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ORIGINAL RESEARCH

Open educational practices at Uttarakhand Open University: from policies to implementation

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Abstract Soon after the emergence of the open courseware movement, in 2002 UNESCO coined the term Open Educational Resources (OERs) in a forum on the impact of open courseware on higher education in developing countries. Since then, the OER movement has gained much momentum and a global movement towards collaboration in the development and sharing of content has developed worldwide. Uttarakhand Open University (UOU) has embraced the OER approach and started following Open Educational Practices (OEP) after adoption of OER policy by it. Using OERs, the University has developed 45 courses and released them under the Creative Commons license. In addition, the University has conducted many OER sensitization workshops, both for policymakers and stakeholders, in the last few years. This paper presents UOU's journey of adopting Open Educational Practices, from policy formulation to implementation. This paper also discusses the outcome of a survey conducted by UOU for ascertaining its teachers' attitude towards OERs.

Keywords Open educational resources (OER) · Open courseware (OCW) · Self instructional material (SIM) · China open resources for education (CORE) · Organization for economic co-operation and development (OECD) · Open learning (OL) · Open educational practices (OEP) · Open and distance learning (ODL) · Self learning material (SLM)

1 Introduction

UNESCO first used the term OER in the year 2002 at a forum on the impact of open courseware on higher education in developing countries. The term Open Educational Resources (OERs) refers to any type of educational material that is in the public domain or available with an open license, which means that anyone can legally and freely copy, use, adapt and re-share it [10]. OERs were originally conceived to support education but they are also being seen as an alternative to traditional textbooks in some countries. OERs are available in a variety of forms, including textbooks, curricula, syllabi, lecture notes, assignments, tests, projects, audio, video, animation etc.

One of the reasons for the increasing popularity of OERs in a wide range of institutions has been the steady rise in textbook prices. The promise of OERs is based on a culture of sharing and learning, encouraging teachers and students alike to adopt existing educational resources and adapting and sharing them with others to maintain the cycle of collaboration and continuous improvement. OERs offer equal access to knowledge to everyone and allow resources to be adapted for meeting accessibility needs, thus making them equitable. Predominantly digital, they are by nature accessible and being in the public domain, they are an economical teaching and learning tool. Some of the benefits and advantages of OER include:

- improved access to learning materials;
- increased access to resources in vernacular languages;
- reduced cost;
- support for lifelong learning;
- curatable and customisable, to suit curricula;
- enhanced accessibility to quality peer-reviewed material, resulting in curriculum enhancement;

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- improved dialogue with peers globally.

This paper reviews the journey of open educational practices at Uttarakhand Open University, from policy formulation to its implementation. This section is followed by a literature survey of OER practices followed in different parts of the world. Section 3 presents UOU's OER initiatives. Section 4 discusses UOU's strategic response to the recommendations made in the second OER World Congress on achieving Sustainable Development Goal 4 (SDG4). Section 5 presents the outcome of the survey that was conducted by UOU to ascertain teachers' attitude towards OERs, after many capacity building and sensitization workshop at UOU and outside. Section 6 discusses the successes, challenges and lessons learned from adoption of Open Educational Practices at Uttarakhand Open University. The paper concludes with few final remark presented at Sect. 7.

2 Literature survey on OER practices around the world

OER is best known as an 'open' movement and the general foundation is simple: that information should be widely disseminated and freely accessible, in order to benefit not just the traditional learner but also the non-traditional and self-learner[7]. OER are educational resources that are freely available on the web under an open license. The open license facilitates the adaption and repurposing of educational contents in varied languages and cultural contexts, without the hurdle of seeking the permission of the content owner. Open educational resources and open education practices have the potential to lower costs and increase participation in higher education [6].

The OER journey stated with The University of Tubingen in Germany, which published a video series of its lectures online in 1999. The timeline of some of the OER initiatives around the world is summarized in Table 1.

OER's penetration in the developing world has been slower than in industrialized countries, with the exception of China, India, Japan, Vietnam and Indonesia [3]. Indian government has supported OER initiatives in both policy and practice. In 2008 the National Knowledge Commission (NKC) called for a national e-content and curriculum initiative to stimulate the creation, adaptation and utilization of OER by Indian institutions and the leveraging of OER produced outside India [9].

Indian government has started several innovative program, like SHAKSHAT (an academic portal), National Mission on Education through Information and Communication Technology (NMEICT), National Program on Technology enhanced Learning (NPTEL), OSCAR(Open Source Courseware Animations Repository), E-Grid (an educational portal of IIIT, Kerala that is supported by MHRD) etc. [2]. In 2014, India's first MOOC platform—SWAYAM—was announced by India's Prime Minister Narendra Modi in his Independence Day speech. Open educational prac-tices (OEP) have also been nurtured, for example, through the Wikimedia India Chapter (http://wiki.wikimedia.in/) and Creative Commons India (https://

Table 1 Timeline of OER journey

Year	Event
1999	The University of Tubingen in Germany which publishes a video series of its lectures online in 1999
2002	Massachusetts Institute of Technology's *Open Courseware (OCW)* initiative with 32 initial courses
2003	China introduced *China Open Resources for Education (CORE)* in collaboration with MIT's OCW
2006	Salman Khan launched *Khan Academy* which provides free access to K-12 level educational resources
	The Open University (OU) of UK also launched *OpenLearn*, which is a open learning platform of OU and contains Self Instructional Material and other education resources through its website *LearningSpace*
2007	Apple Inc. also joined the OER movement in 2007 and unveils *ITunes U* service which is an open and free educational platform constructed on the basis of iTunes, which provides brand-new development conditions and ideas for the co-construction and sharing of OERs [4]
	University of Michigan Medical School launched initiative *dScribe*, which provides all pre-clinical curricula materials as OER
2009	YouTube launched a free educational channel, *YouTube EDU* which consists of thousands of educational videos, including those from partners like Khan Academy, Stanford, and TED-Ed
2011	*Codecademy*, an online interactive platform that offers free coding classes in nine different programming languages, was launched to provide free OERs for learning computer programming
2012	TED (Technology, Entertainment, Design), a non-profit media organization, launched *TED Ed* to provide free access to top-quality educational videos from the world's top teachers to the masses
2013	In Stanford University launched *Stanford OpenEdX* to offer free online courses that draw more than 350,000 enrollments around the world

wiki.creativecommons.org/wiki/India), in addition to the Karnataka OER (http://karnatakaeducation.org.in/KOER/en) and subject teacher forum (http://karnatakaeducation.org.in/KOER/en/index.php/Subject_Teacher_Forum) teacher education projects led by Indian NGO IT for Change [8]. Several institutions in India have initiated activities in the area of OER and are either developing their own policies or looking forward to guidelines from the Government of India. Apart from the open licence policy of NMEICT, some institutions that have some kind of OER policy include Indira Gandhi National Open University (IGNOU), Vardhaman Mahaveer Open University, Krishna Kanta Handiqui State Open University, Uttarakhand Open University, Odisha State Open University, Central University of Himachal Pradesh and the University of Hyderabad.

3 OER initiatives in Uttarakhand Open University

The OER journey of UOU started in 2011 when the University hosted a conference, in collaboration with CEMCA, where issues related to ICT interventions in distance education and open educational resources were presented and shared. The OER journey of UOU is summarized in Fig. 1.

4 UOU's strategic response to SDG4

Based on the second OER World Congress, Commonwealth of Learning [1] has identified concrete actions to mainstreaming OER for achieving Sustainable Development Goal 4 (SDG4): Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all. UOU's strategic responses to the recommendations for concrete action by educational institutions are as follows:

1. *Developed and implemented Institutional OER policy*. Realizing the importance of OERs and the advantages offered by OER, UOU developed and implemented institutional OER policies in 2014 with the support of CEMCA. The purpose of this OER Policy is to:

   (a) *Make material available under Creative Commons licenses* all material developed by the University is released on the university OER Repository site under Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Moreover, material such as University/School blog contents, Lecture notes, Powerpoint presentations, Acts, statutes and ordinances of the University etc. are released under Creative Commons Attribution-ShareAlike 4.0 International License.

   (b) *Support voluntary participation of Faculty and others in developing OER content* faculty members of the University are actively involved in the development of OER content. The course material of Certificate of Computer Applications (CCA), Diploma in IT (DIT), Certificate in E-governance and Cyber Security (CEGCS) and Master of Computer Applications (MCA) are developed and released as OERs.

   (c) *Clarify publication rights and licensing issues* the SLM and the supplementary study material owned by the University contains full license information.

   (d) *Provide guidance in development and review of OER materials, prior to sharing them on a worldwide scale* as a matter of policy, only the material with is edited and approved by the Director of the concerned school is released as an OER.

   (e) *Define collaborations within and outside the university with the intent to allow free access to the e-contents* UOU has signed an MOU with other Universities, like IGNOU and Odisha Open University, for free sharing of e-content.

2. *Created institutional mechanisms for OER quality assurance*. Assuring the quality of OERs helps build institutional reputation. It is important that OERs released by educational institutions be educationally effective. To ensure this, Uttarakhand Open University has created internal mechanisms for quality assurance. University's curriculum-based learning resources, developed through peer reviewing and strict quality assurance mechanism inbuilt in the course development process, does not require further reviewing for uploading on the repository. All other contributions are peer reviewed within the department before uploading on the OER Repository.
3. *Created an institutional repository for OER*. While OERs are developed in institutions, it is necessary to share them effectively for wider use. This is possible only through the establishment of an institutional repository that allows easy discovery of OER by anyone, anywhere in the world. Uttarakhand Open University has developed an OER repository that is accessible at elearning.uou.ac.in. This portal has been developed with CEMCA's active support and contains SLM, supplementary reading material, video lectures, etc. both in English and Hindi. Very soon, UOU shall be migrating the OER repository to the dSpace platform.

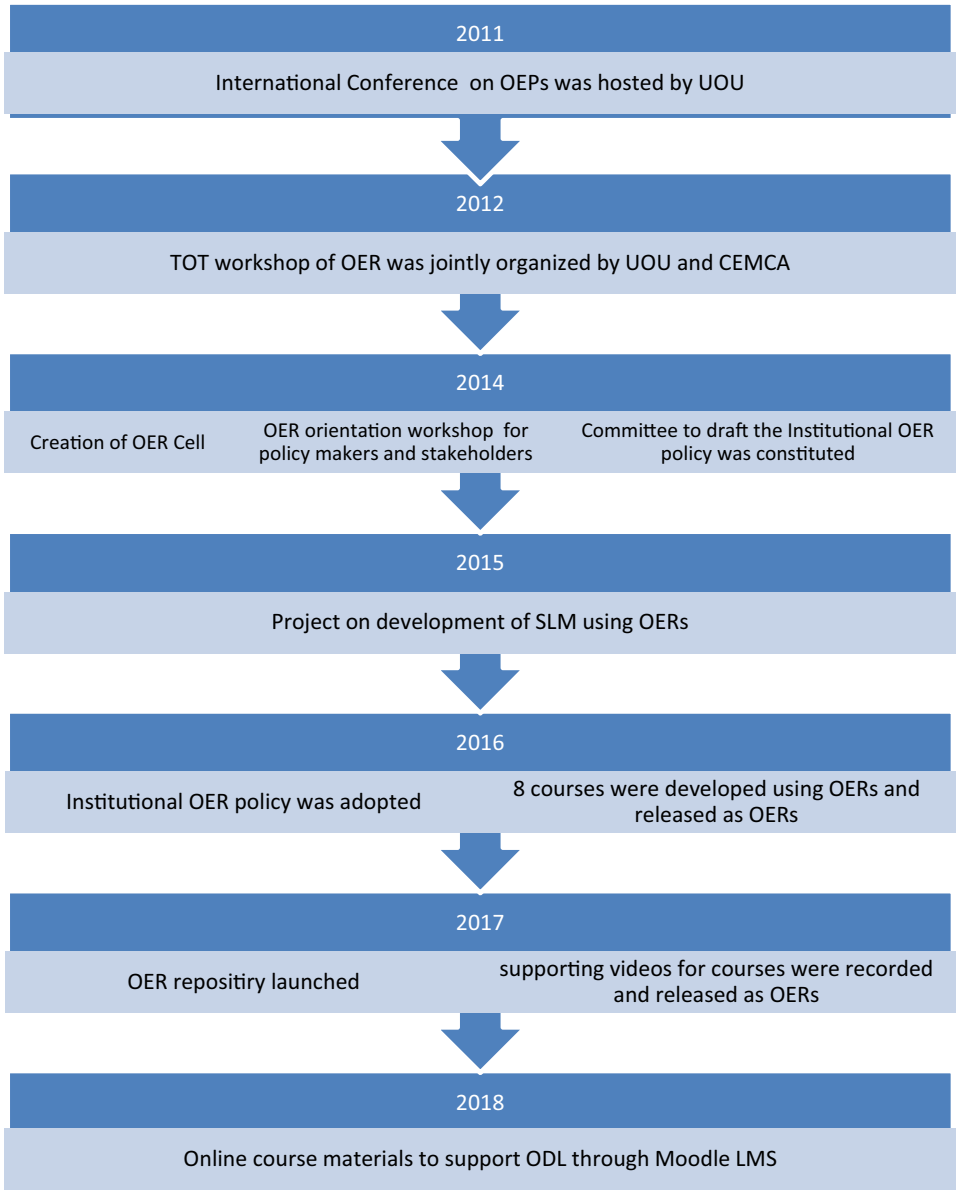

Fig. 1 OER journey of UOU

4. *Regularly organizing OER capacity-building programmes for teachers.* Building the capacity to understand, find and integrate OERs in teaching and learning is important for mainstreaming OERs. The capacity to curate and use OERs is as important as creating or remixing them. While most teachers are not involved in creating or remixing OER, everyone should be an effective user of available OERs. There are many resources available for training teachers about OER. Uttarakhand Open University have conducted five capacity building training programs for its teachers on OER out of which four are organized with the support of CEMCA.
5. *Collaborate with other institutions to avoid reinventing the wheel.* The main objective of OERs is cost reduction through the use of openly available materials. Economies of scale can be achieved through collaboration in content development. Uttarakhand Open University havs used many OER resources offered by NPTEL, Saylor Academy, Wikibooks, Open Textbook Library, University of Minnesota's OER repository, individual website of David Evans, Portland State University, BC Open Textbooks, O'Reilly and Free Tech Books. UOU has also indigenously developed course SLMs for some of the courses, such as discreet mathematics and cyber security, and released them under creative common open license. These courses are available at its repository elearning.uou.ac.in. As of now, fifty-three courses have been developed by fully or partially using OERs.

6. *Taken steps to improve the institution's ICT infrastructure.* Using OERs in teaching and learning, as well as developing OERs in educational institutions depends on the availability of an accessible ICT infrastructure and internet connectivity. UOU is connected to internet through NKN and the University is planning to configure dSpace for its online repository.
7. *Developed accessible OER.* The University has developed OERs using accessible, editable formats and technologies to enable their use and reuse by people with disabilities. Open and Distance Learning system do not require regular class attendance, therefore it is very popular among learners with disabilities and learning difficulties. Based on the recommendations of [5], the following steps have been taken to ensure easy availability of learning materials for people with disabilities:

- The University has ensured that learning material is available through disk/website/repository. Most blind/visually impaired students use computer-based synthetic speech output as their primary means of accessing the learning materials. The learning material is available in editable format, to facilitate the learners who require large prints, so that they can change the font size and style as per their needs.
- Video lectures recorded in Hindi are used to supplement the course material. The videos contain subtitles to assist the learners with hearing disabilities.
- Learners with neurological disabilities often have difficulty with visual presentation because their visual memory may be 'scrambled': they may have trouble extracting meaning from text and graphics. However, they have less difficulty with aural comprehension. Therefore, an audiotape is easier for them to understand. UOU makes available audiotapes to its learners, which are also broadcast through its community radio channel, *Hello Haldwani*.
- Many learners learn better with computers, particularly those with intellectual disabilities. Computer programs that provide multi-sensory information are extremely motivating. They also provide a means of teaching learners with limited or no reading skills. However, the information is limited by what is visible on the screen. Learners may feel safer because they can go back and retrieve information. Online courses have been launched through its online Moodle platform, to assist learners.

5 Attitude of UOU teachers towards OER

UOU has embraced the OER route for course development and delivery. The University has conducted six OER capacity-building workshops, in collaboration with CEMCA and others. Moreover, it has sent six of its faculty members to attend various OER capacity-building programs conducted by other Universities/Institutions. UOU conducted a survey to gauge the attitude of its faculty members towards OERs, between September 13, 2017 and November 8, 2017. The attitude of faculty towards OERs has been computed using a questionnaire containing eighteen 5-point scale items calculated on the basis of scoring of 1–5, i.e., strongly disagree (1) to strongly agree (5). The scale has been classified into two sub-scales—adaptation and use of OER and sharing and contribution to OER. The following analysis is based on mean average and standard deviation of overall scale and the sub-scales also, to better understand the attitude of UOU faculty towards OER. Out of 26 faculty members who responded on the questionnaire, 16 were males and 10 were females. Figure 2 shows that more than half (58%) of respondents are in the age group of 36–50 years, while one-third of them are between the age group of 21–35. The number of faculty members above the age of 51 is less (8%), this indicates that most of the faculties in the present study were in the mid-career age group.

Figure 3 indicates that more than half of the faculty respondents (53.8%) were from Humanities discipline, while 34.6% of them were from vocational subjects. Sciences discipline is covered by only 11.5% faculty respondents. Thus, representation from various disciplines is covered in the study.

The analyses of the overall means and range on the Attitude scale items indicated that faculty responded positively on all the items related to attitude towards OER (M = 3.98, SD = 0.347) (Table 2).

Table 3 represents the average of 11 items' sub-scale for adaptation and use of OER ranged from 3.46 to 4.27 is indicating that, overall, the UOU faculty are positive about adaptation and use of OER. The results indicated that faculty members are sure about the potential of OER as they reported that there will be enough OER appropriate for any given content(M = 4.27; SD = 0.604). Similarly, they accepted that OER material can be customized to the needs of the learners and these materials can be appropriately used in different learning situations (M = 4.12). The free access of OER encouraged the faculty to prefer it (M = 4.08; SD = 0.845) and these materials are also available for any given content (M = 3.46; SD = 0.811). Therefore, OER can be adapted for a given requirement (M = 4.04; SD = 0.662) with supporting different learning

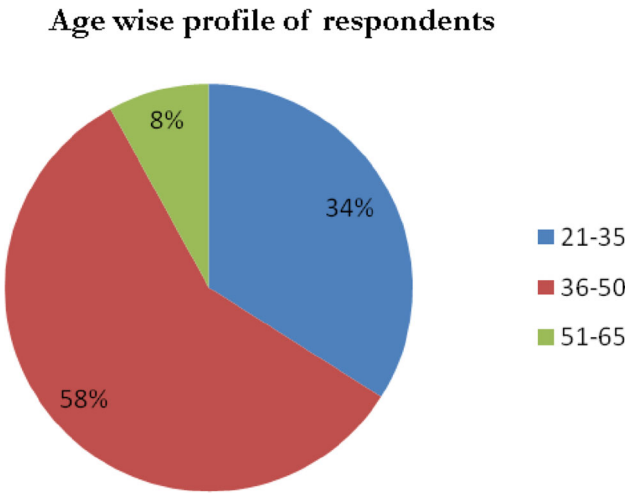

Fig. 2 Age-wise profile of the respondents

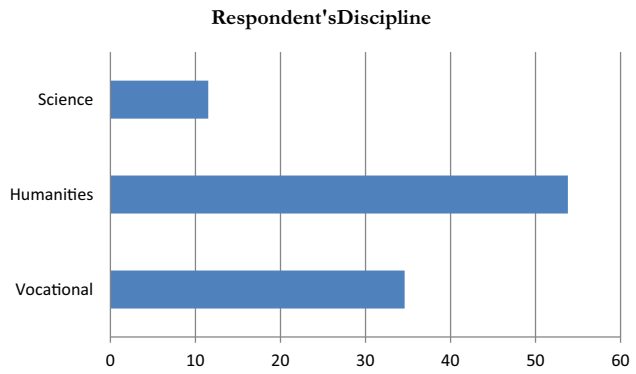

Fig. 3 Discipline wise profile of respondents

styles of students (M = 3.81; SD = 0.634) including differently abled children (M = 3.77; SD = 0.710) that can further help teachers to perform better in classroom transactions (M = 3.92; SD = 0.628). In addition, faculty have shown attitude between positive and neutral when asked about the effectiveness of OER over textbook on students' learning (M = 3.46; SD = 0.948). Overall, faculty reported that the adaptation and use of OER can be effective for personalized learning through better teaching.

Table 2 Overall analysis of Attitude of Faculty members towards OER

Attitude scale analysis	
N	26
Item	18
Mean	3.987
Std. error of mean	0.068
Std. deviation	0.347
Minimum	3.44
Maximum	4.61

The analysis of faculty' attitude towards sharing and contribution to OER (Table 4) shows that all the participating faculty members have positive attitudes towards sharing and contribution of OER with mean ranged from 4.54 to 3.73. Most of the faculty members indicated positive attitude towards their responsibility to share all educational resources that they have created and when they share, they feel happy if someone adopts/adapts their educational resources (M = 4.54; SD = 0.508). Faculty increase their confidence while sharing OER through becoming a part of larger community (M = 4.12; SD = 0.711). They believe that sharing educational materials as OER will encourage others to do so as well (M = 4.12; SD = 0.588) through disseminating their own ideas (M = 3.73; SD = 0.604). Thus, they agreed that it is obligatory for an expert to contribute to a OER repository as his/her social responsibility (M = 4.04; SD = 0.599). Overall, the faculty members of UOU are highly motivated to share and contribute to OER not only for professional development but also to enhance the teaching learning process as well.

6 Successes, challenges and lessons learned

6.1 Successes

UOU has successfully managed to leverage the potential of OERs for enhancing the spread of quality education. This is important since UOU was setup with the mandate of disseminating quality higher education in the Indian state of Uttarakhand, which has historically been faced with low levels of economic growth and development and is constrained by challenging geographical and climatic conditions. Of particular note, among UOU's various achievements, in just over a decade since it was created, are:

- development and implementation of an Institutional OER policy.
- development of 45 courses using OERs and releasing them under creative commons license.
- Creation of an OER repository.
- Configuring a Moodle LMS and mobile app for hosting supplementary video lectures, which are recorded by the University faculty member and released under open license.

6.2 Challenges

Despite UOU's tremendous ardour focussed at deploying OERs, thus simplifying the task of disseminating necessary knowledge economically, the University finds itself short of the targets that it has set for itself internally due to a

Table 3 Average of attitude scale items on adaptation and use of OER'

	N	Minimum	Maximum	Mean	Std. deviation
1. I am sure in the near future there will be enough OER appropriate for any given content	26	3	5	4.27	0.604
2. OER material can be customized to the needs of the learners	26	3	5	4.12	0.588
3. OER materials can be appropriately used in different learning situations	26	2	5	4.12	0.653
4. I prefer to use OER as they are available for free	26	2	5	4.08	0.845
5. OER materials can be adapted for a given requirement	26	3	5	4.04	0.662
6. OER resources can help teachers to perform better in classroom transactions	26	3	5	3.92	0.628
7. OER helps me to reach out to more students	26	2	5	3.85	0.784
8. OER material caters to different learning styles of students	26	3	5	3.81	0.634
9. OER materials help to cater to the learning needs of differentially abled children	26	2	5	3.77	0.710
10. OER material is available for any given content	26	1	5	3.46	0.811
11. Students will learn more effectively through OER as compared to a textbook	26	1	5	3.46	0.948

Table 4 Average of Attitude scale items on 'Sharing of OER'

	N	Minimum	Maximum	Mean	Std. deviation
1. As a teacher, it is my responsibility to share all educational resources that I have created	26	4	5	4.54	0.508
2. It gives me pleasure if someone adopts/adapts my educational resources	26	4	5	4.54	0.508
3. I believe that sharing educational materials as OER will encourage others to do so as well	26	3	5	4.12	0.588
4. Sharing OER enhances my confidence as I see myself as a part of a larger community	26	3	5	4.12	0.711
5. I feel it is obligatory for an expert to contribute to a OER repository as his/her social responsibility	26	3	5	4.04	0.599
6. My own competencies and knowledge of OER helps me to participate in contributing or adopting OER	26	2	5	3.81	0.634
7. OER helps to disseminate my ideas	26	2	5	3.73	0.604

range of constraints, pulling down its efforts. The more prominent of these challenges are:

- Sustainability.
- Low level of OER acceptance: In general, people are wary of sharing knowledge and fear scrutiny.
- Lack of sufficient support from people championing the OER route.
- Loss of Economic gain.
- Identifying suitable OERs from among the plethora available in the public domain globally.
- Understanding the intricacies and fine print accompanying conditions that dictate the use of Open Licenses.

6.3 Lesson Learned

Given that UOU is a young entity, just over a decade old, the speed with which it has embraced and deployed OERs is remarkable. Moving at a fast pace has however made it commit time-consuming and costly errors, from which it has derived various learnings, some of the more noteworthy of which are:

- *Cost saving is a myth* It requires more time and effort to develop SLM as OER as we need to be extra cautious about the quality and relevance of the material. But it a huge saving on cost for the institution who adopt OERs and develop SLM.
- *Alternate open licenses* Various options to the Creative Commons license are available, such as Crown Copyright license, GUI license etc.
- Most of the available OERs fail to meet UNESCO's guidelines defining OERs. Most repositories' content is in pdf or other un-editable formats. Use of open formats, such as MS Word, would ease revision and remixing of content.

7 Conclusion

The present study revealed that overall, UOU's faculty members have a positive attitude towards OERs, in the context of adaptation, use, sharing as well as contributing to OERs. They agree that OERs are significant in teaching

students with individual differences. In addition, OERs support inclusive education through providing different content for different students. Thus, OERs facilitate personalized learning through diverse learning resources. Apart from the pedagogical benefits of OERs, faculty members are intrinsically motivated towards sharing and contributing to OERs. They are enthusiastic towards sharing and are pleased when others use material created by them. Moreover, they develop confidence through sharing OERs. They agree that it is the teachers' responsibility to share resources, thus contributing to the society. The positive attitude of faculty members is useful as a reflection on implementation of OER policy and initiatives by UOU.

Academics are a primary stakeholder in education and stakeholders' positive attitude contributes to the success of any policy implementation. Therefore, the results of the study indicate that adoption and continued movement on the OER route will keep having positive and beneficial effect on higher education in the time to come. This would be especially satisfying for Uttarakhand, which needs to do deliver more with less financial resources in various areas pertaining to its people's development, among the primary one of which is education.

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