

## Motivational Open Educational Resources for Secondary Education in India for Effective Teaching/Learning Process on the Internet

**G. R. Angadi**

Assistant Professor, BLDEA's JSS College of Education, PG and Research Centre in Education, Bijapur-586101 Karnataka, India

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### Abstract

Open Educational Resources (OER) offer opportunities for sustainable growth in improving the access and quality of education, by enabling free use and re-purposing of high-caliber learning materials. OER should be a key focus area for the Indian secondary 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 availability 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 secondary 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.

**KEYWORDS:** OER, Secondary Education, Effective Teaching/Learning Process and Internet

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### 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 Open Course Ware (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.

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.

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 definition provided by William and Flora Hewlett Foundation is as follows: *“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 re-purposing 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”*.

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 R’s 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). 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.

### **OER in the Indian Secondary 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 world<sup>7</sup>. 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 license<sup>8</sup>. 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 secondary 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 secondary 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.<sup>9</sup> 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 Standards<sup>10</sup> 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 organizations like Central

Institute of Educational Technology (CIET) and state level organizations 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 crores, 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.

Several national and state level organizations have launched important initiatives, focused on creation and use of OER, in the secondary education system in India.

Some of these are listed below:

**a. 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 secondary education topics. These resources have been made available to students and teachers across the country, through broadcasting technologies. The state level organizations, SIETs, 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.

**b. National Institute of Open Schooling(NIOS)**

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.

**c. 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.

**d. 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 secondary 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 secondary 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 secondary education:

#### **1. 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 mobilized<sup>13</sup> 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.

#### **2. 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.<sup>14</sup> 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.

### **3. 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.

### **4. 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 cases<sup>15</sup>, 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.

### **5. 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 Framework, 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 secondary 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:

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

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7. 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.
8. 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/OERQ\\_TIPS\\_978-81-88770-07-6.pdf](http://www.cemca.org.in/ckfinder/userfiles/files/OERQ_TIPS_978-81-88770-07-6.pdf)
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