



**CENTRAL SQUARE
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**Open Educational Resources for K-12 Education in India
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Overview

Open Educational Resources (OER) offer opportunities for sustainable growth in improving the access and quality of education, by enabling free use and repurposing of high-caliber learning materials. OER should be a key focus area for the Indian K-12 education system as it addresses issues of scale and existing needs in the area of content and instruction.

While government efforts in India to set up computer labs and provide one tablet per child, have increased hardware availability¹ for teachers and students, there is a lack of digital learning resources in the public domain. Given the diversity of educational, social and linguistic contexts of the Indian K-12 education system, there is a greater need for collaboration to produce and use the required wide variety of content for different subjects, grades and languages. This collaboration is possible when digital content is freely available for use and adaptation. As teachers and students seriously engage in the process of repurposing OER for their individualized contexts, they will also become constructive learners and enhance their own knowledge.

Paucity of high-quality teachers and poor quality of educational resources both in government and private affordable schools are key challenges facing the Indian education system. Increasing the amount of OER can play a big role in helping solve

these problems, by providing students and teachers with much improved access to quality educational resources. Further, OER are available for free-of-cost, thus leading to reduction in the initial and overall cost of producing teaching and learning material.

Historical Background

The precursor to the OER movement was Project Gutenberg, which was launched in 1974, and advocated for digitization and archiving of cultural works, as well as creation and distribution of eBooks. The year 2001 was a watershed one for OER. Wikipedia championed the global movement for free use and open editing of content, and now has more than 4 million articles created collaboratively by anonymous Internet users. The same year, the MIT OpenCourseWare (OCW) initiative to publish course content online began.

The movement has gained steady momentum over the last decade. There has been a proliferation of Massive Open Online Courses (MOOCs), with the world's most prestigious universities offering large interactive courses over the web.²

In addition to benefitting student learning, OER are also used to improve teacher practice in classrooms. Teacher Education in Sub-Saharan Africa (TESSA) has reached out to more than 400,000 teachers, by creating and widely sharing learning material that has been adapted to as many as 10 country contexts.³

Recognizing the growing importance of OER, the recent 2012 Paris OER Declaration, which was approved at the World OER Congress, made recommendations to governments worldwide to adopt OER policies and also urged them to openly license publicly funded educational material.

What is OER?

There is no one standard definition of Open Educational Resources. A broad, commonly accepted definition⁴ provided by William and Flora Hewlett Foundation⁵ is as follows¹:

“OER are the 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 and repurposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge”

William and Flora Hewlett Foundation's definition of OER

Understanding 'Open' in Open Educational Resources: A traditional resource, copyrighted with the 'all rights reserved' disclaimer by default, requires the author or creator to grant permission to people, who wish to use the resource. OER, on the other hand, carry licenses that allow the right to copy, edit, share, or even build upon existing resources.

The four Rs framework is used for assessing the extent to which an educational resource is open:

Reuse: copy verbatim

Revise: adapt and edit

Remix: combine with others

Redistribute: share with others

Many of these resources are licensed under a scheme called 'Creative Commons' (CC)⁶. Creative Commons provides a set of six copyright licenses and tools that create a balance in the traditional 'all rights reserved' setting of the copyright law. The license states specifically, whether the material may be used, reused, adapted, and shared. Such licenses determine how others might use that educational resource, including whether or not they can access, use, print, copy, distribute, display, perform, or modify that resource. In practice, this changes the status from 'all rights reserved' to 'some rights reserved'.

The six CC licenses, also thus, provide authors or organizations with the flexibility to license their work for "open" access, while maintaining control over how these resources may be used and repurposed. Detailed information on using CC licenses is available in Appendix 1.

OER in the Indian K-12 Context

Most OER initiatives in India have focused on increasing the quantum of OER in Higher Education. Two of the notable initiatives include:

National Program on Technology Enhanced Learning

National Program on Technology Enabled Learning (NPTEL) is a project carried out by seven IITs, the IISc, and other premier institutions around India and funded by the MHRD, has gained popularity with more than 90 million views and 170,000 subscribers on its YouTube channel.

Indira Gandhi National Open University

Indira Gandhi National Open University (IGNOU) launched its e-Gyankosh initiative in 2005 to store, index, preserve, distribute & share the digital learning resources developed by them. The initiative has emerged as one of the world's largest educational resource repository, under which over 95% of the self-instructional print materials of IGNOU, are now available in digital format. The eGyankosh website has 0.1 million registered users who are active and has received around 0.8 million views from all over the world⁷. IGNOU plans to adopt open license policy for converting e-Gyankosh into OER. IGNOU is also the first Open University in the world to adopt the OER policy license⁸. IGNOU also has a YouTube channel with a meta-data link in its repository. More than 40,000 self-learning print resources and over 1800 videos are available in the repository.

However, the OER movement in K-12 education is at a nascent stage in India. A few NGOs, educational institutions as well as for-profit organizations allow for the free-of-cost use of their content. However, in the absence of suitable licensing attached to these resources, large populations of

teachers and students are not able to use them.

Most of the government efforts in K-12 education have focused on creating and/or deploying educational resources, which are proprietary in nature. The proprietary nature of the content not only increases the operating cost, but also does not allow for enough flexibility in their use by students and teachers. A noteworthy example here is that of IT@Schools project in Kerala, which after moving from use of proprietary software to that of Free and Open Source Software (FOSS), has been saving Rs. 11 crore, each year on expenses related to ICT-enabled education.⁹ The project also invested extensively, in customizing public software tools, to make them teacher-friendly. This, in turn, has resulted in easy creation, sharing and use of indigenous content, developed for teachers by teachers.

Government Initiatives on OER

The foundation stones for government policies on OER are the National Policy of ICT in School Education 2012 and the ICT@School scheme. Through these policies, the Government of India has encouraged collaborative creation and widespread dissemination of learning resources.

The National Policy on ICT in School Education provides a blue print for the adoption and implementation of educational technology in schools. The

policy emphasizes the role of state in providing universal, equitable, open and free access to ICT and ICT enabled tools and resources to all students and teachers. It proposes setting up state and national level digital repositories which will host a variety of digital content appropriate to the needs of different levels of students and teachers. It also encourages involvement of teachers and students in collaborative development of digital resources. All digital learning resources and software resources will conform to the National Policy on Open Standards¹⁰ of the Government of India. The policy requires state funded projects and programmes that develop content to deploy resources under appropriate licensing to facilitate open and free access to resources. It also underlines the function of school library in curation and dissemination of appropriate resources to benefit students and teachers.

The core of the ICT@School scheme is the development of e-content as well as its persistent and effective use. Under the scheme, the Department of School Education and Literacy at Ministry of Human Resources and Development (MHRD), provides financial assistance for creation of e-content to national level organisations like Central Institute of Educational Technology (CIET) and state level organisations like State Institutes of Educational Technology (SIETs).

The Department is also contributing financial resources for content creation through outsourcing. For a period of 3 years

– 2011-14, a designated amount has been kept aside - Rs.43.30 crore, for CIET, for development of e-content; as well as Rs. 36 crore for development of Learning Objects (LOs), by outsourcing. This is at the rate of Rs.30,000 for 10 subjects for 4 classes (100 LOs per subject per year), while Rs.9.69 crore has been earmarked, as assistance to States, for modification of the developed e-content as per their requirements. The scheme has also sanctioned the setting-up of 12 multimedia labs that would be expected to produce at least 240 interactive multimedia packages (IIMP) per year, for the next 3 years.¹¹

Several national and state level organizations have launched important initiatives, focused on creation and use of OER, in the K-12 education system in India. Some of these are listed below:

National Repository for Open Educational Resources

National Repository for Open Educational Resources (NROER) is a web platform that allows for collaborative creation of digital content as well as its organization along a concept map. It is an initiative of CIET, the educational technology unit at NCERT. Over the last two decades, CIET has created several audio and video resources on K-12 education topics. These resources have been made available to students and teachers across the country, through broadcasting technologies. The state level organizations, SIETs¹², also create audio,

video and other multimedia resources based on their specific needs.

With the launch of the web platform NROER, students and teachers, will now have access to quality resources, at their own convenience. NROER will host high-quality digital resources for different subjects, across classes, in different languages. It also aims to encourage teachers and other content creators, to share their content, engage in peer review, and adapt as well as adopt resources, to enrich their professional practice. Launching in August 2013, NROER hosts several resources, in the form of wiki pages, documents, images, videos etc.

National Institute of Open Schooling

National Institute of Open Schooling (NIOS), the world's largest open schooling system, supplements self-learning using print material as well as audio, video and multimedia material. These resources are distributed in CD format or broadcasted through education channels on television and radio. It publishes the online version of textbooks on its website. It has also created a wiki-based platform for Open Education Resources. Currently, material is available for three courses namely ICT Applications, Rural Technology, and Tourism and Hospitality Management. For academic courses catering to secondary and senior secondary schools, NIOS is in the process of developing OER in Physics, Chemistry, Biology and Physics.

NIOS, also, has a robust online admission system with 100% of students registering online. This further indicates that learners can get access to online technologies and leverage it for their benefits. NIOS has also conducted a feasibility study to analyze the opportunity of Virtual Open Schooling (VOS) in India, in partnership with Commonwealth Educational Media Center for Asia (CEMCA). As an outcome of this study, NIOS is now setting up an online platform for VOS. This platform will be used by all Open Schools to offer their programmes and courses, as OER in a virtual model.

Karnataka-Open Educational Resources

Karnataka's Department of State Educational Research and Training (DSERT) has launched a project, Karnataka-Open Educational Resources (KOER), to create contextual teaching resources, for all grades and subjects for Karnataka school teachers, in English and Kannada, between 2013 and 2016. In 2013-14 it is running a pilot project to create OER, for Grade 9 Math, Science and Social Science. These resources will be made available on a wiki platform, for wider use and adoption, within and outside the state. By encouraging teachers to create and re-purpose resources, the project aims to facilitate professional development, among teachers.

Earlier in 2011, it rolled out a three-phased capacity building program, for public school teachers, to strengthen their subject matter expertise, using ICT tools. Following a cascade training model, the program has

trained over 6000 teachers, in the use of public software tools. The K-OER project will engage these trained teachers, who, with support from teacher educators from DIETs, will create the educational resources. IT for Change, an NGO based in Bangalore, is leading the management of the project for Karnataka's DSERT.

Open Educational Resources for Schools

This is a joint initiative of Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research (TIFR), Maharashtra Knowledge Corporation Limited (MKCL) and Indian Consortium for Educational Transformation (I-CONSENT). The project aims to provide educational resources for teaching and learning Science and Math, for Grades 1 to 10. Teaching resources include conceptual discussion, teaching aids, activity/experiment/projects, pedagogic guidelines, research and innovations and assessments. Student resources include content enrichment, puzzles, games and activities, experiments and projects, and quizzes etc. All resources created under this project are available on the website of MKCL. The project is financially supported by the Rajiv Gandhi Science and Technology Commission (RGSTC) and the Government of Maharashtra.

Global Initiatives on OER

The educational potential of OER is best demonstrated by a review of a few global examples that highlight some unique efforts

which are extending access and quality of K-12 education. In Appendix 2, we have listed some of these examples of OER projects and platforms, and policy initiatives and advocacy movements, from around the world.

India can also leverage the significant amount of global OER, particularly for content in subjects such as Maths and Science. However, contextualizing resources for alignment with syllabus, method of instruction, accent, language etc. is important, for making them relevant for our use. For example, globally Khan Academy videos with an aggregate viewership of more than 250 million have the third largest number of views from India, after USA and Canada. Around the world, individuals or organizations have translated and sub-titled these videos; Khan Academy videos are available in more than 30 languages. In India also, there are on-going efforts to translate Khan Academy videos in Indian-accented English and/or other Indian languages.

We should further invest in collecting evidence on usefulness of such resources for Indian students and teachers. By investing in appropriate technologies and processes, we can benefit from the existing relevant global content.

National movement for OER

OER offer potential for increasing the availability of content for use by teachers and students, and also for engaging them in

a constructivist approach to learning. Recognizing the huge role that OER can play in education, India needs to invest in building a concerted national movement, focused on increasing the creation and use of Open Educational Resources in the K-12 education system. To build a successful national movement around OER, we need an organized effort that unifies the OER agenda of major stakeholders.

We believe the following focus areas need to be prioritized for OER within K-12 education:

Creation, Curation and Contextualization of OER

We need to undertake several activities for developing high-quality OER, especially in Indian languages, on a priority basis. These activities would include creation of India focused OER, aggregation and adaptation including translations of resources available globally for diverse Indian contexts, and mapping the adapted content to different school curricula.

We can encourage the development of OER in many ways. First, publicly-funded educational material, including material developed by schools and teachers, should be published under open licensing. Second, select schools and teachers should be encouraged and mobilized¹³ to take lead in creating India-focused digital resources. These teachers could then inspire schools and teachers, in other parts of the country, to adapt or create new local content. Third, there is a significant amount of global OER,

which is available for re-purposing in the Indian context. OER in Maths and Science, and subjects that differ less in terms of curriculum, could be aggregated and mapped to Indian curriculum and accordingly adapted in different Indian languages.

OER in English language has benefitted from a large base of global users, who have also enriched the content over time. The comparatively smaller size of user base in any Indian language, poses challenges in both creation as well as promotion of any language specific content. In this regard, we should also make significant investments in processes, people and technologies, to enable the generation and translation of content in multiple Indian languages.

Building stakeholder capacity to adopt open licensing

Most curricular resources are copyrighted by default and hence cannot be used by a large population of students and teachers. A majority of users in India, from policy makers to educational companies to teachers, lack the technical understanding of various licenses associated with materials available on the internet and are unable to use them appropriately.

Often times, users knowingly violate the licensing conditions. For example, despite NCERT specifically disallowing permissions to repurpose NCERT textbooks on their website, anecdotal evidence suggests that several vendors have violated the licensing rights. Such violations dissuade the content

creators from openly sharing their content. At the same time, another challenge is that the content creators themselves are unaware about different, flexible licensing options, under which they can publish their own work.

In order to promote greater utilization and production of materials, we need to create sound understanding of copyright and open licensing, among creators and users of OER. We also need to ensure that the licensing is enforced and respected. This will require taking a massive advocacy effort to sensitize various stakeholders, on the benefits of open licensing.¹⁴ We will further need to invest in building capacity of individuals and institutions, to adopt open licensing, for increasing the amount of OER in the country.

Distribution and use of OER

The ICT@School Scheme has already set up ICT infrastructure in a large number of government schools across the country. This provides an enabling environment for teachers and students to access and use OER. We also believe that growth in number of relevant educational resources will further tempt several hardware providers to pre-load content on device. Owing to limited internet connectivity, institutions will need to carefully design offline distribution mechanisms for use and adoption of digital content. It is also imperative to ensure that schools are adequately using the ICT infrastructure by carrying out a diligence of current state of

infrastructure vis-à-vis requirements for developing and using OER.

Strengthening ICT competency in teachers

Effective implementation of ICT in a classroom or lab relies significantly on competency of teachers to apply technology in their daily pedagogical practice. Currently, teachers, especially in government schools, barring a few cases¹⁵, receive just basic computer literacy. Both pre-service and in-service teacher training, need to lay emphasis on integrating technology in classrooms, and developing skills in creation and use of curriculum related digital content. This would go a long way in enabling teachers to take a constructivist approach towards learning resources and to engage actively with technology. These training sessions can also incorporate training in the access-adopt-adapt methodology of OER.

Defining Quality parameters for OER

As we progress towards large-scale creation and curation of OER, we need to build a common understanding of quality metrics and to develop a mechanism for measuring the quality of OER. There is no standard way to define the quality of OER, because the process of discovery, collaborative creation and adoption, is as important as the relevance of final product, measured in the context of user. As part of their recent initiative on Guidelines for Quality OER, Commonwealth Educational Media Center for Asia (CEMCA), reviewed more than thirty frameworks for quality assurance in

related fields such as e-learning or educational innovations. Their research has resulted in a T.I.P.S Framework¹⁶, which would need to be further tested, for its comprehensiveness as well as user friendliness.

Recommendations to State Governments

We need to invest in multiple efforts, for ensuring large-scale creation, promotion and use of OER in Indian K-12 education space. We believe that all major stakeholders, i.e. governments, educational institutions, NGOs and philanthropic foundations, need to join forces and prioritize their activities, for building a national movement around this cause.

In particular, we recommend that state governments adopt the recommendations outlined below:

1. Examine and adopt open licensing options for all government published material. Release the material under an explicit open license.
2. Create policy guidelines on creation and release of educational resources by all stakeholders i.e. SCERT, SIET, DIET, schools, teachers etc.
3. Build capacity of all stakeholders in adopting open license for their published work, as well as in appropriate use of other published material.
4. Encourage schools and teachers to use and create OER. Recognize the creation of OER as a scholarly activity.
5. Ensure schools and teachers have access to required ICT infrastructure, and are adequately using them.
6. Develop capacities of public school teachers in use of ICT for creation and adaptation of material suitable for their contexts.
7. Set up a state-level platform that will facilitate creation and sharing of OER by all stakeholders.
8. Collaborate with other government bodies, both at the national and state levels, as well as non-profit organizations in creation and adaptation of digital content.

Appendix 1: Creative Commons Licenses

The CC licenses take account of different copyright laws in different countries or jurisdictions and also allow for different language versions. To make the licensing process as simple as possible for users, the CC site provides a license generator that suggests the most appropriate license based on a user's response to specific questions regarding how their work may be used. In order to facilitate searching for resources licenses in a particular way, the CC license is expressed in three versions¹⁷:







1. Commons deed, plain language version of the licence, with supporting icons
2. Legal code, the legal fine print that ensures the licence is recognised in a court of law
3. Digital code, a machine readable translation that allows search engines to identify work by its terms of use

All CC licenses include 'Baseline Rights': the rights to copy, distribute, display, perform publicly or by digital performance, and change the format of the material as a verbatim copy.¹⁸ Additionally, all CC licenses assert the author's right over copyright. They mandate the granting of copyright freedoms and require licensees to:

1. Obtain permission should they wish to use the resource in a manner that has been restricted

2. Keep the copyright notice intact on all copies of the work
3. Publish the licence with the work or include a link to the licence from any copies of the work
4. Not change the licence terms in anyway
5. Not use technology or other means to restrict other licences' lawful use of the work

Creative Commons Licenses

 <p>Attribution: CC BY</p>	<ul style="list-style-type: none"> This license lets others distribute, remix, tweak, and build upon the licensor's work, even commercially, as long as credit is given for the original creation. This is the most accommodating of licenses offered, in terms of what others can do with works licensed under this attribution. 	 <p>Attribution: ShareAlikeCC BY-SA</p>	<ul style="list-style-type: none"> This license lets others remix, tweak, and build upon the licensor's work even for commercial purposes, as long as credit is given and the new creations are licensed under the identical terms. All new works based on the original work will carry the same license, so any derivatives will also allow commercial use.
 <p>Attribution: NoDerivs CC BY-ND</p>	<ul style="list-style-type: none"> This license allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to the licensor. 	 <p>Attribution: Non-Commercial CC BY-NC</p>	<ul style="list-style-type: none"> This license lets others remix, tweak, and build upon licensor's work non-commercially. Although the new works must also acknowledge the original work and be non-commercial, derivative work doesn't need to be licensed on the same terms.
 <p>Attribution: Non-Commercial-ShareAlikeCC BY-NC-SA</p>	<ul style="list-style-type: none"> This license lets others remix, tweak, and build upon the licensor's work non-commercially, as long as credit is given to the licensor and new creations are licensed under identical terms. 	 <p>Attribution: Non-Commercial-NoDerivs CC BY-NC-ND</p>	<ul style="list-style-type: none"> This license is the most restrictive license, as it only allows redistribution. It allows others to download works and share them with others as long as they credit the original work, but they can't change them in any way or use them commercially.

Appendix 2: Global examples on OER in K-12 education

OER Project in Washington

In April 2012, the Washington State Legislature passed a law directing the Superintendent of Public Instruction (OSPI), to support the 295 Washington K-12 school districts, in creating a collection of openly licensed courseware. The law also directed OSPI to align the courseware to common core standards and to conduct an associated awareness campaign to inform school districts about these resources.¹⁹ The opening section of the bill reads:

“The legislature finds the state’s recent adoption of common core K-12 standards provides an opportunity to develop high-quality, openly licensed K-12 courseware that is aligned with these standards. By developing this library of openly licensed courseware and making it available to school districts free of charge, the state and school districts will be able to provide students with curricula and texts while substantially reducing the expenses that districts would otherwise incur in purchasing these materials. In addition, this library of openly licensed courseware will provide districts and students with a broader selection of materials, and materials that are more up-to-date.”

The OER Project is currently evaluating available open resources in Algebra 1 and American Literature, to measure the extent to which they align with the state’s learning

standards. This activity would culminate in a collection of resources for schools.

OER Africa²⁰

OER Africa, an initiative of the South African Institute of Distance Education (SAIDE), is involved in promoting the use of OER in Africa and supporting individuals and organizations in creating OER. It is working with universities in Anglophone Africa on three key areas:

1. Policy engagement: Offers interested organizations practical advice to help create environments that support development, adaptation and use of OER. For example, OER Africa helps review existing policies (national or institutional) of organizations for issues such as intellectual property rights or recognition/remuneration for resource development. OER Africa facilitates the adaptation of these policies into the broad OER policy framework to encourage and sustain development and use of OER.
2. Development/adaptation of OER for educational programmes and courses: Provides support to educational organizations to develop or adapt high quality learning and teaching resources. These range from proof-of-concept pilots for creating resources for a single module to a comprehensive project for creating resources for entire programmes.
3. Support to collaborative networks: Provides support of various kinds to

new and existing collaborative networks. This support can be in the form of facilitating processes to design collaborative projects, as well as online tools for sharing.

Their website provides a space for various OER projects in Africa. For example, the SAIDE ACE Maths project piloted a collaborative process for the selection, adaptation and use of OER for teaching and learning Math, for teacher education. OER Africa does not engage in funding OER projects and works independent of government in all the African countries it operates. OER Africa's initiatives have positively impacted quality of education. For example, the University of Malawi launched an OER project at the Bunda College of Agriculture, which led to the compilation of a first year communication skills textbook. The backdrop of the project was an insufficient number of relevant textbooks in the college, and involved the creation of a paper-based textbook from freely available OER. The project team developed new resources, in addition to adapting existing resources from all over the world.

Teacher Education in Sub-Saharan Africa²¹

Teacher Education in Sub-Saharan Africa (TESSA), as it is popularly known, is an innovative approach to improving the quality of, and extending access to, teacher education in Sub-Saharan Africa. TESSA was founded in 2005, to serve the following three key objectives:

1. Create a network of African universities with the help from The Open University, UK and other international organizations, to focus on the education and training needs of K-12 teachers in Sub-Saharan Africa
2. Support the exploration and development of in-school methods of teacher training
3. Design and build a multi-language repository of OER for teacher educators and teachers, in the region

TESSA has succeeded fairly well in achieving these objectives. The TESSA network is active in more than 13 educational institutions across 12 African countries. More than 700 African teacher educators have participated in the TESSA process including authoring and adapting the core TESSA study units. For primary teachers, TESSA has created 75 study units that have been adapted by 10 countries and are available in four different languages - Arabic, English, French and Kiswahili - on the TESSA website. All TESSA study units contain classroom activities, for teachers, in life skills, literacy, numeracy, science, social studies / arts. Guidance toolkits have been prepared, to assist teacher educators, to integrate and make effective use of study units, in their courses. In 2010, 400,000 teachers in 19 teacher education programmes were estimated to have benefitted from their engagement with the TESSA resources and lessons. TESSA is also developing OER for secondary science

teacher training in Ghana, Zambia, Tanzania, Uganda and Kenya, and extending the use of OER in primary teacher education programmes and at colleges in Uganda and Zambia.

TESSA undertook a study recently to assess its impact on the practices of teachers and teacher educators in target countries. The study mentioned that with respect to use of TESSA OER, *“There has been very considerable ‘take up’ of TESSA materials. The TESSA OER has been used in programmes with almost 300,000 enrolments of teacher-learners and in-service teachers across a wide range of programmes in all partner institutions.”* With respect to the benefits of networking, it mentioned, *“The TESSA network has grown far beyond the original TESSA consortium partner institutions... reflect not only a legitimate challenge to the traditional model of approaching education reform initiatives from the centre (seat of bureaucracy) to the periphery (grassroots), but also provide a good case study on how to cascade education reform initiatives from the ‘bottom’ to the ‘top’ (from the grassroots to the centre)...”*

Sao Paulo Municipality legislation on OER²²

Brazil has over the years has launched many OER initiatives in K-12. One of the notable ones is legislation in 2011, by the municipality of São Paulo Department of Education, that mandates that all its educational and pedagogical content] be made available, under the Attribution Non-

Commercial Share-Alike (BY-NC-SA) license. Some other OER initiatives include International Database of Educational Objects (BIEO), a repository of 20,000 learning objects, including research publications and digital content for K-12 to higher education and Multimedia Mathematics (Matemática Multimídia), a collection of multimedia educational resources for senior secondary Maths.

Learning Resource Exchange for Schools in Europe

Learning Resource Exchange for Schools (LRE) is a service launched by European School net, in 2004, to enable teacher educators for finding multilingual OER from many countries and providers. The portal offers a federated search capability, across a network of 20 OER repositories including those of 16 Ministries of Education in Europe. Currently, more than 200,000 learning resources from more than 50 content providers are searchable based on language, subject, resource types and age range.²³

Hippocampus - National Repository of Online Courses (NROC)²⁴

NROC offers a library of high-quality course content for students and teachers in higher education, high school (Grade 9 – 12) and Advanced Placement. Courses in the NROC library are contributed by developers from leading academic organizations in the USA. NROC content is available for free to students and teachers on public websites including Hippocampus. NROC is funded by

a grant from the William and Flora Hewlett Foundation. The Monterey Institute for Technology and Education maintains both, NROC and HippoCampus. HippoCampus offers high-quality video content across multiple subjects, ranging from Khan Academy to the National Repository of Online Courses. Content includes presentations/lectures, worked examples and simulations, and ranges from full courses (such as Algebra I, in both English and Spanish) to “collections” of related items, grouped under a subject. Students can find online content based on chosen subject areas or aligned to their class textbooks, develop playlists to work with and share their learning plan with others. For teachers, HippoCampus subject matter experts maintain blogs with ideas on how to incorporate HippoCampus content into the classroom and recommend other related resources on the Web as well. There are a collection of case studies of schools that have used its Math content. Average visit duration lasts for over 18 minutes, with an estimated 200K visits per month (93% from the U.S.) during the academic year.

OER Commons²⁵

OER Commons provides a library of 46,000 educational modules for K-12 and higher education, from more than 500 major content providers. These resources have been curated and rated by experts and; are aligned to the common core standards in the USA. Teachers and students can search, discover and refer to OER material. OER Commons also provides OER workshops and

trainings for teachers on introduction to OER, open licensing, collaborative content creation and remixing OER. Additionally, OER Commons offers tools such as *openauthor* that lets users combine text, pictures, sound files and videos on the website, to create new openly licensed educational resources.

OER Commons was launched in 2007 by ISKME (Institute for the Study of Knowledge Management in Education), a non-profit research institute that helps schools, colleges, universities, and the organizations, expand their capacity to collect and share information, apply it to well-defined problems, and create human-centered, knowledge-driven environments, focused on learning and success.

Curriki

Curriki is a free community that provides OER for K-12. These resources are contributed by members of Curriki community including educators, partners and parents from 193 countries and are peer-reviewed for quality and adherence to 47,400 the OER contributed by educators, partners and parents. Curriki has 8.5 million users and receives more than 2.5 million views each year. Curriki results in cost savings to teachers, since the teachers can use Curriki OER, instead of using supplemental materials.

CK-12²⁶

CK-12 is a non-profit organization dedicated to increasing access to high quality educational materials for K-12 students, all

over the world. CK-12 offers high-quality standards –aligned open content in science, technology, engineering and maths (STEM) subjects, through an integrated set of tools for learning, such as digital textbooks, concepts-based learning resources, SAT preparation, and an interactive Algebra curriculum. All the offerings on CK-12 can be customised to match the needs of the students, teacher or school. CK-12 covers more than 5000 concepts, through more than 15000 resources. These resources have been viewed more than 36 million times.

Connexions

Connexions is a global repository of educational content for learners from all walks of life, including K-12 and higher education in nearly every discipline, including math, science, psychology, sociology, history etc. Connexions' repository consists of more than 17,000 learning objects or modules and over 1000 collections (textbooks, journal articles etc.). These resources can be remixed and edited for reuse and can be easily downloaded for free of cost on any mobile device. More than 2 million learners access Connexions every month. The platform is provided and maintained by Rice University.

Khan Academy

Khan Academy provides a library of more than 4100 educational videos, interactive challenges, and assessments, for K-12 and higher education. Khan Academy videos have been watched more than 250 million

times since its launch and the website receives 6 million unique visitors on a monthly basis²⁷. India has the third largest viewership after USA and Canada. Khan Academy videos have been translated in more than 30 languages. The organization works with partner organizations that lead the translation efforts. Lemann Foundation and Slim Foundation are leading some large scale translation efforts in Brazil and Mexico respectively. In India, Azim Premji Foundation and Central Square Foundation have done some translations, for Indian context. Khan Academy is also working towards opening up platform architecture to enable dubbing of the entire platform.

PhET Interactive Simulations²⁸

PhET provides more than 130 interactive, research-based simulations, for teaching Science and Math to school and university students. These simulations play a useful role in making a connection between real life and science concepts. Translated into 66 languages, PhET has been delivered more than 130 million simulations so far and runs more than 25 million simulations every year. PhET simulations are being used by many organizations for free, including Pearson, Plato Learning and McGraw-Hill. PhET has been ranked by Google as the best portal for science simulations.

Utah Open Textbook Project²⁹

The Utah Open Textbook Project engages teachers in the process of collaboratively aggregating OER and aligning these with state standards, in order to produce fully

OER-based replacements for traditional science textbooks. The project started in 2010, with seven public high school teachers and 1200 students, who used adapted openly licensed CK-12 textbooks. Most used printed versions of the textbooks, while some students used online versions of the textbook on desktops, netbooks or iPads. These textbooks resulted in tremendous cost savings for the school districts. Available for free in digital format, these adapted CK-12 textbooks cost the school district approximately \$5 per book in print format compared to \$80-100 books from publishers. Based on the success of the project over the last few years, Utah is now in the process of creating customized versions of Grade 6 – 12 language arts, math and science open textbooks for use across the state.

Free High School Science Texts (FHSST) South Africa³⁰

FHSST is an initiative to develop and distribute free science textbooks for Grade 10 – 12 students in South Africa. Textbooks are mapped to the government's syllabus, and published under a Creative Commons license (CC-by-SA), allowing teachers and students to print or share them digitally.

E-Pustakalaya in Nepal³¹

Launched in 2009 by Open Learning Exchange (OLE) Nepal, E-Pustakalaya offers a digital library of educational resources, including full-text documents, books, images, videos, audio files, and interactive educational software. The aim of the

project is to improve children's reading skills, develop a reading culture in schools by giving free and open access to age-appropriate reading materials, and enable students to conduct research projects and promote the habit of independent inquiry.

Weekend Open Textbook Hackathon in Finland

A group of Finnish Mathematics researchers, teachers and students made a record, when they created an openly licensed senior-secondary mathematics textbook, in a booksprint that lasted just 72 hours.

Publicly funded educational materials

Legislation involving open licensing of publicly funded educational materials has been passed in Brazil, Poland, USA and Canada. Several foundations (covering education) have implemented or are considering making open licensing on the outputs of their grant funds, a requirement. William and Flora Hewlett Foundation and the Open Society Foundations require their grantees to publish the resources they build with grant money, under open licenses. Commonwealth of Learning and the World Bank have also adopted open licensing policies, to share their publications.³²

NOTES:

1. As of now, around 96,610 secondary schools have a computer lab, <http://www.cietncert.org/ICT-Schools/node/67>)

2. All MOOCs do not grant permission for free use and repurposing of their material.

3. TESSA is a research and development initiative of 12 countries focused on teacher education in Sub-Saharan Africa, http://www.tessafrica.net/files/tessafrica/Briefing_note_general_June_2012.pdf)

4. Here, the definition of OER does not restrict the format of OER materials to only digital format.

5. Since 2002, the Hewlett Foundation has worked with OER grantees to improve education globally, by making high-quality academic materials openly available on the Internet.

6. Creative Commons is a non-profit organization devoted to expanding the range of creative works available to others to build upon legally and to share.

7. 109th Meeting Notes for IGNOU, <http://www.slideshare.net/CEMCA/cemca-oer-workshop-22213umak>,

8. 109th Meeting Notes for IGNOU; <http://www.slideshare.net/CEMCA/cemca-oer-workshop-22213umak>,

9. Mathrubhumi Year Book 2012 report available on IT@School, Kerala Website.

10. <http://egovstandards.gov.in>

11. Revised ICT Scheme, Ministry of Human Resources and Development.

12. As of now, SIETs are functioning from Ahmedabad, Hyderabad, Lucknow, Pune and Thiruvananthapuram. SIETs in Patna and Bhubaneswar have been closed.

13. Learn Zillion, a company in the US organizes summer fest and invites selected teachers to create high quality Math content.

14. Commonwealth Educational Media Center for Asia (CEMCA), Creative Commons and Wikimedia have played an important role in advocacy efforts in India, by organizing workshops, for government bureaucrats, and educational institutions, on sensitizing them towards the importance of copyrights and the benefits of open licensing.

15. IT for Change, a non-profit organization based in Bangalore, Karnataka, is working with the state government to train all public schools teachers in the use of free and open source software, on their respective subject matter.

16. T.I.P.S. acronym stands for the (T)eaching and learning process, the (I)nformation and material content, the (P)resentation, product and format, and (S)ystem, technical and technology. It covers four dimensions, involving 19 categories as sub-dimensions and overall 65 criteria. http://www.cemca.org.in/ckfinder/userfiles/files/OER_Q_TIPS_978-81-88770-07-6.pdf

17. Neil Butcher, Creative Commons website, Liang, 2004, p. 82

18. Hofman & West, 2008, p. 11 accessed through Neil Butcher

19. http://digitallearning.k12.wa.us/oer/OER_HotTopic_Nov13_2012.pdf

20. Though focused on higher education, OER Africa has important lessons for India in terms of organizing a movement to lead the OER effort on a large scale. Source: OER Africa Website; OER Dossier: OER and Higher Ed Neil Butcher

21. TESSA website and TESSA: Formative Evaluation Report Oct 2012

22. For details on history of OER movement in Brazil and its vision for the future, please see

<http://iite.unesco.org/pics/publications/en/files/3214695.pdf>

23. lreforschools.eun.org/

24. NROC, Hippocampus website; EdSurge

25. OER Commons Website,
http://wiki.creativecommons.org/OER_Case_Studies/United_States

26. CK-12 website and press toolkit

27. <http://www.forbes.com/sites/michaelhorn/2013/03/21/special-k-dont-sleep-on-khan-academy-knewton/>

28. <http://phet.colorado.edu/en/about>

29. <http://www.lumenlearning.com/success> and
http://wiki.creativecommons.org/OER_Case_Studies/United_States and <http://utahopentextbooks.org/>

30. http://en.wikibooks.org/wiki/FHSST_Physics

31. <http://pustakalaya.org/about.php>

32. Creative Commons Blog

This note has been prepared by the team at Central Square Foundation, under the guidance of Dr. Rajaram, Joint Director, Central Institute of Educational Technology, NCERT.



Central Square Foundation (CSF) is a venture philanthropy fund and policy think tank focused on improving learning outcomes for children, from low-income communities in India, with a focus on school education. We are strictly a philanthropic funding and capacity-building organization and operate by making early and growth stage grants in education-focused NGOs. Our focus is on initiatives that are impactful, efficient and effective, with the potential to scale, so as to effect systemic change. We are data driven, seeking empirical, fact-based information to inform our views and insights. In specific, we support initiatives around the following themes - 1) high quality affordable schools, 2) human capital development (principal/ teacher training), 3) technology in education (for personalized and self-paced learning), 4) accountability/ community engagement.

For further details, please visit www.centalsquarefoundation.org