Recent Techniques of Open Educational Resources

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Abstract. The field of learning has a reasonable claim of being a specified example on the way it could be improved or sustained by technology. Operating with technology for the sake of learning, users are expected to be taking longer period of time facing issues, struggling through these issues and in nearly all cases the interaction with technology is one of several effects on the achievement of success. This doesn’t mean the fact that Internet and computing have had no sustainable impacts on how users learn and on the options that exist for learners. formal learning field has been experiencing a period of fast changes, and barriers between formal learning and informal one show falling away signs, partly because of changes in accessing information or alternate delivery modes. The impact technology has on pedagogy (structure or way of teaching) is complicated. There are rather few specified researches on how technological potentials and pedagogical responses to those operate to take advantage of life-long learners. In this paper a survey for last designed systems and platforms of e-learning based on open educational resource (OER) via combining evidence from research strands that are based on working in on-line and distant learning under formal settings, and in addition on open and free on-line learning that is typically of less formality. The presented study discusses numerous factors that are related to results of the instruction: the usually unpredictable learner motivations, the paths that those learners take during courses, and signs of success in formal learning and informal learning, based on each of technology and pedagogy. The results of practical activities are given for the sake of widening the access to education with using technology that indicates the fact that open education offers from alternate manners of supporting learners. Those propose an emphasis on design decisions which may be helpful in integrating learning process more thoroughly with how on-line systems are presently supporting learning and data which may be utilized for interpreting how well these designs work.

Key words. E-Learning, Open Education Resources (OER), On-Line Learning Systems, Teaching Structure.

1. Introduction

Movement in the direction of open education, which encompasses disseminating open education resources (OER) in addition to engaging with those resources and open education practices (OEP) in a more general way, keeps growing [1]. While the idea that underpin OERs, sharing and reusing, aren’t foreign to education, the change in education and learning of societal expectations and strengthening and developing infrastructure of the technology which supports the initiatives of education is rapidly changing the landscape of education [2]. The appearance of licensing and technology allowing resources to be remixed, reused, and redistributed outcomes in a phenomenon of long tail; the unrestricted resource and
individual choice availability in the way they are going to be used [3]. OERs Change efforts considerably emphasized educational contents with OERs frequently conceptualized as agents of change. On the other hand, changes in professional practice can’t be sustained only with new content forms. It additionally requires developing many types of knowledge and re-thinking social norms about the meaning of being a learner and a teacher [4].

2. Open Education Resources

The Open University (OU) has offered open educational resources since the year of 2006 via its Open Learn web-site, and through its courses on i-Tunes and YouTube. The web-site of Open Learn is a repository of OER hosted by OU. It’s completely on-line, free, and accessible to everyone, it is made up of extracts from past and present OU fee-paying curriculum—which include text-based resources in addition to video and audio material combined with resources that have been particularly made for Open Learn [5]. It has been presented with support from Hewlett Foundation so as to make OU courses and learning materials available and provide on-line learning to be open and free to all. In the first year and a half post being launched 75,000 users have made the registration with Open Learn. In Jan. 2010 this platform had its 10-millionth visitor. It operated on Moodle as a virtual learning environment of open source [6].

3. OER Challenges

Some of the countries face the problem that sufficient sources of teaching and learning are unavailable because of lacking in competence, tradition, and experience for developing those resources. OER is considered not merely as distinct learning objects but as main components in an inter-connected digital learning eco-system. Those problems are important to both OERs evaluation and design:

- Accessibility/Universal Design: Extra resources could be required for making the content entirely accessible to students that have disabilities.
- Metadata: Including suitable metadata enables finding the content by the search of a user, being sufficiently stored and obtained from data-bases, being portable across platforms, in addition to that, enabling tools of automated analytics determining the resources that are the most sufficient.
- Checking for Bias: Contents need being editorially reviewed for the sake if ensuring that they are bias-free and are fair in treating ethnicity, religion, sexual orientation, and race.
- Standards/Course Alignment: Which includes alignment to state, local, and/or Common Core State Standards in addition to different assessment types.
- Multiple Versions: Keeping multiple versions is necessary in nearly all cases for resource use with different operating systems (OSs), browsers, and devices (which includes versions of legacy) [7]. The development of resources has to consider the cost and effort of ensuring that a certain resource displays in a proper way on many different technologies and devices and offers backward compatibility.
- Assessments: Formative, summative, and interim assessment items and scoring rubrics could be included for supporting core curricula.

Numerous OERs, particularly open-source text-books and the resources that are related to them, start as conventional print works transformed for digital delivery (typically to PDF or Word) and might not be including multi-media, hyperlinks, network, or data-tracking abilities available for current digital media [8]. Other types of OER are constructed and distributed in EPUB or HTML formats and not only benefit from one or more of those abilities but may be enhanced to be used across numerous types of device, such as: laptops, desktops, smartphones, and tablets. Both potentials and challenges increase with the
complexity: digital OERs that have been converted from print works are, in general, easily distributed but stay instructionally isolated and inert [9].

4. The Framework Of OER Architecture
The framework of the architecture (Figure 1) includes 6 dimensions, which are: technological, pedagogical, academic, managerial, ethical, and financial. Those dimensions are organized with areas of relevance of the components: IT services and infrastructure, development and maintenance of the open content, support systems of management, assessment and evaluation of learners, and on-line learning and teaching [10].

![Figure 1. The OER Architecture Framework](image_url)

5. The Characteristic Dimensions
   - Technological: The technological OER framework dimension indicates technological infrastructure of distance learning environments, which include matters like design of software and hardware, planning of infrastructure, and technical design for learning programmers, like design of pages and sites, animations, content design, multi-media, usability testing, and navigation [11].

   - Pedagogical: The pedagogical OER framework dimension mainly indicates OER-based open initiatives like openly public learning and teaching, open on-line courses, open study groups, etc. This dimension is part of the issues that concern open initiatives like design approach, analysis of contents, organizational approaches, analysis of goal, and strategies of ODL [12].

   - Academic: The academic framework dimension is involved with creating and using on-line programmers and courses and materials and techniques of teaching and learning, which includes open textbooks and self-learning materials (SLMs), for students [13].

   - Managerial: The managerial OER framework aspect is mostly related to the management and planning of administration and other education activities which are needed to foster an environment of distance
learning. In addition to that, it includes executing policies of open management as well as opening up access to managerial information and data of the institution. Moreover, management is involved with framing educational policies and decision making regarding developing and maintaining a good environment for learning, distributing related information, delivering sufficient distance education, etc [14].

- Ethical: Ethical dimension of open and distance learning are related to geographical diversity, legal matters (like licensing), learner diversity, and information accessibility as related with the general information of the institution [13].

- Financial: The economical/financial dimension mostly indicates budgeting (in other words, managing and availability of finances for developing, implementing, and maintaining educational systems according to OERs. In addition to that, it would involve the development of a cost-effective and sustainable educational systems, business model, and processes for the related initiatives of OERs [15].

6. Overview Of OER Systems

OER system is important resource for educational environment; the user of such system can access online resource freely and on time, these systems changes rapidly, reasons for these changes are mainly reference to the huge revolution in the communication, cloud services and smart devices that affect the design of these platforms.

Many researchers develop systems in open educational resources which will review in this survey:

First: In [16] authors stress the importance of collaboration and forming long-term relationships and argue the benefits of OERs can be evidenced through open pedagogical practices that provide a holistic vision of the process beyond the classroom. The inquiry involved a need to consider under what conditions emancipator learning was possible using digital tools. Under any definition of the term “emancipator,” the self-awareness of one’s agency to make change within a collective must be included. Learners are always situated within a singular classroom and other course-by-course environments. The disruption of other learning habits through the collective process leads to conditions that engender the competence needed to document the emancipator process in dialogue with others.

Second: In [17] authors have introduced a WebQuest which has been built in OK-Mindmap style in a form of sustainable model of OER. They have emphasized on ways for deploying a number of skills of 21-st century which are, communication, collaboration, computational thinking, critical thinking, and creativity in the processes of learning and teaching with the use of on-line tools like Scratch, OK-Mindmap, Facebook, and Youtube to high school teachers’ practice in the University of Can Tho in Vietnam. In this research, OER in an OK-Mindmap page has been constructed and utilized in teaching and learning. WebQuest in the style of OK-Mindmap has been produced by teachers as an assignment for 140 students in their course-work. The learning products of students in the style of OKMindmap referred to as Big Book have been shared on Facebook for helping their community in the long life learning.

Authors have emphasized the study on the use of on-line tools for the 21st century classrooms, OER which has been produced by on-line tools may result in innovative practices of learning and teaching. OK-Mindmap is an excellent tool for knowledge management. It is free, easily accessed, and an efficient education service. WebQuest in OK-Mindmap style are sufficient instructional strategies due to the fact that they are easy to learn and it’s a service of cloud computing, users merely need a PC or a smart-phone which connect to Internet in order to use it. Mobile learning is quite appropriate with suggesting the use of OK-Mindmap in classrooms. They have discovered that Scratch is a good programming language for learning products of
WebQuest as project-based learning has proven to be a sufficient teaching approach. It has been found that a Big Book in the style of OK-Mindmap may be an efficient OER too. Big Book Students of classes in a school has been the great resources.

Third: In [18] the authors have proposed a framework to use for the integration of OERs to activities of lesson designs for pre-service teachers. Ten guidelines and 4 principles have been provided for guiding implementing design activities of OER-based lessons in actual settings. This new framework is capable of enhancing pre-service Web resource-based professional development of teachers.

The new framework integrating the example-based frameworks. Pre-service teachers make an interaction with external cognitive resources (OER) for the sake of accomplishing tasks of design. OERs play the roles of design materials and examples. The process of learning is a reflection of the same approach of example-based learning. In early phases, pre-service teachers view the examples by which to recognize abstract representation rules. After that, they internalize the representations increasingly.

The activity of lesson designs with OERs is focused on the support of the transitions of pre-service teachers from observations to internalizations. Pre-service teachers are given the ability of integrating OER to their existing schema, at the same time as engaging with lesson design.

Fourth: In [19] authors have proposed an innovative system of visual navigation which is helpful for users in the more efficient and effective exploration of a large set of biomedical videos of OER for seeking information and overviewing content. Supported by this tool, the users are given the ability for efficient and comprehensive identification of videos of interest from a set of results of video searches in addition to the intuitive overviews, locating, and annotation of segments of valuable content that have been embedded in videos of interest among a large corpus. They have explored computing solutions of high-performance and a more efficient video content.

Understanding algorithms for enriching the content which has been managed by the system in addition to enhancing its ability of searching. This paper improves the design of visual interface based on the feedbacks that have been obtained from users.

Fifth: In [20] the authors have introduced a model for creating and evaluating accessible and inclusive OERs (IA-OERs) toward the view of IMS caliper analytics framework. This proposed model has been implemented by 72 teachers of secondary and primary schools that have co-created and assessed the IA-OER in context of phase of validation of the inclusive project of learning. The assessment of IA-OERs has covered 2 aspects, which are: quality and Web accessibility. In addition to that, accessibility V-dashboard has been advanced for displaying graphics of results that have been obtained from assessing Web accessibility. The model of CO-CREARIA presents a collaborative model for creating and evaluating IA-OERs based on the method of ADDIE and taking under consideration the web content accessibility guidelines and Universal Design for Learning for the sake of making IA-OERs have more inclusiveness and accessibility. It is a flexible model where teachers are amongst the main players in co-creating and evaluating IA-OER, which is why training process activities and contents have been designed for addressing the requirements and expectation of all students. Tracing the information which has been produced in the process of co-creating and, specifically, in evaluating IA-OER has been handled from the point of view of the learning analytics. It gives the ability for IA-OER authors in the identification of the optimal practices in the procedure of co-creating.

Sixth: In [21] authors try to present a way for the enhancement of face-to-face class-rooms with OER integration, and thereby produce blended instruction of learning. Reusing OER by individuals or organizations could be significantly beneficial in both creative and economical point of view for the environments of learning. The strategy has been based on Linked Data for describing and
publishing OERs. In this concept for the consumption and integration of the educational content, OERs will have a potentially productive and decisive impact in blended learning. The suggested method may be utilized for supporting various models of blended-learning.

Designs of courses are a set of OERs that are aggregated in a way resembling a conventional courseware could be in various forms and shapes. In the case where teachers set up blending courses, it takes a considerable amount of pre-class organizations. The material they are teaching in conventional class-room settings have to be converted for the sake of fitting the hybrid medium. Teachers are required to come up with creative ways and use sufficient practices in teaching, reusing OERs and converting materials from one medium to other in order to maintain meaning and messages. Which increases teachers preparation time. In addition to that, teachers could be untrained for and unfamiliar with the available technology and tools. Usually, free digital learning path versions could be made available for other users as new OERs.

7. Quality Evaluation Of OER Systems
The quality measures of these systems are done in this survey using many factors such as:

1. Content quality: accuracy and effectively of the resources shared within the system and goodness of the system.
2. Feedbacks: feedbacks according to the learner and user input.
3. Motivation: ability to motivate the students and learners.
4. Usability: easy to use and to contribute with.
5. Reusability: ability to use with different settings and different users devices.

8. Comparison Of OER Systems
The quality of the services provided by the OER system is analyzed and results concluded shown in (table 1), most of the systems described in this paper own the quality evolution points and if some OER system do not own it this is not mean that this system is small or un useful but it mean that this quality characteristics is not fit with the system need currently.

| OER Systems | Techniques                          | Content Quality | Feedbacks | Motivation | Usability | Reusability |
|-------------|------------------------------------|-----------------|-----------|------------|-----------|-------------|
| First       | Web / data base                    | Y               | Y         | Y          | Y         | Y           |
| Second      | Web/ data base / scratch           | Y               | N         | Y          | Y         | Y           |
| Third       | Web/ data base/ distributed cognition | Y       | Y         | Y          | Y         | N           |
| Fourth      | Web / data base                    | Y               | Y         | Y          | Y         | N           |
| Fifth       | Web / data base                    | Y               | Y         | Y          | Y         | N           |
| Sixth       | Web / data base / IMS caliper      | Y               | N         | Y          | Y         | Y           |

9. Conclusion
Utilizing OER will assist the understudy with accessing to boundless number of asset on less time and cost, yet it contains a numerous downsides such us associating with clients and their needs, the nature of the substance, even the ease of use of such framework is significant factor to framework clients and similarity of such frameworks with new gadgets and haze/distributed computing framework.

The implementation of the OER architecture framework, will help the associated distance education institutions would be able to share on a national basis the available physical and intellectual resources, evolving a common pattern and structure for high quality distance learning programs.
An OER Architecture Framework systematically developing new educational resources. Thus, it would smooth the way to build an appropriate educational system, which would provide equity and quality in distance education at the national level.

The assessment of OER framework is received dependent on numerous variables, for example, methods, Content quality, Feedbacks, Motivation, Usability and Reusability and if a framework doesn't have at least one of these factors this may not result this is definitely not a decent stage to manage.

According to the comparison characteristics the more valuable method is the one who can meet the requirements (content quality, feedbacks, motivation, usability and reusability), systems in (Jason M. Leggett, 2018, and Piedra, Nelson, et al., 2016) is result more dynamic system that can provide the user needs.

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Reference
[1] Hayman and Jenni 2018 Diss. Arizona State University East Eisenhower Parkway Open is an Invitation: Exploring Use of Open Educational Resources with Ontario Post-Secondary Educators 789 224.
[2] Zawacki R, Olaf and Terry A 2014 Published by AU Press, Athabasca University Online distance education: Towards a research agenda Printed and bound in Canada by Marquis Book Printers 63 520.
[3] Geith, Christine and Karen V 2008 Journal of asynchronous learning networks Access to Education with Online Learning and Open Educational Resources: Can They Close the Gap? 12 105-126.
[4] Norm F and Norm 2009 The International Review of Research in Open and Distributed Learning Open educational resources: New possibilities for change and sustainability 10 5.
[5] Downes and Stephen 2007 Interdisciplinary Journal of E-Learning and Learning Objects Models for sustainable open educational resources 3 29-44.
[6] Butcher and Neil 2015 Commonwealh of Learning (COL) A basic guide to open educational resources (OER) Published in 2011, 2015 by the United Nations Educational, Scientific and Cultural Organization 6E 2E9 134.
[7] Torres and Nadia M 2013 Open Praxis Embracing openness: The challenges of OER in Latin American education 5 81-89.
[8] Robert F, Rebecca P, Beatriz D L A, Leigh-Anne P, Martin W and Patrick M 2015 British Journal of Educational Technology Impact of OER use on teaching and learning: Data from OER Research Hub 46 972-976.
[9] Murphy and Angela 2013 Distance Education Open educational practices in higher education: Institutional adoption and challenges 34 201-217.
[10] Pankaj K and Basak P C 2013 The International Review of Research in Open and Distributed Learning An OER architecture framework: need and design 14 65-83
[11] Gan J, Wen Z, Guozheng F, Zaosheng L, Weichang H, Chunwei Y and Zhigang Z 2017 Angewandte Chemie International Edition Three-Dimensional Hierarchical Architectures Derived from Surface-Mounted Metal–Organic Framework Membranes for Enhanced Electrocatalysis 56 44.
[12] Nelson P, Janneth C, George L and Edmundo T C 2014 IEEE Global Engineering Education Conference (EDUCON) Supporting openness of MOOCs contents through of an OER and OCW framework based on Linked Data technologies 14 1112-1117.
[13] Nelson P, Janneth C, George L and Edmundo T C Open Praxis OCWC Global Conference Selected Papers An Architecture based on Linked Data technologies for the Integration and reuse of OER in MOOCs Context 6 171–187.

[14] Danni D, Kui S, Xiaodong C, Huirong C, Junying C, Ting F, RongFang W and ying wie L 2018 Acs Catalysis Multi-level architecture optimization of MOF-templated Co-based nanoparticles embedded in hollow N-doped carbon polyhedra for efficient OER and ORR 8 7879-7888.

[15] Ackovska, Nevena and Sasko R 2014 IEEE Transactions on Education OER approach for specific student groups in hardware-based courses 57 242-247.

[16] Jason M L, Jay W and Anthony C 2018 Action Research, Scholarship of Teaching and Learning, Innovative Pedagogy Emancipatory Learning, Open Educational Resources, Open Education, and Digital Critical Participatory 1 18-35.

[17] Le D B and Yong G K 2018 International Journal of Engineering & Technology The building OER in okmindmap for innovative teaching and learning 7 26-31.

[18] Kim D 2018 The International Review of Research in Open and Distributed Learning A Framework for Implementing OER-Based Lesson Design Activities for Pre-Service Teachers. 19 4.

[19] Zaho B, Xu S, Lin S, Luo X and Duan L 2015 Journal of the America September A new visual navigation system for exploring biomedical Open Educational Resource (OER) videos 123 34-41.

[20] Avila, Cecilia, et al, 2016. IEEE Revista Iberoamericana de Tecnologias del Aprendizaje Cocreation and evaluation of inclusive and accessible open educational resources: A mapping toward the IMS caliper. 11 167-176.

[21] Nelson P, Janneth C, George L and Edmund T C 2016 IEEE Global Engineering Education Conference (EDUCON) Integrating OER in the design of educational material: Blended learning and linked-open-educational-resources-data approach 16 1179-1187.