International Journal of Business and Administrative Studies
volume 9 issue 1 pp. 46-55 doi: https://dx.doi.org/10.20469/ijbas.9.10003-1

Open Educational Resource (OER) for Lifelong Learning: Digital Initiatives of India

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Abstract: Lifelong learning has become an essence of a knowledge society. Open educational resources help in realizing the lifelong learning concept in a true sense. India has been able to develop an educational portal under digital initiatives. These are designed and developed by eminent subject experts across various disciplines. These educational online resources are open and free to use along with other in-built characteristics like interactive, shareable, editable, and collaborative. Moreover, these are user-friendly. Most of the online resources developed are using web 2.0 technologies and thus these resources are produced using audio/video, text, animations, and other sites. It is a useful portal for students, teachers, and professionals. Capacity building of teachers, professionals, and training for students is being offered by these online resources. Almost it covers all the emerging fields of science and technology along with humanities, languages, and arts subjects. NEP-2020 has focused its attention on digital initiatives that have been taken in the last 10 years in the field of education ranging from school education to higher and technical and professional education. All these initiatives of digitalization of education available under different platforms like Swayam, DIKSHA, Swayam Prabha, radio and podcast channels which are being carried out for the promotion of quality education, reaching the unreached section, have been converged into one single window called PM E-vidya wherein with click of house all the online resources are available to different stakeholders. This has resulted in optimum utilization of resources, avoiding duplication of efforts, and focused targeted attention with economies of scale. The present paper discusses some of the online educational resources under Digital initiatives taken by the government in the last 10 years.

Keywords: *Digital education, online resources, lifelong learning, educational portals, information and communication technology, disciplines.*

Received: 15 January 2023; ***Accepted:*** 6 March 2023; ***Published:*** 10 April 2023

INTRODUCTION

Lifelong Learning is one of the main aspects of sustainable development goals (SDG 4.4). Almost every nation is working on how to develop and enhance the capacities of its knowledge workers. As the sea of knowledge is increasing every day, it seems difficult for people to stay connected almost every time and catch up with the growing knowledge. So, many nations and their institutional agencies are now using the potential of ICT to leverage the country to become knowledge workers which could benefit the global society in the immediate future. In this regard, many countries and educational institutions are developing online and offline certificate, diploma, and degree-level programs for their

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people so that the objective of lifelong learning can be fulfilled and capacities can be enhanced. India too realizes the potential of digital resources and is now developing and offering various open educational resources starting from school to higher levels of education so that an equitable knowledge society could be created using these resources and thus help in mainstreaming them in the global society.

Technology in India and across the world has been able to create a society that has made the life of an individual smoother, easier, and more efficient and this has been particularly true for newer generations. In the last quarter of the century, changes in technology have come in leaps and bounds. As a result, technology has made more impact in the life of people than it used to be earlier. It is not difficult to guess that changes and innovations in the field of information and communication technology that happened in the past quarter are more in numbers than any other technological changes that happened in other fields. Information and Communication Technology (ICT) has revolutionized the lives of the common man. It is more so with the advent of the internet at the global level. Almost all the sectors are now ICT intensive. The reasons for being ICT intensive are: first, the evolving of newer and newer technology through scientific breakthroughs, second, technology has become more consumer-friendly, third, integration of technology into the realms of different sectors i.e. social, economic, political, educational, and others fourth, its ability to penetrate deeper into the geographical locations(accessibility of technology and its services at remote geographical areas) and finally the cost-effectiveness of the technology. It has been available to common people at a very economical price. ICT has mediated in science and technology, business and commerce industry, banking industry, governance, health, agriculture, etc, and has revolutionized the operation at the grassroots level. The educational industry though slow to react, is now quickly catching up with other sectors. The best Universities like MIT, Stanford, Harvard, Cambridge, etc where an individual dreams to study, can now enroll themselves as students in different programs through digital mediums. The digital medium has broken the geographical barriers between countries and continents. The potential of digital media has been realized by educational organizations, government organizations, and even private educational organizations and that's why online platforms like Khan Academy, Coursera, edX, Udacity, etc have come up in a big way and started to provide open and online courses to learners across globally. Newer technologies like Web 1.0, web 2.0, and now Web 3.0 have helped education to reach the unreached and have brought the education to the doorstep of learners. New technologies have also changed the realm of learning. Earlier learners were focused on one of the media for learning but today learner has the option to learn from multimedia. The content available in the web world uses multimedia to make learning fun, enriching, interesting, interactive, and cost-effective. Moreover, the inherent characteristics of ubiquitous connectivity, open technologies, open identity, networking computing, and the intelligent web have made education and its sources available, accessible, affordable, and adaptable. Moreover, the present communication technologies focus on efficiency, effectiveness, seamlessness, interoperability, and amenability so that learners can best benefit out of them.

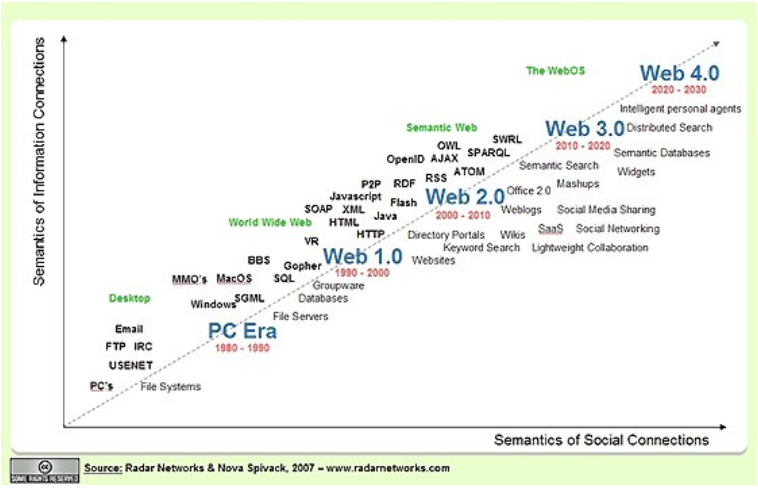

Figure 1 *Source: Evolution of Web https://lifeboat.com/ex/web.3.0*

Presently, with the use of Web 3.0 technology, the user has the power to create, collaborate, edit, share, and interact user-generated content online. Most educational organizations be it private or government, national or international are using the potential of Web 3.0 technology tools for creating various online education resources that have far-reaching and positive impacts on learning. Indian government too realizing the potential of ICT and its reach has developed

ICT-based policy at school and higher education levels. In the mission document of the National Mission on Education through Information & Communication Technology (NMEICT) it has been reiterated that India has a demographic advantage and to reap this demographic dividend it is necessary that it should be converted into a knowledge powerhouse and that too within a short period. Hence, the traditional approach must be blended with appropriate digital interventions so that all the knowledge resources reach the learners according to their convenience and in time (MHRD, 2009). This one-stop education portal has built-in navigation techniques to take care of the learning needs of the community using e-learning. The portal is designed to access the developed educational materials in different formats. The portal provides educational resources through recorded video lectures, digitally smart talking books, virtual laboratories, and audio-video tutorials.

Purpose of the Study

The present research article focuses on the various digital initiatives that have been taken by the government and its associated educational agencies to popularize the open educational resources in various subject domain which has been immensely beneficial for the students and teachers who were at the disadvantageous position as they do not have access to good books and journals in their repositories, video lectures of subject experts from premier institutions like IITs, IIMs, NITTRs, NITs, IISERs, central universities and other institutions of national importance. These resources not only have able to bridge the knowledge divide that exist among learners and teachers of state universities/colleges and that of faculty members and students of premiers institutions but also help them in sharing their knowledge, enhancing collaboration, updation in professional knowledge and skills etc. Though OER has been developed in both at school and higher education level but at higher education level it is more of government digital initiatives that has scaled up the over the period of time has providing benefits to lakhs and lakhs of learners of undergraduate, postgraduate and students of professional programmes.

Objectives of the Study

The following were the objectives of the study:

- To study the various provisions in the policy documents that focuses on digital initiatives for promoting OER
- To study the different digital initiatives of Indian government in promoting OER.
- To study the importance of OER in Indian situation

LITERATURE REVIEW

KMPG (2021) conducted a study on Online Education in India: in 2021 and reported that India has a huge potential market for online education. Currently, the capital market is around 247 million USD which will increase up to 8-fold by 2021 and it will be around 1.96 billion USD (p.11). Major categories where the bulk of the online education market is oriented are language & learning, higher education, re-skilling and online certification, test preparation, and primary and secondary supplementary education. It has been found that online higher education is second from the bottom among the categories. The report found that online higher education is still in the incubation period because of a lack of clarity on regulations. The report further emphasized to boost online learning a robust regulatory framework is required. Re-skilling and online certification are another area which has a high growth potential. Surprisingly government efforts are more towards digitalization of higher education but the report indicates that it is the primary and secondary category that has the highest percentage of share in the market. Projects like SWAYAM, SKILL INDIA, and DIGITAL INDIA at higher education levels wherein a high percentage of Indian youths are in search of employment and the government wants that through online re-skilling and education, they will able to provide certification to skills they possess or they through online skills would be provided for employment. The report also cited the major hurdles in online education classroom experience, practical experience, and regulations. Online higher education will be popular because of accessibility, flexibility, convenient content access, and reduced travel time. The main challenges faced by the student's availability of employment opportunities, authenticity of courses, and exams.

Lakshmi and Samal (2024) did a study on awareness and attitude of OERs among teacher educators attitude and reported that there is a strong need among teacher educators to be made aware about the creation and sharing of OER in their field irrespective of the socio-institutional and other backgrounds. Study revealed quite an astonishing result male faculty members had greater awareness and attitude towards OER creation and sharing than female faculty members. Similar kind of result was obtained for permanenet versus non-permanent faculty members.

Mićunović, Rako, and Feldvari (2023) did a small study on the practices of OER in higher education institutions of Europe in the field of library sciences. The result revealed that though impetus has been grown on using the OER there is still a lack of awareness among the faculty members about its benefits and opportunities. Moreover, the study also highlighted the lack of institutional policies, inadequate peer review, and in absence of regular monitoring and evaluation of OER.

Nath (2022) in her article Open Educational Resources (OER) Initiatives: Global and Indian Quo Vadis tried to explore and review the historical beginning of OER, the major global and national initiatives taken to expand the scope of OER. The study captures the journey of OER vis-à-vis, at the global level and Indian levels. She highlighted USA is the leading nation in OER followed by Africa. In India, too OER has progressed well with the support of the national government. But she also there is plenty of scope but an equal number of challenges for OER especially availability in English language, copyright, challenges related to software, lack of availability of optical character recognition in local languages, etc.

Marín et al. (2020) did a comparative study of National Infrastructures for Digital (Open) Educational Resources in Higher Education in ten different education systems across the globe based on their existing policies on OER, quality assurance mechanism, and different measures for promoting OER including infrastructural development. The documentary analysis was done and the study reported that the difference in the OER policies adopted in each of the countries is largely due to the country's political organization, context, and culture.

Shukla (2020). Open Educational Resources: Initiatives in India have highlighted the various initiatives taken by the government of India in promoting OER especially creating digital platforms. But she also recommended that the government must take the initiative of convergence of these digital initiatives so that all of them could be accessed at a single point with categorization and classification.

Ossiannilsson (2019) wrote an article on OER and OEP vis-à-vis access, equity, equality, and quality wherein the author has written that OER has the potential and catalyst for lifelong learning and continuous professional development. OER has the potential to achieve quality, establish legal and policy frameworks, and promote social justice along with equality.

Tang (2021) has written an article on implementing open educational resources in digital education based on the study done by Hilton (2016) about the efficacy of OER Hilton reviewed 16 studies to find out the efficacy of OER. The researcher was of the view that apart from considering that OER did not undermine the learning effectiveness other factors like research, design, culture, and practice also decide the efficacy of OER. According to Hilton (2016) open educational practices wherein resources are adapted, shared, and contextualized improve the efficacy of digital mediums. Further, Hilton (2016) viewed that cost-effective and open licenses not only lead to cost reduction but also differentiated instruction from conventional textbooks. Third, the positive perception of teachers 'of making OER personalized material and also helping in assessing the learner in a granular way makes its efficacy higher. Lastly, OER works as per the principle of social and equitable justice. So, the researcher finds that during the COVID-19 outbreak, OER was the game changer as it supports the continuity of teaching-learning with the above premises of efficacy.

Bansal, Chabra, & Joshi (2013) written on the initiatives and challenges of OERs in Indian Higher Education have cited the numerous numbers of organizations in India entrusted with the responsibility of the development of OER. They discussed the key challenges related to OER: lack of awareness and technological backwardness among teachers, issue of intellectual property rights or copyrights, availability of digital resources only in the English language, and quality of open educational resources.

Das (2011) in his study on the Emergence of OER in India and Lifelong Learning reported that Indian OER is normally textual and audio-video platforms using other web-based video channels. The paper discusses various collaborations done in the area of OER to enhance the knowledge and skills of the different stakeholders.

Kumar (2009) wrote an article on Open Educational Resources (OER) in India's national development which discusses the issues about OER and suggests that organizational readiness and development of infrastructure are key for scaling up as well as effective use of Open Educational Resources.

Venkaiah (2008) did a study on OER in India vis-à-vis attitude and perception of distance teachers and found that distance education teachers are not only using OER extensively but they are also contributing towards its development to make OER. But in comparison to other countries, its usage is still low. However, the development and use of OERs in India are still low when compared to the developed countries. One of the important suggestions of the research is that the government should lay down clear and sound policies and guidelines for updating the content regularly.

METHODOLOGY

In the present research, the researcher studied the policy documents and its various provision that promotes creation, sharing and distribution of OER especially with reference to policy on ICT/IT, in education. (MoE, 2020), (Meity, 2012), Digital India Campaign (2015), (MHRD, 2004), (MHRD, 2009). The desk-based content analysis of the policy documents was carried out along with digital initiatives taken by the government in this direction. highlighted three key areas: equity, excellence, and quality of education in education.

FINDINGS

The policy documents highlighted that there was strong digital divide among the learners and teachers in terms of access of educational resources, quality of resources and most importantly quality of teachers teaching in premier institutions of India and rest of other educational institutions. So, to bridge the digital divide educational institutions are equipped with good quality digital infrastructure. For that, it started equipping institutions with digital infrastructures and convergence of digitalization initiatives at the national level. The policy documents further highlighted the key difference was the non-availability of high-quality teachers in non-premier higher educational institutions. So, responsibility of government and its educational organization to create high quality educational material from world class teachers and made it available in all possible digital formats on open access basis so that everyone can share, edit, modify and re-use it. The above documents highlight that in the last ten years, India has invested a huge amount to create an online educational resources repository for higher education wherein the content generated is in the electronic and modular form and is available to the community of learners 24/7 (anytime and anywhere). The materials so developed are called open educational resources and are placed in the public domain. These educational resources are of high quality as it has been developed by adopting international standard procedures generally used by the various national and international educational organizations. These resources cater to a wide range of subjects and technology humanities and arts, and languages. These resources are meant for undergraduate to doctoral programs, general to highly specialized courses. Realizing the potential of open online educational resources and the multiple benefits it has, the government is encouraging and promoting educational experts to develop open educational resources so that they could be put on the educational platform which will help a large number of students who are studying in institutions which are not at par with IITs, IITs, IISc, or central universities. Recently government of India has tied up with many private institutions and foreign universities, publication houses, and educational organizations to make their e-resources freely available online to the Indian community of learners. The government is urgently pushing Indian institutions including private and foreign ones to develop as many as possible e-resources so that Indian learners can get access to the best of their knowledge at the bare minimum or free of cost. Indian government's target to increase the higher education enrollment to 30% and 500 million skilled forces by 2022 could be achieved by offering as many skilled-based courses online and for that one requires a huge number of online resources. MoE (2020) also highlighted the creation of e-resources so that these are available to all irrespective of the geographical boundaries. MoE (2020) further highlighted that:

Technology-based education platforms, such as DIKSHA/SWAYAM, will be better integrated across the school and higher education and will include ratings/reviews by users, to enable content developers to create user-friendly and qualitative content (MOE, NEP-2020, p.57).

The concerted efforts of the government have been further catalyzed by COVID-19 wherein the government finds the need and scope of generating e-content because of wide disparities as well as poor quality of higher education being offered to the learners. Moreover, many of the students of our universities are unable to access the best of the educational resources which have been confined to few libraries and few institutions. That is why under the Digital India mission all libraries are digitalized and connected through high-speed networks. These are done so because resources available in one library could be accessed by others with the click of a mouse. Moreover, libraries will be updated and upgraded as knowledge storehouses so that everyone can benefit if even one is not able to go in person. All the databases and repositories of text (e-books and journals) are made available on these web-based platforms supported by government agencies like INFLIBNET, IITs, UGC, IGNOU, etc. The accessibility of resources would help faculty members, scholars, and students in saving their time, energy, and cost. Even the government has tied up with the world's best universities and educational organizations so that the Indian community of learners could get the best of the educational resources which might not be possible for many of the learners in their lifetime (MHRD, 2009). Given below are the digital initiatives taken by government for the high quality, affordable education for the learners of

India:

- **Consortium for Educational Communication (CEC)**: It is an inter-university set up by the University Grants Commission in 1994 to use TV in educational programs of higher education. With the launch of the EDUSAT satellite, it broadcasted an interactive satellite-based education system, especially for learners living in the remotest of areas. Later on, it started producing e-content and transmitted over the web platforms. Under the National Mission on Education through ICT, CEC has developed two web platforms i.e. CEC1 and CEC 2 wherein learners are provided e-content with not only video lectures on different areas/subjects but also provided with online scripts of the same videos. Presently CEC is the central repository of e-knowledge resources which houses enrichment video programs (20,000) university video lectures, e-content on undergraduate courses, video programs on undergraduate programs, and learning object repositories. Under NMEICT the CEC has developed e-content courseware in 77 subjects. CEC has added features like Learning Management Systems (LMS) and Learning Object Repositories (LORs) which will help learners to be digitally more empowered. The content produced was made available to the faculty members and students cutting across geographical boundaries (retrieved from http://cec.nic.in/Pages/Home.aspx).
- **National Programme on Technology Enhanced Learning (NPTEL)**: The National Programme on Technology Enhanced Learning is a joint initiative of the Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc) for generating e-content for science and technology students studying across different engineering colleges in India. Though it started for undergraduate science and technology-based disciplines. Later focus shifted to other areas: higher education, professional, distance, and continuous and open learning. The courses are modular with the facility of a discussion forum. These are free and open courses, meant for teacher's knowledge enhancement, training the newly inducted teachers, and for lifelong learning. These courses can be remotely accessed. NPTEL has also shifted from disciplinary to interdisciplinary courses. Another major objective of NPTEL is to bring the best teachers across the institutions to record their video lectures and make them available free of cost to the community (retrieved from www. nptel.ac.in).
- **Talk to A Teacher**: It is another e-resource developed by IIT Bombay for engineering and science graduates. Teachers of IIT Bombay recorded the day-to-day lectures of their classes, assignments, lecture slides, and references and loaded them as a resource for other engineering and science undergraduate and postgraduate students. Along with it, there is a provision for asking questions and answering with the teachers (interactive). As already stated, all recorded lectures are accessible to anyone cutting across geographical boundaries. This platform also provides opportunities for students to speak to teachers about their doctoral work. Students of other educational institutions can interact with the teachers of IITs for their research work. It is also the forum to share and disseminate the research work (retrieved from http://www.co-learn.in).
- **Free and Open-Source Software in Education(FOSSE)**: FOSSE generally means software that respects the user's freedom. It is just like Creative Commons (CC) wherein the user has the freedom to use/modify/edit or redistribute it to others without having commercial intentions. However, users have control over the software they use. FOSS has many advantages as it is customized and tailor-made as per the needs of the users. Since it is free, therefore, there is no infringement of copyright act on it. Recently, MHRD launched several educational initiatives using FOSS like SCILAB, python, Lab migration, etc. The basic purpose of using FOSS is to build the capacity of learners by using it on their own. More and more FOSS-based educational projects could be made available to students studying in remote areas (Retrieved from the website: http://fossee.in/).
- **Spoken Tutorial**: It is a part of the "Talk to a Teacher" project. Saxena (2013) cited in her article Spoken Tutorial: Free Resource for IT Literacy through Open Source Software stated that the purpose of it is to promote digital literacy, provide training in software handling, improve the probability of employment, and also reduce the digital divide. Spoken Tutorial is an audio/video tutorial tool that helps the learner to learn and use open-source software (OSS). It helps the learner to learn software using simulated learning material through expert instructions. One of the key features is its availability in Indian languages. Spoken Tutorial uses a quadrant approach wherein apart from audio and video, recorded sessions use animation, narration, e-books, and other reference material. Its main objective is to help learners who do not have access to and opportunities to learn software, can do so through spoken tutorials. (Retrieved from http://spoken-tutorial.org/)
- **PG-Pathshala**: PG-Pathshala is the assimilation of e-content developed by the subject experts in 71 PG subjects in a modular approach. The content is curriculum-based, interactive, and made available in different subjects

across all disciplines. (Retrieved from www. http://epgp.inflibnet.ac.in/about.php)

- Virtual Labs: Web-based and video-based courses are addressing the issues of teaching to some extent. But many subjects in science and engineering are practical-oriented courses and therefore need hands-on experiences. Since the majority of our institutions have poor lab facilities or do not have the necessary equipment to conduct practicals and Indian institutions are not in a habit of resource sharing therefore it poses a serious challenge for our science and engineering students. However, the internet and other contemporary technologies have made it possible to have web-enabled experiments. Virtual labs are one such initiative. Web-based labs help students to design their experiments and thus enhance the learning of students. Web-based experimentation helps in sharing– knowledge, software, and data, apart from helping students to undergo skillful experiments with time and space with no barriers. It resolves the paucity of resources and enthuses the curiosity and innovation of students. Virtual labs help the students to provide results of an experiment by –modeling and simulation, feeding data on the virtual labs, conducting the experiment in actual situations, and using the computer interface to obtain the result. Virtual labs also provide audio-video streaming of actual lab experiments and equipment (retrieved from http://www.vlab.co.in /index.php).
- **Shodh Shuddhi**: It is the repository of e-journals and e-books managed by INFLIBNET under the Ministry of Education. Almost 98 CFTIs, 217 universities, and 4200+ colleges of higher education are members of it. There are 12 repositories of global e-journals ACM digital library, American Institute of Physics, American Physical Society, Annual Reviews, ASCE journals, ASME journals, Economic and Political Weekly, JSTOR, Oxford University Press, Project Muse, Springer, and Taylor & Francis subscribed by various institutions of higher education and almost 5 databases where e-journals can be accessed. It is meant for students, teachers, and other stakeholders to access these journals almost free of cost which often comes with the hefty amount for individuals and institutions. (source: https://ess.inflibnet.ac.in/index.php)
- **Indian Research Information Network System**: It is a web-based platform developed by INFLIBNET for faculty members, researchers, scientists, and others to collect, curate, showcase, and disseminate their scholarly works among each other or to provide opportunities to the fraternity of scholars to create a network among themselves. This system integrates among human resources system, grant management system, institutional repositories, and citation database of scholarly works. All the private research-based platform systems like Google Scholar, ORCID ID, Scopus ID, etc. have been integrated with IRNIS (source: https://irins.org/irins/)
- **VIDWAN**: It is a database of profiles of academicians, researchers, and scientists working in premier educational institutions or research and development laboratories in India. It provides detailed information about their area of work as well as experience, publications, achievements, etc. It is developed, managed, and maintained by Inflibnet. It is a stop portal wherein one can not only find the group of experts/researchers but also a platform where experts can share, collaborate, or network with each other for research projects, peer-review, funding, etc. (source: https://vidwan.inflibnet.ac.in/).
- **National Educational Alliance for Technology (NEAT)**: It is a public-private partnership model initiated by the Ministry of Education to invite private parties working in the area of technical education to showcase their technological products in education pedagogy on a single platform for the learners. It contains customized e-learning content available to government colleges. (source: https://neat.aicte-india.org/)
- **Shodhganga**: Shodhganga is the repository of Indian suites available in the digital format managed and maintained by Inflibnet. Any researcher who proposes to work in any area of research, can go to the website Shodhganga and search for the work already done in the past by putting keywords in the filter. All the work done in the past will be reflected in pdf form. It acts as a review of related literature available in the area as well as to avoid duplication of work (Source: https://shodhganga.inflibnet.ac.in/).
- **National Digital Library**: This is a project run by IIT Kharagpur and a national-level digital library. It relates to all the public libraries available in different institutions. It is the repository of all kinds of e-resources available in the various public and institutional libraries. It is a stop portal wherein e-books, e-journals, videos, audio, etc are available (source: https://ndl.iitkgp.ac.in/).
- **SWAYAMPRABHA**: It is a group of 40 DTH channels broadcasting high-content educational programs meant for both school and higher education. The programs are repeated five times a day so that any students can switch on each of the channels and hear the content. This content is prepared by high-quality faculty members working in the field of school and higher education serving in IITs, IGNOU, UGC, and other institutions.

- **SWAYAM**: SWAYAM is the indigenous massive open online course platform similar to Coursera, Khan Academy, edX, Udacity, etc. developed by the Indian government to make a variety of courses available in different subjects/disciplines like NPTEL. The purpose of creating SWAYAM is to achieve equity, quality, and access in terms of educational teaching-learning material to all. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy (source: SWAYAM website). SWAYAM is the congregation of the best educational material provided by the best of the teachers working in school or higher education in the form of credited or non-credited courses.

Kumar (2009, pp.80-81) highlighted in his paper "Open Educational Resources in India's National Development" the importance of developing online educational resources at the national level for the following reasons:

- **Global OER Movement Enforces Creation of Content at Local Level**-In almost last decades the OER movement has revolutionized and come in a big way and many international national, private, and public educational organizations are now developing OER. Since, India has one of the most diverse backgrounds of educational organizations, as well as learners, benefits can be reaped by getting high-quality OER from these organizations, and can be translated into different languages for enhancing the quality of not only our institutions but also of our learners.
- **Support Indian Institutions to Produce High Quality Content**: Many of the IITs, NITs, and other higher educational organizations especially government-funded funded are into the development of OER and have produced thousands in video, audio, and multimedia format. The expertise present in this organization must be utilized for the further production of quality content. It is also necessary that many of the state and centrally funded universities and their faculties in different disciplines should be roped in as many of the great teachers are working in the different fields and thus help in producing high-quality content for our students as well as globally. Therefore, the government must support these organizations both technically as well as financially to produce world-class OER.
- **OER Help in the Development of Online Simulation Programs for Science and Engineering Lab Practical**: In NPTEL various IITs, NITs, and IISc have already developed a program based on the four-quadrant approach. The first quadrant is related to the content development in the textual form. It is either in doc form or ODT (open standard for electronic documents) form. E-text should be in modular form which can be enriched by multimedia supplements. Quadrant II is a Video version of self-learning. OER formed should be supported by multimedia, animation, documentary, and wherever possible simulation, graphics, and virtual Lab. The next two quadrants relate to self-assessment and suggestive readings.
- **Large-scale E-curriculum development**: The government of India has launched SWAYAM - Massive Open Online Courses (MOOCs) wherein the government desires to offer online courses on various subjects including skill-based and market-oriented programs so that, the learners can acquire and enhance their employability skills as well as use it for upgradation in the employment sector. Since the government of India has taken the initiative to provide skills to almost 500 million therefore, it is an opportunity that can achieve viability through MOOCs. MOOCs require online educational material in different disciplines as well as in different languages. Therefore, a great opportunity for Indian higher education and others to seize the opportunity and develop online educational resources.
- **Strengthening of Infrastructure for Increasing Preparation Production and Usage of OER**: India is on the path of rapid economic development. It has been acknowledged by the world that by the year 2030 India will have the largest force of young human resources. Therefore, it is essential to transform this large force of humans into human capital. For this, it is imperative to provide education especially higher ones to the large scale of youths. Since it is difficult to have a large number of higher educational institutions as it puts severe strain on the Indian economy, therefore electronic media can be the viable option to do it. Developing OER is one of the key aspects of giving quality educational materials to learners. EDUx, Udacity, Khan Academy, etc have shown that they have phenomenal rates of enrolment almost in millions when they launched courses or programs, and Asians and particularly Indians are the most enrolled. Therefore, taking a cue from it is necessary that the Government of India should strengthen and renew infrastructure for developing, and producing the OER so that it should be accessible to learners. Huge budgets have been allocated already for developing OER, it is necessary to build institutional infrastructure and enhanced and speedy connectivity of networks to make it successful.

- **Robust and Ubiquitous Connectivity**: Open e-learning resources not only require a robust development process but also require free accessibility to the learners. OER requires 24x7x365 days of ubiquitous connectivity for individuals as well as for institutions and it requires robust internet with high bandwidth and greater speed. India's geographical terrain location ranges from hilly to coastal areas and from plain to desert. Educational institutions are present in these different geographical locations. In these ever-challenging geographical locations accessing OER by the learners is a big challenge that is why under National Knowledge Network (NKN) and NMEICT government are strengthening the internet connectivity so that it reaches the doorstep of learners as well as the institutions. To date, almost 1500 institutions are connected under NKN and almost 403 universities and 20,000 colleges are connected with high bandwidth ranging from 512kbps to 1Gbps.
- **Delivery**: The key to success for online resources is ensuring that the quality educational content is available in a reliable manner and available for appropriate use. Initially when it was started with the Sharable Content Object Reference Model (SCROM) and later it was changed to (an open standard for electronic documents) form. This indicates with the technology change online resources are changed into formats which is more user-friendly as well as efficient and reliable so that learners can access and use them.

CONCLUSION

Lifelong learning through educational resources requires some important pre-requisite systematic infrastructural development. The basis of it is the availability and accessibility of technology within the reach of the common people. Thereafter, it is important that it must be ubiquitous i.e. 24x7x365, and for that, it requires integration of advanced technologies into the system and once it is done then it is the design, development, and availability on the online platforms. India has taken a big stride in developing open educational resources in the last decade. Initiatives of the national government of creating open educational resources in almost all disciplines have contributed to the development of knowledge in almost all disciplines but also helped millions of teachers, students, and other stakeholders to remotely access them and reap the benefit of their knowledge and skill enhancement. It also helps in building the capacity of teachers, students as well as of the common people and thus in turn develop the competence and skills and make them globally competitive. Open education resources have created a wave in this direction and experts in different fields including private players are joining hands to create a knowledge society that India always dreams of becoming Vishwaguru. OER has great potential and with the advent of advanced technologies being utilized, OER will become ubiquitous in the years to come. It will help in developing a community of learners and practitioners and thus help in bridging the knowledge and skill gap between the learner's premier institutes and learners of private or non-ranked educational or governmental organizations, urban and rural learners, and socially advantaged and disadvantaged learners. Online resources will also help to realize the dream of a knowledgeable and competent India across the world. One of the barriers that was there was that most of the open educational resources are being made available in the English language which a large section of the stakeholders are unable to use for knowledge and skill enhancement and upgradation. So, after (MoE, 2020) national government has started a concerted effort in this direction wherein the government is pushing for making OERs in local /regional/scheduled languages so that a large spectrum of people can benefit from it.

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