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Current Initiatives and Challenges to OERs in Indian Higher Education

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ABSTRACT :

In the modern era of information technology, digital resources have become readily accessible source of learning for teachers and learners. One such movement that encourages and enables sharing such learning resources is OER (Open Educational Resources). In India OER movement is especially important as higher education is still facing the paucity of high quality teachers, inadequate infrastructure of the universities and more specifically their libraries, and the derisory quality of Educational Resources utilized at the various universities and colleges. The paper intends to elucidate the OER movement in Indian higher education and to introduce the open educational resources initiatives in /Indian higher education. It also outlines the issues hindering the progress of OER in India along with the recommendations that address these issues.

Keywords:
OER (Open Educational Resource), Open Educational Movement, Higher Education, India

INTRODUCTION :

In today's knowledge seeking environment, information technologies have proved themselves as more readily available and easily accessible medium for both teaching and learning. Those involved in education have found that a vast number of digital resources are available from many sources such as internet and other digital technologies. It is often found that many teachers and students use internet in their courses and this is one of the reason of growing number of content in digital format. Until recently it was seen that large number of material was locked up behind passwords within proprietary systems, this limited the usage of these resources for a category of learners. For this reason efforts were made at different levels to make Open Educational Resources (OERs) accessible which aimed at offering opportunities for free and open sharing of the content to a wide range of users. The effort has now taken the form of almost a movement.

The OER movement has now grown into a worldwide movement which by digitalizing the print resources has dramatically reduced the cost of higher education and has made higher education equally accessible to all.

The National Knowledge Commission (2007) has also highlighted the importance of OER in widening the access of higher education. It has stated that

"National Educational Foundation with a one-time infusion of adequate funds must be established to develop a web-based repository of high quality educational resources. Open educational resources (OER) must be created online through a collaborative process, pooling in the efforts and expertise of all major institutions of higher education. The OER repository would supply pedagogical software for various programs run through ODE and be available for utilization by all ODE institutions. An enabling legal framework that would allow unrestricted access without compromising intellectual authorship must be devised for this purpose."

OBJECTIVES

- To define Open Educational Resources
- To exemplify OER initiatives in India and in different parts of World.
- To compare the OER movement in India and other Countries.
- To identify the challenges to OER in India.
- To recommend suggestions for overcoming the challenges.

RATIONALE

'Open Education Resources' is comparatively a newer notion with a focus on collective knowledge.

In the Indian context, this sharing and reuse of learning content would definitely leave its impact on the different dimensions of higher education. The current study will help in grasping this rendezvous of OERs in Indian Higher Education. The focus of the study will be in mapping out the scale of initiatives taken in the field of OERs in Indian higher education as well as the barriers which hinders its growth in India, so as to assess the extent by which OER is freely available to the learners, teachers, researchers and professionals in the various fields of higher education. The study will also highlight the OER initiatives taken in the different parts of the world so that it can be charted out that where India stands in comparison to its other counterparts in terms of OER movement in higher education.

METHODOLOGY

This research is based on secondary data. The data has been taken from different research reports, journals and research papers.

FINDINGS

The findings from the study have been encapsulated under different headings for better comprehensibility of the readers.

OPEN EDUCATIONAL RESOURCES

OER are teaching, learning, and research materials in any medium that reside in the public domain. The concept of Open Educational Resources came into existence during a conference hosted by UNESCO in 2002. Since then the term has become a subject of interest and many explorations have been done by the institutions on finding out the contributions it can make to education. The initial concept pertaining to OER was developed further based on follow ups through online discussion hosted by UNESCO. The final form is as follows:

Open Educational Resources are defined as 'technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for noncommercial purposes.' They are typically made freely available over the Web or the Internet. Their principle use is by teachers and educational institutions to support course development, but they can also be used directly by students. Open Educational Resources include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabuses, curricula, and teachers' guides.

OER has also been defined as "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others" (Atkins, Brown, & Hammond, 2007, p. 4). In more simple words it can be said that OER describes the educational resources that are freely available on the internet for the use of learners, educators and educational institutions and doesn't accompany itself with the need of paying royalty, license or registration fee. The scope of OER ranges from full courses to course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.

But it should be noted that OER is no explicitly about e-learning as many people conclude it because of it sharing content on the digital architecture of internet. OER do use the digital architecture of internet but shares printable materials stored in digital format and share it as easily as any form of multimedia.

WHY OER IS SIGNIFICANT?

OER, in general, refers to digital resources and focus on its usage in online or hybrid learning environments.

A license is issued for each resource which spells out that how the resource can be used. Some content or learning material can only be used in their original form while some can be modified or remixed. OER is found in collections or repositories of single institution or in collections of materials gathered from institutions or individuals from wide range of single institutions from where the OER can be downloaded by the learners or instructors for use in formal or informal learning.

As in OER, Educational resources are developed in an open environment which results in their improvement by a broad community of educators and as a result pedagogical innovations, new and innovative methods for effective teaching spurs up. It also provides an opportunity to the learners and instructors to get familiar with huge content which never found its way into educational use. OER also increases the accessibility of the high quality learning material by distributing the cost of development of content over a large number of users and makes it possible for the learners to obtain the educational content at low cost. Moreover by providing the learning content all the time it enables particularly the adult learners, nontraditional students and the students who work full time to learn independently. OERs have also potential to facilitate new styles of teaching and learning by giving opportunity of modification and assembling of open resources in unique way.

OER INITIATIVES AROUND THE WORLD

The simple idea behind the spread of Open Educational Resources is that the world's knowledge is a public good and that technology in general and the World Wide Web in particular provides an extraordinary opportunity for everyone to share, use, and reuse knowledge. All the fundamental components of education—content and tools for teaching, learning, and research are under the purview of OER.

Hence OER initiatives are in all these directions. Some of the notable ones are highlighted below (Sharma, 2013):

- There are huge active initiatives in OER at the colleges and universities around the world. Currently there are more than 2500 open access courses available from more than 200 universities.

- In United States 1700 courses have been made available online by seven universities namely MIT, Rice, Johns Hopkins, Tufts, Carnegie Mellon, and Utah State University.

- In China more than 450 courses have been made available online by participation of more than 150 universities in China Open Resources for Education initiative.

- In Japan 1500 courses have been made available online by the universities participating in Japanese Open Course ware Consortium of which 1,285 are in Japanese language and 212 are in English.

- In France, over 2,000 educational resources from around 200 teaching units have been made available by twelve member universities of the ParisTech OCW project.

- There are numerous Higher Education OER initiatives coming up in the United Kingdom (UK). One such initiative JORUM (http://www.jorum.ac.uk), which is a free online repository service for teaching and support staff in UK Further and Higher Education Institutions.

- There are also several translation projects underway which is undertaking efforts to make higher education based OCW materials available in multiple languages, including Universia's Spanish and Portuguese translations, CORE's simplified Chinese translations, OOPS' traditional Chinese translations, and Chulalongkorn University's Thai translations.

- More OER projects are emerging at various universities of Australia, Brazil, Canada, Hungary, India, Iran, Ireland, the Netherlands, Portugal, Russia, South Africa, Spain, Thailand, United Kingdom, United States, Cuba and Vietnam.

CURRENT OER INITIATIVES IN INDIAN HIGHER EDUCATION

Indian higher education is posing a challenge with rapid increase in demand and with limited increases in resources. Further there has been a rollout of ICT infrastructure into higher education institutions; all this has created a distinctive situation. It has become increasingly important to widely use OER so as to expand the coverage of higher education in India. Further the use of OER is being done with the goal is to make education available to everyone in the country (particularly those in the geographically difficult terrains or who could not otherwise afford an education—as well as self-learners). In India, government, universities and research institutions have realized the importance of Open Educational Resources in widening the access to higher education and for this they are undertaking several efforts to promote it in the country. In India, there are not many major initiatives for creating open educational tools and resources, most of them are in the area of science and engineering. Some other initiatives are highlighted below.

i)Digital Library Initiatives

A Digital library is a type of information retrieval system where collections to be stored in digital formats which can be accessed with the help of computer networks. In India following digital library initiatives have been taken.

a)CSIR Explorations (URL: http://eprints.csirexplorations.com/)

CSIR Unit for Research and Development of Information Products (URDIP) at Pune is the principal agency behind its implementation while Council of Scientific and Industrial Research (CSIR), Government of India is supporting this project. SIR Explorations is a digital library of electronic dissertations, thesis and research reports of the fellowships and projects supported by CSIR. Presently, it has three bibliographic databases, namely, E-Thesis, EMR (Extramural Research) and CSIR Publications. This database is very useful for the doctoral candidates, faculty members and scientists who are interested in knowing about the researches completed in past by their research fellows.

b)Cultural Heritage Digital Library in Hindi (CHDLH) (URL: http://tdil.mit.gov.in/Publications)

Indira Gandhi National Centre for the Arts (IGNCA), New Delhi, India has established this digital library on indigenous cultural heritage whereas Ministry of Communications and Information Technology, Government of India is supporting it. This digital library has been developed with special focus on the Hindi-speaking region in India. *CHDLH disseminates information and traditional knowledge related to:*

- *common heritage of the people;*
- *poetic and literary heritage;*
- *architectural heritage;*
- *natural heritage; and*
- *miscellaneous information related to other areas of arts, aesthetics and culture.*

c)Digital Library of India (URL: http://www.dli.ernet.in/)

Indian Institute of Science (IISc), Bangalore is the principle agency behind implementation of Digital Library of India. It is hosted at the Mega Scanning Centers Indian Institute of Information Technology Hyderabad (IIIT Hyderabad); Centre for Development of Advanced Computing, Noida (CDAC Noida); Centre for Development of Advanced Computing, Kolkata (CDAC Kolkata) whereas ERNET (Education and Research Network), India is the participating institution in it. Ministry of Communications and Information Technology, Government of India (for India) and National Science Foundation, USA (for Overseas) are supporting agencies behind this project.

The Digital Library of India (DLI) is the greatest digital library initiative in South Asia, spreading all over the country and establishing a network of four mega scanning centers and 21 scanning centers, which feed the digital contents into the digital library systems. Its mission is to create a portal that will foster creativity and free access to all human knowledge. For realizing this mission free-to-read, searchable collection of 1 million books, predominantly in Indian languages, is available to everyone over the Internet. The vision of the website states: *"For the first time in history, all the significant literary, artistic, and scientific works of mankind can be digitally preserved and made freely available, in every corner of the world, for our education, study, and appreciation and that of all our future generations."*

d)in.arXiv, hosted by Institute of Mathematical Sciences, Chennai
(URL 1: http://in.arxiv.org/ Hosted by IMSc, Chennai)
(URL 2: http://xxx.imsc.res.in/ Hosted by IMSc, Channai)
(URL 3: http://www.arxiv.org/ Hosted by Cornell University Library, USA)

Behind this Digital Library, the Principal Implementing Agency is Institute of Mathematical Sciences, Chennai (IIMSc). It hosts a mirror site of the arXiv, a resourceful open access archive in the fields of physics, mathematics, non-linear science, computer science, quantitative biology and statistics since 1997.

e)Indian National Digital Library in Engineering Sciences and Technology (INDEST) Consortium
(URL: http://paniit.iitd.ac.in/indest/)

The Indian National Digital Library in Engineering Sciences and Technology (INDEST), implemented by IIT, Delhi and funded by MHRD, Government of India is a national information infrastructure programme which is established for strengthening access to subscription-based electronic information resources and for capacity enhancement of information infrastructure in Indian academic institutions imparting professional education and research in the areas of engineering, technology and management sciences.

f)Kalasampada: Digital Library - Resources of Indian Cultural Heritage (DL-RICH)
(URL: http://www.ignca.nic.in/dlrich.html)

Kalasampada: Digital Library Resource for Indian Cultural Heritage (DL-RICH) has been established by Indira Gandhi National Centre for the Arts (IGNCA) with the support from India's Ministry of Communications and Information Technology. It is basically recognized as a reference databank for cultural heritage of India which encompasses and preserves the distributed fragments of Indian arts, aesthetics and culture. It has over 0.5 million folios of manuscripts, slides, digitized photographs, IGNCA published books & periodicals, more than 400 hours of audio and video, and approximately 50 walkthroughs.

g)Vidyanidhi
(URL: http://www.vidyanidhi.org.in/)

Vidyanidhi, a national level repository, covering major universities of India is a national digital library for electronic theses and dissertations (ETD), which is initiated by the University of Mysore and is supported by the Department of Scientific and Industrial Research (DSIR), Ford Foundation and Microsoft India. It aims at enhancing visibility of Indian doctoral research and maintains mainly two kinds of databases namely bibliographic database and full text repository using DSpace software.

h)Vigyan Prasar Digital Library
(URL1: http://www.vigyanprasar.gov.in/digilib/)
(URL2: http://www.vigyanprasar.gov.in/dream/index1.asp)

Vigyan Prasar Digital Library, initiated by Vigyan Prasar, Noida, supported by Department of Science & Technology, Government of India maintains a network of science clubs across the country known as VIPNET for promoting scientific attitude among the youths and school children. Its open access digital library has 131 books (72 in English, 42 in Hindi and 17 in other languages) on significant scientific works published by Vigyan Prasar.

ii)Open courseware Initiative

The term**'Open Courseware'** (OCW) refers to that digital material which is freely and publicly available,and that are either a part of, or a complete course from an educational institution such as a university or college. These OCW generally includes audio/video lectures, course syllabi, study material and evaluation tools. *In 2002 MIT started the initiative by offering 50 open online classes on its website. The number of classes and materials grew into more than 2,000 open courses, as of 2010.* (http://www.ehow.com/facts_7439178_meaning-open-course-initiative_.html)

Some of the OCW initiatives are as follows

a)CEC Learning Object Repository
(URL1: http://cec.nic.in/LOR/Pages/Search.aspx)
(URL2: http://cec.nic.in/Pages/Home.aspx)
Consortium for Educational Communication (CEC), established by University Grant Commission (UGC), is an inter-university centre on electronic media. CEC produce television programmes (audio visual programmes) in various languages for various subjects in coordination with its 17 Educational Multimedia Research Centers. The television programmes are based on syllabus based topics of the schools, polytechnic, colleges and university levels. Produced programmes are broadcasted on the national educational television channels such as Vyas Higher Education Channel, Gyan Darshan, and Doordarshan.

b)eGyankosh - A National Digital Repository
(URL:http://www.egyankosh.ac.in)

eGyankosh, is a digital repository which is initiated by Indira Gandhi National Open University (IGNOU), New Delhi and is supported by Ministry of Human Resource Development, Government of India. It stores, index, preserve and share the self instructional study material, audio video programmes and radio & television based live interaction sessions, produced by IGNOU.

c)National Programme on Technology Enhanced Learning (NPTEL)
(URL: http://nptel.iitm.ac.in/)

The NPTEL project, implemented by IIT Madras, carried out by seven IITs and funded by MHRD is one of the major programme of India which focuses on enhancing the quality of engineering education in India through developing curriculum based audio video material and Web courses. Currently, the programme has 120 web based courses and 115 video courses in the areas of core sciences, computer science, civil engineering, electrical engineering, electronics and material engineering.

d)Ekalavya
(URL: http://ekalavya.it.iitb.ac.in/ekalavyaHome.do)

The Ekalavya project, launched by IIT, Bombay distributes the content developed in various Indian languages through the internet. Under this project Open Source Educational Resources Animation Repository (OSCAR) has also been developed which provides an opportunity for teaching various concepts and technologies using web-based interactive animations.

e)E-Grid

E-Grid is a project which is supported by MHRD at IIIT, Kerala. Under this project subject experts develop and govern subject specific portals, though currently this programme offers OER only in sciences and engineering sciences.

f)Brihaspati
(URL: http://www.iitk.ac.in/doaa/DOAA/brihaspati.htm)

Brihaspati, an e- Learning platform is initiated by IIT, Kanpur and is supported by Ministry of Communication & Information Technology. This platform is being used since January 2003 and is benefiting over 75 universities Institutes across India by posting the lecture notes, handouts, and reference material.

iii)Open Access Journals Initiative - **Open access journals** (sometimes called "gold road to open access") are the scholarly journals which are available online without financial, legal, or technical barriers. They provide open access to literature and publications in journals.

a)e-Journals @ INSA
(URL: http://www.insaindia.org/)

The e-journals@insa is a project that was started in July 2002 by Indian National Science Academy (INSA) with objectives of building national digital resource, bringing out electronic versions of INSA journals and global access of scientific information. This project has become one of the much-acclaimed open access initiatives in India, supporting the concept of free access to scientific literature.

b)Indian Academy of Sciences Published Open Access Journals
(URL: http://www.ias.ac.in/)
The Indian Academy of Sciences (IAS), Bangalore is a scientific academy funded by the Government of India was established in 1934 and publishes 11 journals. All 11 journals are open access and full-text literature is available in PDF format on each journal's website.

c)INDMED@NIC and MEDIND@NIC: Biomedical Journals from India
(URL: http://medind.nic.in/)
The Indian MEDLARS Centre at the National Informatics Centre has initiated two unique projects namely INMED@NIC and MEDIND@NIC with support from the Indian Council of Medical Research. NDMED@NIC indexes 70+ prominent biomedical journals of India and MEDIND@NIC provides open access to the full-text content of 38 Indian biomedical journals.

Some Open Access Journals Hosted by Private Bodies are given in the following Table 1.

Table 1: Open access journals hosted by private bodies

URL	Implementing Agency
http://www.indianjournals.com	Divan Enterprises, New Delhi
http://www.krepublishers.com/KRE-New-J/index.html	Kamla-Raj Enterprises, Delhi
http://www.medknow.com/journals.asp	Medknow Publications Private Limited, Mumbai

iv)Institutional Repositories

Clifford Lynch (2003), Director of the *Coalition for Networked Information* has defined Institutional Repositories as *"a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution."*(http://www.arl.org/bm~doc/br226ir.pdf).

Some of the Institutional Repositories in India is mentioned in Table 2.

v)Some More Academic Initiatives

a)Catalysis Databases (http://catalysis.eprints.iitm.ac.in/)

The Catalysis Database implemented by National Centre for Catalysis Research (NCCR) collects, preserves and disseminates the scholarly materials (research publications, conference papers, conference proceedings, theses and dissertations) related to a narrower area of chemical sciences in digital format produced by members of the Catalysis Society of India (CSI) and/or the scientists of the National Centre for Catalysis Research (NCCR).

b)Librarians' Digital Library (LDL)

(URL: http://drtc.isibang.ac.in/)

This open access repository implemented by Documentation Research and Training Centre (DRTC) stores different kinds of scholarly materials such as journal articles, conference papers, theses, dissertations, reports, presentations, multimedia objects and digital photos pertaining to library and information science.

Table 2: Institutional Repositories in India

Repository Name	URL	Implementing Agency	Types of Documents
Digital Archive of National Institute of Technology – Rourkela	http://dspace.nitrkl.ac.in/dspace/	National Institute of Technology-Rourkela (NITR)	Conference papers, journal articles, preprints and theses
Electronic Theses and Dissertations of Indian Institute of Science (ETD@IISc)	http://etd.ncsi.iisc.ernet.in/	National Centre for Science Information (NCSI), Indian Institute of Science (IISc), Bangalore	Theses & Dissertations
Open Access Repository of IISc Research Publications (ePrints@IISc)	http://eprints.iisc.ernet.in/	National Centre for Science Information (NCSI), Indian Institute of Science (IISc), Bangalore	Research Papers, Articles, Reports, etc.
Digital Repository of IIT Bombay	http://dspace.library.iitb.ac.in/	Central Library, Indian Institute of Technology Bombay	Faculty and research publications
DSpace at National Centre for Radio Astrophysics	http://ncralib1.ncra.tifr.res.in:8080/jspui/	National Centre for Radio Astrophysics (NCRA), Pune	Research Papers, Articles, Reports, Thesis, etc.
Digital Repository Service at National Institute of Oceanography	http://drs.nio.org/drs/index.jsp	National Information Centre for Marine Sciences (NICMAS), National Institute of Oceanography, Goa	Journal articles, conference papers, conference proceedings, technical reports, theses, and dissertations

Indian Institute of Astrophysics Repository	http://prints.iiap.res.in/	Indian Institute of Astrophysics, Bangalore	PhD Theses of IIAP, journal articles, papers and Research publications based on data from Indian Astronomical Observatory
DSpace at National Chemical Laboratory	http://dspace.ncl.res.in/dspace/index.jsp	National Chemical Laboratory, Pune	PhD theses, research papers, technical reports, project reports, research reports, journal articles and conference papers
DSpace@INFLIBNET	http://ir.inflibnet.ac.in/	Information and Library Network (INFLIBNET) Centre, Gandhinagar	Research Papers, Articles, Reports, etc.
University of Delhi EPrint Archive	http://journals.du.ac.in/	University of Delhi, Delhi	Journal articles, conference proceedings, papers, books
Raman Research Institute Digital Repository	http://dspace.rri.res.in/	Raman Research Institute Library, Bangalore.	research publications, collected papers of C.V. Raman, Archives and Miscellaneous Publications
EPrints and ETD at Indian Institute of Technology Delhi	http://library.iitd.ac.in	The Indian Institute of Technology (IIT), Delhi	Research Papers, Articles, Reports, etc.
Digital Repository at Management Development Institute	http://www.mdi.ac.in/elibrary/	Management Development Institute Library, Gurgaon	Research publications of researchers and faculty members (such as journal articles, conference papers and business case studies)
National Aerospace Laboratories Institutional Repository (NAL Repository)	http://nal-ir.nal.res.in/	Information Centre for Aerospace Science and Technology (ICAST), National Aerospace Laboratories, Bangalore	Research Outputs of NAL scientists: project documents, technical reports, journal articles, conference papers and workshop papers

DSpace at GBPUAT University	http://www.gbpuat.ac.in/library/index.html	G.B. Pant University of Agriculture & Technology	Research Papers, Articles, Reports, Thesis, etc.

c)Inter-University Consortium for Technology-Enabled Flexible Education and Development at IGNOU (IUC-TEFED), India

The IUC-TEFED was established in India at IGNOU (www.ignou.ac.in) in 2004 as an education, training, development, R&D and service centre on ICT-enabled interactive multimedia and online education for the distance education system in the country. It undertakes national and international collaborative R&D activities for appropriate technology applications for education, training, research and extension. IUC-TEFED aims at transforming the conventional distance learning to modern ICT-enabled, multimedia based, online and blended learning.

CHALLENGES TO OER IN INDIA

The appropriate use of information technology can help equalize the distribution of high quality knowledge and educational opportunities for individuals, faculty, and institutions within India. However, there are obstacles to the spread of OER, which have been dealt in the following points-

- Economic Issues: Teachers rarely show any interest in development of the open courseware as most of them are already unpaid and supporting the OER movement by developing the content at no cost is of no interest to them. Therefore the concept of open courseware is encountering resistance from educators in India.
- Intellectual property: Intellectual property is still the biggest problem with OER in India. None of the content is available under Creative Common License so as to ensure the copyright. In this competitive age, universities are seeking ways to protect their intellectual property for fear that it might be stolen or used by others and without assurance of copyright they feel reluctant to share thesis/ dissertations on public portals.
- Infrastructure: Where there is shortage of power, it is difficult to imagine a strong network enabled infrastructure. Most of Indian semi urban and rural areas are still struggling for sufficient amount of supply of electricity and the students in these areas are deployed of facilities being offered by ICT at their footstep. A strong network enabled delivery infrastructure with the focus on access and delivery is required to make OER movement successful.
- Lack of Awareness: In India, there is still lot of unawareness about the availability of Open Educational Resources and the opportunities provided by them among the educators and learners communities. Libraries and librarians are still to get involved in OER related work.
- Technological Backwardness: OER movement in India needs technological overhauls. OERs are presently based on Web 1.0 tools whereas migration towards Web 2.0 is necessary. It is not just technological backwardness but may be non-affordability of latest technology.

- Language and/or cultural barriers: Most of the OERs available only in English, limiting their usefulness to non-English speakers. Additionally, not all resources are culturally appropriate for all audiences. The Indian learner audience is generally from the non-English background.
- Lack of Quality Assessment and Assurance Provisions: Most of the OERs are not following any pre determined standards and are not related to teaching learning process. Moreover the content is not updated regularly.
- Financial limitations: Institutions are generally operating in a financial crunch. Since OER generally do not generate any type of payment for their usage, there may be little incentive for institutions to update their OER or ensure that it will continue to be available online.

RECOMMENDATIONS FOR OVERCOMING CHALLENGES TO OER IN INDIAN HIGHER EDUCATION

There need to be considerable efforts in both directions - for *reducing barriers* and also *understanding and stimulating use*. Barriers can be reduced by dealing with technology issues and understanding can be promoted with R&D, feasibility studies, plus awareness creation. Following measures can be taken to overcome hindrances caused in the way of OER in Indian Higher Education:

- Development of user friendly systems is required for ensuring the implementation for quality assurance of courseware;
- Adoption of new and appropriate technologies to match the teaching-learning environment;
- Initiating steps to increase the awareness among the teachers, researchers and students about the availability and benefits of OERs in facilitating quality teaching learning process.
- Reward system should be introduced to motivate the educators for developing open educational resources.
- Integrate OER into university curricula and organizational structures.
- Application of licensing, copyright and intellectual property rights.
- Modularizing the content to meet localization needs.
- Development of skills among the teachers to use or share the resources developed by other teachers or institutions.
- High quality content materials can be achieved largely by funding content development from well established educational institutions.
- Capacity building efforts need to be made for both teachers and learners to train them for effective use of OER.
- Research should be increased in about and around OER so as to make future efforts in the right direction.
- Infrastructure needs to be developed for general software and middleware services for creating, federating, and finding OER resources.
- Appropriate *e-infrastructure* or *cyber infrastructure* needs to be generated in the country.

CONCLUSION

The present world demands creativity and innovation from all of us. A culture of learning needs to be developed so as to equip people to prosper in a rapidly evolving, knowledge-based world. A computer- enhanced learning environment can help make the much needed transition from just ‘knowing’ to ‘sharing’.

OER is a concept rooted in the belief that unrestricted access to education should be entitled to everybody. Through a common model of open licensing, OER allows anyone to access, customize, and share digitally published educational materials for free, with the end result of advancing teaching and learning worldwide. OER has limitless potential to expand knowledge among lifelong learners around the world. Believing in the capacity of OER, the reach and impact of open courseware needs to be extended by encouraging the adoption and adaptation of open educational materials around the world. In India, we are still in the nascent stages of using OER. However, there have been recommendations, for the Government, at different platforms for developing a national *e-content* and *curriculum* initiative. The *e-content* and *curriculum* initiative should initially focus on the rapid production and acquisition of content in high need areas like agriculture, teacher training, basic and applied sciences and engineering, technical education, liberal arts and social sciences, communication skills, ethics and values, public health, and high end skills including management. Our projects should not be copied or modelled on the lines of those developed in other countries. Our model should be based on our needs like multiplicity of languages and available resources. Also, more efforts would need to be made for 'Building Awareness, Voice, and Understanding' about the issue.

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