scopus database. The results provided data on the scientific productivity of the journal, authors, research institutions, and countries that contribute to the development of this topic. The evidence reveals an exponential trend, mainly in the last five years. In addition, current and future lines of research have been identified. Research at an international level presents a growing trend of publication that allows determination of the relevance of research on ICT management to achieve sustainable education in the context of higher education. This study makes it possible to establish the relationship between science, sustainability, and technology in higher education institutions, and to base the decision-making process for the driving agents of this area of knowledge.

Hofstetter, M., Gees, T., Riedl, R., & Koumpis, A. (2020) [7]. In their opinion promote the idea of an open dialogue to take place from within the Sustainable Futures journal that will offer the opportunity to a wide range of actors and stakeholders to present their ideas, concerns and worries on a variety of issues relevant and related to aspects of sustainability. Such an open-ended approach will help overcome opposing dynamics that currently cater for polarization and as a result to the segregation within the scientific community and the society at large. On the positive side, there is a wide spectrum of ambitious, game-changing and disruptive initiatives that can be taken from academia, from the industry, from the activists' movements and the citizens at large, which will aim to increase our freedoms and not reduce them.

Gogoi, L. (2016) [8]. States that the demand for having basic and updated knowledge and skills of information and communication technology (ICT) along with basic, higher order and affective skills within the employee is growing day by day. As such, institutions of higher education today need to focus preferably on imparting education with ICT so that basic knowledge and skills of ICT can be acquired by the students in the process of education, i.e. teaching-learning. The basic task of HEIs is to create an ICT-enabled learning environment. For this, an ICT policy needs to be evolved strategically for institutional practice including well equipped ICT infrastructure, education-industry collaboration, competence building of teachers and pedagogy-ICT integration.

Kler, S. (2014) [9]. In his paper states that the use of ICT in teaching learning have changed the whole concept of education and had proved to be of great benefit both for the teachers as well as the students. Through ICT, teachers get an opportunity to use new innovations in their teaching and present the study material in a more refined manner which is easily understood by the students and apart from this, ICT usage in teaching learning by the teachers gives an opportunity to the teacher to get acquainted with the new innovation and become contributors to its use in education. The students gain a lot by learning through ICT and they learn to seek knowledge on their own by using ICT. They also get an opportunity to share their knowledge with others through ICT. But there are certain factors which effect the successful ICT integration in teaching learning. This paper throws light on the benefits of ICT usage in teaching learning, three phases to successful ICT integration, factors influencing ICT by teachers, the barriers to successful ICT integration, implications to check barriers, and the changed role of the teachers.

National Educational Policy 2020 regarding ICT in Higher Education for Sustainable Development:

The global education development agenda reflected in the Goal 4 (SDG4) of the 2030 Agenda for Sustainable Development, adopted by India in 2015 - seeks to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" by 2030. Such a lofty goal will require the entire education system to be reconfigured to support and foster learning, so that all of the critical targets and goals (SDGs) of the 2030 Agenda for Sustainable Development can be achieved.[3] The vision of the Policy is to instill among the learners a deep-rooted pride in being Indian, not only in thought, but also in spirit, intellect, and deeds, as well as to develop knowledge, skills, values, and dispositions that support responsible commitment to human rights, sustainable development and living, and global well-being, thereby reflecting a truly global citizen.

Given the emergence of digital technologies and the emerging importance of technology for teaching-learning in Higher Education, the Policy recommends the following key initiatives:

a. Digital infrastructure: There is a need to invest in creation of open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and point solutions, to solve for India's scale, diversity, complexity and device penetration. This will ensure that the technology-based solutions do not become outdated with the rapid advances in technology.
b. Online teaching platform and tools: Appropriate existing e-learning platforms such as SWAYAM, DIKSHA, will be extended to provide teachers with a structured, user-friendly, rich set of assistive tools for monitoring progress of learners. Tools, such as, two-way video and two way-audio interfaces for holding online classes are a real necessity as the present situation.
c. Content creation, digital repository, and dissemination: A digital repository of content including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality will be developed, with a clear public system for ratings by users on effectiveness and quality.

Manoj K. Saxena; Anu G. S. (2020). *New education policy on higher education (Prabhat Prakashan)*. Prabhat Prakashan.

d. Addressing the digital divide: Given the fact that there still persists a substantial section of the population whose digital access is highly limited, the existing mass media, such as television, radio, and community radio will be

extensively used for telecast and broadcasts. Such educational programmes will be made available in different languages to cater to the varying needs of the student population.

e. Virtual Labs: Existing e-learning platforms such as DIKSHA, SWAYAM and will also be leveraged for creating virtual labs so that all students have equal access to quality practical and hands-on experiment-based learning experiences. The possibility of providing adequate access to Socio-Economically Disadvantaged Groups students and teachers through suitable digital devices, such as tablets with pre-loaded content, will be considered and developed.
f. Online assessment and examinations: Appropriate bodies, such as the proposed National Assessment Centre or PARAKH, School Boards, NTA, and other identified bodies will design and implement assessment frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics.
g. Blended models of learning: While promoting digital learning and education, the importance of face-to-face in-person learning is fully recognized. Accordingly, different effective models of blended learning will be identified for appropriate replication for different subjects.
h. Laying down standards: As research on online/digital education emerges, NETF and other appropriate bodies shall set up standards of content, technology, and pedagogy for online/digital teaching-learning. These standards will help to formulate guidelines for e-learning by States, Boards, schools and school complexes, Higher Educational Institutions.

Discussion

The learning processes in Education for Sustainable Development projects, students to achieve competences, which are important for the global sustainable development, but the key competences that is Information Communication Technology competences helps enabled Higher Education Institutions trying to create culture for studying from remote areas and access to all students from the Home though Information Communication Technology. Government and policy makers must have knowledge, skills, and attitude to implement ICT in Higher Educational Institutions. They must be aware of its norms, policies, and demands that can make an effective administrative management, an effective leadership management in Higher Educational Institutions must take into consideration the current emerging Information Communication Technology to forms, related concepts and sufficient knowledge of technological and processes, methodology to collaborate to integrate Information Communication Technology for enhancing productivity of Higher Educational Institutions for Sustainable Development.

Conclusion

Many colleges and communities have access to Information Communication Technology resources to join the global economy with knowledge workers who have 21st century skills and are inspired by life-long learning. Information Communication Technology have great potential for knowledge dissemination, effective learning and the development of more efficient education services. Information Communication Technology will not only sustain development of education but also the global energy, environmental and social challenges. Besides, the present study argues that technological advancement has not necessarily meant an improvement in teaching and learning standards. The introduction of new technological methods and the assessment, thereof, does not necessarily add value to maximize Education for Sustainable Development. The focus now in higher education has completely been shifted to technological methods that adds value to the educational experience, and Faculty need to guard the processes and procedures that can detract the value of teaching and learning process from the system.

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