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Nooruddin Merchant Mr.

Habib University, nooranu@gmail.com

Shahira Ishaq Ms.

UIT University, shahiraishaq@gmail.com

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Open Access and Education Resources (OAER) and the analysis of University and Library Websites in Pakistan

Nooruddin Merchant Habib University, Karachi – Pakistan
nooranu@gmail.com

Shahira Ishaq, UIT University, Karachi – Pakistan
shahiraishaq@gmail.com

Abstract

The abrupt transition to online teaching and learning during COVID-19 has necessitated the need of providing information sources and textbooks online. The Open Access and Education Resources (OAER) have the potential to fill the gap which may have occurred due to fiscal constraints and budget cuts within Higher Education Institutions in developing countries. This study highlights the importance of OAER movement, its emergence as a strong information resource and its contribution in teaching and learning in higher education. The study also examines the current state and utilization of OAER resources in Pakistani higher education institutions. The authors have used two methods for completing this study. Literature review of OAER and the analysis of Pakistani higher education institution's websites including their library websites. The study recommends to consider this valuable resource and advocating its use, creation and adaptation in Pakistani Higher Education Institutions at a national level. The study also focusses on the roles academic libraries and librarians could play in creating an awareness of OAER at their institutions and recommends policy level strategies which could lead to inclusion and promotion of OAER into the academic and research endeavors of faculty, students and researchers.

Keywords

KEYWORDS COVID-19, online transition, open educational resources, OER, OAER, textbook affordability, academic library, Pakistan

Introduction

Open Education movement has started becoming a key contributor in supporting teaching and learning during the last decade. The key drivers of this movement are exacerbating costs of textbooks, digital divide and inequitable access. The Budapest Open Access Initiative (BOAI) postulated that open access means that resources are available on the public internet without any expenditure, their access is granted to everyone to refer, read, download, copy, distribute, print, search or link to the full texts, crawl them for indexing or use them for any other legitimate purpose, without any fiscal, legal or technological barriers other than those inseparable from gaining access to the internet itself (Ahammad, 2019).

The Scholarly Publishing and Academic Resources Coalition (SPARC) is also commonly cited to define the concept of Open in terms of the "5R's" i.e. users are free to Retain, Reuse, Revise, Remix and Redistribute these educational materials(*Who We Are - SPARC*, n.d.) OAER are resources for teaching, learning, and research that are available in the public domain or are released under an intellectual property license that allows their free use and re-purposing by anyone attached with academic and scholarly pursuits(Smith & Lee, 2017).

The most important tool which made possible the storage, retrieval, publishing, access and distribution is the pervasive nature of Information and Communication Technologies (ICT). The Information which was only available in print form is now available in digitally. ICT development has made it possible to create affordable and accessible Open Educational Resources (OER) which are a key to equitable and inclusive learning (Mwinyimbegu, 2018).

Academic Libraries since decades have endeavored to offset the high cost of textbooks by making certain books available through course reserves. Such efforts often face lack of funds to make more than a few copies available or by the fact that course textbooks are typically only placed on reserve by the request of a faculty member. Open Educational Resources (OERs) has become a powerful new tool for libraries to use in combating high textbook costs. Course reserves are a limited solution, whereas when an OER replaces an expensive textbook, it is a viable solution for all students (Valentino, 2015). This approach has few inherent limitations. A physical textbook can only be accessed by one student at a time and could be made available to limited students for a limited time. Furthermore, students must visit the library to use the textbook which may present difficulties for off-campus and distance learning students. In addition, purchasing even a single copy of all textbooks used at an institution would be cost prohibitive; therefore, most of the libraries only provide a limited number of copies of textbooks based on higher the enrolment rates. (Politz et al., 2009).

In the month of March 2020 the entire world including realm of education, teaching and learning was disrupted due to pandemic and there was an involuntary shift to online learning. This was a unique challenge for educational institutions around the world and a number of institutions including the ones in developing countries were not ready in terms of infrastructure and programs to manage this transition. The involuntary shift to online learning and resource provision during pandemic has resulted in multiple challenges and opportunities for higher education including academic libraries. Just near to the initial outbreak of COVID-19 in Pakistan and lock down related decisions were started to get imposed on the educational institutions, the authors shared few important roles which university librarians can play during the pandemic. The roles included raising awareness through public health education, extending support to medical staff and researchers and how to continue ongoing traditional services to the regular library users.(Ali & Gatiti, 2020).

The academic librarians are poised to work on supporting learners and helping them prepare information literacy and digital literacy skills is a competency required for the new online learning normal (Martzoukou, 2020). One of the thorny challenges which occurred during the pandemic was the provision of textbooks to students living in the cities and remote locations.

The pandemic has turned world upside down in a matter of weeks, and everything is still uncertain and changing rapidly. Publishers stepped up quickly to assist students who found themselves unable to access their course materials unexpectedly, but most of the free resources they are currently offering will be locked behind paywalls again after few months. (Murphy & Shelley, 2020). The university and library websites became an essential one stop shop for information access. In a study of library websites and their role for information sharing and communication, a study was carried out on how academic library websites in Tanzania updated their library users and connected them with relevant information resources and services. The authors also shared practical implications and possibilities for the university and research librarians. (Mnzava & Katabalwa, 2021)

Merchant, N. and Ahmed, F. (2021) have documented readiness of academic libraries in Pakistan for supporting library patrons and shared the challenges being faced by the libraries. The

Academic Libraries in Pakistan faced the similar challenge of providing access to information resources including textbooks. The challenge became grave as the institutions were closed down before few days of final semester exams at a number of institutions and libraries struggled to provide resources especially textbooks which aid in exam preparations. Textbook affordability and its repercussions for students in Pakistan is yet to be determined and there is no research available on whether the higher costs of textbooks have any impact with academic continuity and retention of students.

There is a need to examine how Open Access and Education Resources (OAER) made their place on the library or university website which was reported to be the one of the best sources for remaining in touch and updated for students especially during online transition and beyond.

This research has been carried out by reviewing the status and availability of Open Access and Education Resources (OAER) on the university and library websites and the type of resources being made available. Based on the data collected primarily through websites, this report presents a quantitative analysis of the OE resources available and the number of institutions who have updated their websites. The report will also share the shortcomings and recommend areas for improvement for embracing open access resources and advocating their creation, adaptation and use for teaching and learning. The report encompasses recommendations for academic libraries and librarians vis-à-vis their capacities to support such an endeavor.

Objectives

The study seeks to achieve the following objectives

1. To know existing literature available on OAER and its usage by the Pakistani Higher Education institutions.
2. To ascertain how many universities and their libraries have made OAER available to students and faculty.
3. To explore the effectiveness of OAERs as a valuable learning and research resource.
4. Recommend ways through which OAER could be integrated into the learning fabric of the institutions.

Methodology

All the public and private sector universities recognized by Higher Education Commission (HEC), Pakistan have been taken as a sample. The content analysis of webpages containing Open Education Resources (OER) has been carried out to ascertain the availability of OE resources. Through desktop research, the websites of more than 200 higher education institutions and their libraries have been reviewed. The data and information obtained through the websites was arranged in a form of spreadsheet, where, the key fields were identified and filled with relevant data. A statistical analysis has been carried out and reported in percentages with description.

Literature Review

Open Educational Resources (OERs) are “teaching, learning or research materials that are in the public domain or released with an intellectual property license that allows for free use, adaptation, and distribution” (UNESCO, 2021). The Open Access movement emphasizes on the principle of

democratization of Knowledge (Elliott & Fabbro, 2015). Since more than last two decades, the developments in the field of Open Access and Education have started taking shape. Rice University in 1999 pioneered works in OER development (Shams et al., 2020). Another best known earlier examples of OE include the initiation of the Open Courseware (OCW) program in 2002 by The Massachusetts Institute of Technology (MIT). MIT developed a repository of all their course materials in digital form and shared them with the world using open licenses (de Jong et al., 2019). Since then, a number of higher education institutions have started their own OE initiatives. A number of these institutions have joined together in the Open Education Consortium (<https://www.oeconsortium.org>), which is a members-based network of OE institutions and organizations. The consortium is now called OEGlobal (<https://www.oeglobal.org/>). Currently across the globe, there are more than 200 educational institutions registered as members of this consortium.

The higher costs of textbooks and its effects on student retention is also a key factor that contributed to the creation and expansion of this movement. This idea motivated the university library community at Athabasca University to come up with an open library (Elliott & Fabbro, 2015). According to Baily (2017) the common elements essential to creation of an open education resource include the subject matter and quality of intellectual knowledge. The second element is the intended audience. Availability of expertise, technological resources and capacities along with information storage and retrieval tools is the third critical element. The final element is a shared sense of collaborative team work and how to sustain culture of collaboration.

Purpose and Type of Open Education Resources

According to William and Flora Hewlett Foundation the term open education

encompass the myriad of learning resources, teaching practices and education policies that use the flexibility of OER to provide learners with high quality educational experiences. Creative Commons defines OER as teaching, learning, and research materials that are either (a) in the public domain or (b) licensed in a manner that provides everyone with free and perpetual permission to engage in the 5R activities– retaining, remixing, revising, reusing and redistributing the resources (*Open Education*, n.d.)

To put it in another way, they are educational materials that are either in the public domain or have been licensed under an open copyright license such as Creative Commons (<http://creativecommons.org/>) so that they are not only freely accessible, but also permit people to engage in the 5Rs of Openness: retain, reuse, revise, remix, and redistribute (Wiley, 2014).

Online education as a prevailing form of distance education has become popular over the last decade. The extensions of former education system called Massive Online Open Courses (MOOCs) were added by universities as an avenue to facilitate their part-time students. Reich et al. (2014) in Qureshi shares the creation of MOOC (Massive Open Online Courses), which emerged as a consequence of strategic collaboration between Harvard and MIT and later on, many other universities across the world joined hands. Coursera, edX, Udacity, and Udemy are the most popular MOOC platforms (Qureshi, 2019). One result of the MOOC movement has been an increase in open courses and courseware available for adoption and adaptation (Salem, 2017). Perhaps the most prominent example is the Open Courseware program at the Massachusetts

Institute of Technology (MIT); however, the Open Courseware program at Johns Hopkins University is noteworthy as well. Both offer full courses and open-licensed content in topics related to the public interest in their local expertise.

Athabasca university library realized that MOOCs disrupting higher education and learning paradigms, however for the students, infusion of information literacy skills and tutorials to furthering research is critical.(Elliott & Fabbro, 2015)

The International Review of Research in Open and Distributed Learning (IRRODL) is a refereed, open access e-journal that disseminates original research, theory, and best practice in open and distributed learning worldwide. *IRRODL* is available free-of-charge to anyone with access to the Internet, and there are no article submission or access charges for publication in this open journal. The Journal targets both researchers and practitioners of open and distance education systems. It aims to improve the quality of basic and applied research while also addressing the need for the translation of this knowledge into policies and activities that improve educational opportunity for students and teachers. The journals is indexed in SOPUS as well.(Athabasca University, 2019)

The Department of Art and Art History at Providence College came up with a digital open access version of their Digital Arts Journal. This was a collaborative effort of library team and the art history department. The impact of this effort brought in 12,359 scholars who discovered and downloaded article and images available on Providence College Digital Commons website (Bailey, 2017). Ahammad (2019) shared the implementation process of the Open Access Repository in a private university in Bangladesh, with a conviction that Institutional Repository software DSPACE is an ideal option for storage and retrieval of various forms of OER (Ahammad, 2019).

With the goal of lowering the cost of learning materials including textbooks and maintain student outcomes the Cleveland State University's Affordable Learning initiative promotes creation, promotion, adoption and publishing of open educational resources across departments. The initiative has also partnered with OhioLink and Open Textbook Network (*Affordable Learning @ Cleveland State University - Michael Schwartz Library, CSU, n.d.*). City University of New York students taking courses in the Zero Textbook Costs program found it easier to use materials because they were cost-free and could be accessed at their convenience(Sotak et al., 2020)

The OER Research Toolkit has been developed and is comprised of the OER Research Guidebook and several additional resources, including surveys for both students and instructors who are using OER in the classroom. The purpose of this guidebook is to provide ideas for how individual faculty members and those who support them (e.g., librarians, instructional designers, etc.) can research the effect of their adoption of open educational resources (OER).

The Alt-textbook project has been successful in attracting faculty who were looking to reduce the cost of their learning materials. The faculty members who were eager to create or use innovative resources that add value in ways a traditional textbook can't, were also given this opportunity. Student-made videos, 3-D scanned files and renderings, remixed popular articles, interactive

tutorials, and iterative courses developed through versioning tools like GitHub were integrated in the textbooks free to use.

An OER Dynamic Coalition, which aims to create groups of international experts that can work on the OER recommendation. This initiative was supported by several Ministries of Education worldwide (Tlili et al., 2021).

The emerging field of Data Science and Analytics has created a realization about the importance of sharing open data for research, learning and development. The data covered diverse range of fields including economics, finance, business, transportation routes, geo-spatial data. Thomson Reuter's university library is one such example (Libray, n.d.). Artificial intelligence, Internet of Things (IoT) and blockchain could be used to facilitate access, selection, retrieval and reuse of OER. These technologies could also address trust issues. Tlili et al. (2021) has carried out a comprehensive review of literature related to OER challenges and have recommended ways through which emerging technologies including AR, VR could be used to address those challenges.

The number of open resources is increasing at a fast pace, however, there are disciplines in which little or no open content is available. This further emphasizes on the need to expand skills of searching for other scholarly sources. Furthermore, the information seeking behavior should help in identifying the gaps in the materials being found.(Elliott & Fabbro, 2015)

Mainstreaming Open Education Resources

There are several advantages of Open Education Resources, some of which may include improved access to textbooks, improved quality of the content, enriched faculty professional practice, increased access and provision of non-English language resources, cost saving, support for lifelong learning and cultural diversity (Commonwealth of Learning, 2017a). These resources have also an impact on student success and some evidence suggests that OER are often more effective in enhancing student performance and are related to increased student continuity (Salem, 2017).

Delimont et al. (2016) conducted a survey of 524 students including 13 faculty members awarded with Open Access grant under Kansas State University Open/Alternative textbook initiative. It was reported that students rated the OAERs as good quality, preferred using them instead of buying textbooks for their courses, and agreed that they would like OAERs used in other courses. Students indicated that they were somewhat satisfied taking courses using OAERs and used them somewhat more than a normal textbook. The survey also reported that nearly all (12/13) faculty members indicated their preference of using OAERs in their course instead of a traditional textbook and a lot of them shared that opportunity to customize the content was one important reason for this preference. Few more reasons which were shared include easier format for use, flexibility, maximizing collaboration with other faculty and ease of teaching. Some faculty members also informed that they like the process of creating OAER.

Qureshi (2019) has explored the inclination of students towards MOOCs enrolled in the management science program in Karachi, Pakistan. Total 24 students were selected out of which 12 have completed courses through MOOCs and 12 did not know much about MOOCs. The study also explored awareness, perceptions, peer advice, self-motivation and commitment to participate in such courses. The author informs that MOOCs have emerged as a strong alternative for those

students who could not afford higher costs of university education. The courses also provide an opportunity to learn from some of the best instructors from different universities around the world. The MOOCs have the potential to upskill the existing knowledge and skills of students, who go abroad for pursuing higher education or jobs(Qureshi, 2019).

In another survey done in two largest public sector universities in Pakistan comprising of 92 students, the advantages of OER in accomplishing the academic challenge were assessed along with few other benefits. Shams et al. (2020) found the following

52% of the respondents agreed that the use of OERs have helped them accomplishing the academic challenge, 56.7% of respondents shared that the use of OERs helped them in memorizing facts, ideas or methods, while 50% reported that OERs helped them to analyze an idea, experience, and theory. 67.8% of the students felt that using OERs helps them to synthesize and organize ideas, or experience. Regarding the benefits of OER on making a judgment, 49% of the students reported that they could easily apply their ideas and concepts in coursework by utilizing OERs. On expectations and evaluations, 43.3% of students reported that the use of online resources helps them to work harder than they thought they could. In skill development, 42.2% felt that the use of OER helps them to write clearly and effectively, 51.1% of students said that online resources help them to speak clearly and effectively whereas 59% of students said that online resources help them to think critically and analytically (p. 5645).

Brandle et al. (2019) informs about University of New York students who had taken courses through Zero Textbook program. The students were finding it easier to use the materials because they were cost-free and could be accessed at their own convenience; it was interesting to note that the majority of students did all or most of the required readings.

Open Source Digital Libraries (DLs) and Institutional Repositories (IRs) are also considered free accessible resources. DLs and IRs play a vital role in the field of open access (OA) and the open educational resources (OER) movement for scholarly publications. Many institutions around the globe are using DSpace for collecting and disseminating their publications (Ahammad, 2019).

Library consortiums could also become beacons of promoting Open Education and Access resources. CARLI a consortium of 128 Academic and Research Libraries in Illinois, USA has initiated OER provision to improve college affordability. The case study provides an avenue for existing library consortiums to learn, create and adapt the procedures and practices to support college level affordability interventions. CARLI is the first consortium of libraries who has joined Open Textbook Network, which is a project of the Center for Open Education in the University of Minnesota's College of Education and Human Development (Sweet & Clarage, 2020)

A detailed analysis has been presented on International Open Access movement and its status in Pakistan. The study also have strong recommendations on how to increase the participation in the open access movement at a national level. The recommendations also include roles libraries and librarians and professional development organizations play in spreading and contributing to the open access movement(Sheikh, 2020). Farzand, A and Saleem, Q (2020) has conducted a website analysis of 5 top universities of Pakistan, highlighting the digital services and information they

have provided during the pandemic lock down. The authors have also recommended that Access to Open Education Resources should be considered an option for higher education institutions facing budget cuts in this part of the world.

The term website has a variety of definitions. Rempel (2010, p. 19) wrote that “A library website is well-recognized as the gateway to the library for the vast majority of users”, while Mahmood and Richardson (2011, p. 366) add that “A library website is considered as a window for providing its services to the users electronically even outside the library walls”:

A library website is much more than the compilation of HTML code and good visual design. It is not just the presentation of content but, in fact, is a gateway to many types of content, wrote McGillis and Toms (2001, p. 365).

(Konnur et al., 2010) reported in their study that:[...] a comprehensive resourceful library web site provides access to the following: (i) introduction of the library resources, services and facilities; (ii) access to online databases and e-journals subscribed; (iii) links to other open source databases and institutional repositories available in different subjects; (iv) access to a world of information from e-books, e-theses, e-dissertations, e-prints and web-based reference sources, etc.; (v) automated library housekeeping operations; and (vi) other resources and services.

Elliot and Fabbro (2015) has highlighted pertinent questions related to the provision of open access resources through website, designing the website, integrating open access information literacy tutorials, tagging etc. Additionally, there should be direct links to free online open access resources, such as Directory of Open Access Journals (DOAJ), Open Access Theses and Dissertations (OATD) and Directory of Open Access Books (DOAB) (Sheikh, 2017).

Funding of OE Resources

Because of their free and open nature, OER are strongly considered a possible solution to the textbook affordability crisis by making education more affordable to students. It is not just faculty, students, and librarians that see the benefits of OER. Indeed, governments are encouraging the use and development of open textbooks and other OER. To provide support for replacing textbooks, there are a number of initiatives that make grants available to the faculty members to replace textbooks with OAERs that students can use for free (Delimont et al., 2016). The Alternative Textbook Project at Temple University provides grants up to \$1,000 (Bell, 2012) and The Open Education Initiative at the University of Massachusetts at Amherst provides grants of \$1,000-2,500 for faculty members to replace textbooks with OERs (Billings et al., 2012).

Openstax at Rice University and the Open Textbook Library and Open Textbook Network (OTN) a project initiated by the University of Minnesota offer the best examples of the progress that open textbooks have made. Both of these programs provide repositories of openly-licensed textbooks. Both programs are prominent especially for the coverage of their texts, their simple integration into modern learning management systems, and exhibit faculty peer reviews in the form of quality assurance (Salem, 2017).

In March 2014, the leaders of British Columbia, Alberta, and Saskatchewan in Canada signed a Memorandum of Understanding on Open Education Resources (OER). These three provinces

agreed to collaborate on open textbook initiatives with ministries of education. BCcampus (<http://bccampus.ca/>) led by British Columbia has been funded through the British Columbia Ministry of Advanced Education. The B.C. Open Textbook Project is one of its major initiatives, which aims to increase access to higher education by reducing student cost, giving faculty more flexibility, and improving learning outcomes (<http://open.bccampus.ca>). The project has been funded by Ministry to provide free, openly licensed textbooks in the top forty highest enrolled subject areas and in selected skills training and practical programs. Out of 134 open textbook collection and 294 known text book adoptions, the costs which students saved was ascertained (Smith & Lee, 2017)

In the United States, California, Minnesota, North Dakota, Oregon, and Washington cities have also passed state legislations for supporting open textbooks. The new Open Government National Action Plan in United States also includes responsibilities to expand access to OER (Smith & Lee, 2017). Similar to this fashion, the North Carolina State University recognized the financial burden placed on students for purchasing textbooks. With the help of university library the Alt-textbook program was initiated which mapped identified avenues for alternative to traditional textbooks. For students support and achievement, the university offered both textbook lending program and grants to support faculty adopt open education resources. Small grants were provided between \$500 to \$2000 to faculty members interested to replace commercial text book to open resource(Thompson et al., 2017). McGowan (2020) has carried out a comprehensive content analysis of 37 American Higher Education Institutions and their existing mechanisms and systems for OE resource provision including alternative textbooks. The author has also shared recommendations which could improve institutional support and funding for OER adoption, adaption and creation.

Programs and Services offered by universities and academic libraries to support OER

Many academic libraries are leaders or institutional partners in the movement to develop open educational resources (OERs) as a free or low-cost alternate to textbooks. OERs can level student access to course materials and supplement library course reserves.

At the U Delft, the library initiated a pilot program by providing services including writing software, templates for design and layout, advising on copyright matters and how to publish an open textbook. Seven out of 30 projects resulted in the publication of an open textbook within first year. The publications were listed on the public professional profile of the faculty members and the project helped educators enhance their professional image (de Jong et al., 2019).

Athabasca library has also developed a libguide which points to links to open data resources around the world (*Data - Creative Commons and Open Resources - LibGuides at Athabasca University Library*, n.d.).

The Alt-Textbook project has successfully converted 20 courses to open or free educational resources, easing the financial burden of textbooks on our students by over \$300,000. (Thompson et al., 2017)

A collaborative effort of integration of Open Access materials in the library catalog of Penn State University Libraries was shared in an article encompassing details of MARC tags. The challenges encountered were also discussed (Edmunds & Enriquez, 2020).

Library staff at University of Nevada, Reno came up with google chrome extensions which could facilitate students and faculty members to search for open access resources with a click of a button. The authors did an experiential research with 12 respondents (6 faculty members and 6 students) by providing them hands-on experience of exploring four chrome extensions and their usability (Azadbakht & Schultz, 2020).

Role of Libraries and librarians

Libraries have been advocates of the OER movement since the early days of open access journals. In the past five years, the quantity and quality of open textbooks has increased dramatically, which has increased awareness of the OER movement outside of libraries (Sweet & Clarage, 2020)

Robertson (2010) investigated the possible roles of academic libraries in promoting, supporting and sustaining Institutional Open Educational Resources initiatives. The study showed that librarians can take an advisory role within the institution to offer advice to academic staff and students. The librarians could be engaged in OER through metadata and resource description, information resources storage, management and dissemination, providing digital or information literacy training on finding and evaluating OER, creating or identifying subject-based guides for finding resources and share advise and methods on managing intellectual property rights and open licensing. While many of the more traditional roles of academic libraries persist, there is an ongoing and relentless evolution of new roles for libraries, and numerous North American and international studies have highlighted the evolving digital roles of higher education libraries.

A number of academic librarians in the US have grabbed the opportunity to lead programs for supporting adoption and creation of OERs at their institutions by creating Libguides, websites containing links to OER and open textbooks and tools to integrate OER into the courses. Some librarians have also stepped up further and are participating in the development and publishing of open textbooks (Smith & Lee, 2017). This also proves that the university library, in collaboration with faculty, has to be seen a natural partner and leader of OER initiatives at institutions of higher education.

Librarians not only excel at finding, evaluating, and organizing resources, they are also early adopters of technology(Allen et al., 2014). Distance librarians in particular have a long history of keeping pace with technological trends related to online learning and building the skills and knowledge required to support its needs and demands(Cassner & Adams, 2012). The experience makes the role of the academic librarian natural fit for OER. As a matter of fact, academic libraries have the competencies, strengths and conceptual clarity to cultivate, promote and create OER. A number of academic libraries offer students some form of a lending service for library-owned materials needed for academic courses. These are typically discoverable through a centralized course reserves system, which displays print materials available to borrow and online content available through library subscriptions (Sotak et al., 2020).

In 2014, the Michael Schwartz Library hosted open textbook workshops for Cleveland State University support staff and faculty to explain what open textbooks are and why they are important to help students succeed. The workshops outlined how faculty can create OERs and how staff can support faculty in the process. The library staff also provided support for selecting appropriate software, extending support for text formatting, cover design, consultation for copyright and license (Goodsett et al., 2016). Delimont et al. (2016) reported that two faculty members from Kansas state university created, advocated and used OERs on their campus. They also collaborated with the library to seek out funding to start an initiative similar to Temple University and University of Massachusetts.

Inspired by the growth of open education movement in British Columbia, The British Columbia OER Librarians, a group of grassroots academic librarians came together and created a community of practice to increase their knowledge and expertise in OER. A heckfest was organized and the attendees decided to come up with a draft strategic planning guide for librarians and developing a mediawiki site (Smith & Lee, 2017). The BCOER librarians has also developed adaptable comprehensive guides and tools including OER repository assessment rubric, advocacy poster and OER guides <http://open.bccampus.ca/bcoer-librarians/bcoer-tools/> (*Advocate for Open Education – BCcampus OpenEd Resources*, n.d.). In addition, Hewlett Foundation invited BCOER librarians to become a country champion by inviting them to promote awareness of the work of OER leaders and projects through a website OER world map (*OER World Map*, n.d.). The library team of University of British Columbia with the assistance of MLS students developed an OER repository Assessment Rubric. It is a tool for librarians to assist them in evaluating OER repositories and standards of selection (*Advocate for Open Education – BCcampus OpenEd Resources*, n.d.).

Dhanvadan (2016) did an analysis of open access books and shared different statistics few of which include author wise distribution of books, year wise distribution of books, number of books added on a yearly basis, license wise distribution of books etc. Mwinyimbegu (2018) conducted a survey of academic librarians of four institutions in Tanzania to explore what roles they play in OER promotion and creation. Through a random sampling technique 80 librarians from different cadres were selected out of which 52 responded to the survey. Results show that Librarians have multiple roles to play in OER including promotion 37 (70%), identification 36 (13.8%), guiding users 35 (13.5%), dissemination 34 (13.1%), evaluation 32 (12.3%), collection 31 (11.9%), management 30 (11.5%) and integration 25 (47%) (Mwinyimbegu, 2018).

Libraries can and often do play significant leadership roles in their institutional OER programs. For those libraries seeking to support student success, OER programs represent a focused way of doing so and should be designed with student success as a primary goal (Salem, 2017). Librarians are excellent at facilitating effective use of OER through information literacy training as they do for other resources (Mwinyimbegu, 2018).

In a survey based study of 92 students from two largest public sector universities in Pakistan, it was revealed that 60% of the respondents have sometimes used OER in the educational endeavors, while 20% of the respondents have never used different kinds of OER. The study also informs that 52% of the respondents have agreed that use of OERs have facilitated them in accomplishing academic challenges (Shams et al., 2020).

OER is of particular value to institutions in the global south as they help increase access to education and create equity by reaching the unreached such as marginalized communities, girls and women (Ferreira and Kamal, 2016; Abeywardena, 2017).

Instructional librarians could play a pivotal role in introducing OER to the students. The instruction librarians from Clemson University Libraries, Clemson University piloted a module for not only orienting students about OER but how copyright works, helping students with citations, providing information about how students can become creators of knowledge and disseminate it including the importance of intellectual property rights. A libguide was also created to facilitate students in extending their learning (Kohout-Taylor & Sheaffer, 2020).

Emporia State University established an OER task force to look into collaborations with internal and external stakeholders. This was done as a case study project. The project revealed how collaborations with different stakeholders influenced the process, choices and outcomes of the task force. The members of task force also explored the status of OER to their colleagues working at different institutions. One of the most important areas of the tasks force was to look for strengths and weaknesses of the Open Access resources, their utilization, student and faculty attitudes, software to facilitate use of OE resources etc. as a part of strategic planning initiative 2015-2025. One of the key highlights of this finding was in every case, librarians played a central role in the success of OER initiatives (Sutton & Geuther, 2020).

The pandemic and sudden pivot to online instruction emphasized the issues with licensed e-Book content. Electronic books have unique advantages and drawbacks. They are often just as cost-effective for the library to purchase as print materials and can be accessed by multiple users from any location at any time. However, not all print materials are available electronically and when they are, not all can be offered without usage restrictions. Unlimited user e-Books had been the library's gold standard and if not offered, a print book was the preferred choice. However, with the onset of the pandemic, the library has purchased e-Books despite less favorable user models. In these cases, the library worked with the platform to make the material as accessible as possible. For example, checkouts for single user e-Books were disabled so that no one student can inadvertently prevent other students from accessing the content (Sotak et al., 2020).

With the declaration of COVID-19 as a global pandemic in March 2020, school campuses were closed. Governments in most developing and developed countries have consequently recommended moving teaching and learning online. Even when campuses re-open, teachers and learners will probably need to continue to practise physical distancing and do some work online. This course, targeting teachers of primary and secondary schools, uses contemporary learning design and accessible technology to introduce participants to using Open Educational Resources for some aspects of online learning provision. The course is particularly suited for teachers in developing country contexts and runs over 4 weeks. It requires up to 3 hours of time each week. Participants learn from readings, videos as well as discussions with fellow teachers and mentors. A Certificate of Completion is given to those who complete all the tasks in the course. <https://www.mooc4dev.org/OnlineTeaching2>

Challenges to OER Implementation

The OER movement provide a useful opportunity to librarians for expanding and taking on exciting roles, however there are some challenges which should also be taken into account. One of the challenge is the rapid advancement in the pace and rate of technologies in past two decades, which demands transformation and constant evolution in the role of academic librarian. Another contributing challenge is the growing demand of online learning which has been forcing the librarians to asses, evaluated, alter and add more services. The 2015 NMC horizon report by Educause has emphasized that the librarians may play an important role in the proliferation of OER (Smith & Lee, 2017). Librarians interested or assigned to take OER related roles need to learn the language and culture of open education, develop expertise in open licensing, e-learning, and OER standards and supportive technologies (Bueno-de-la-fuente et al., 2012). One of the ways to address some of the challenges is to place an emphasis on continuous professional development programs for the librarians. Another challenge highlighted by Smith & Lee (2017) is the amount of time which would be required by a librarian to undertake OER responsibilities. OERs have the potential to reduce reliance on the textbook industry business model. However, not all libraries have the bandwidth or staffing to lead OER initiatives (Sotak et al., 2020).

In a survey study focusing on awareness of OER and the role played by libraries and librarians in public sector university libraries in Tanzania, it was revealed that that librarians are aware of the OER concept and also play multiple roles in promoting awareness on OER and its integration in university websites to facilitate their accessibility and use. The study further informed that limited awareness on existing OER and lack of policy guidelines on the use of OER are major challenges faced by librarians in promoting access and use of OER. The study recommends more OER awareness creation campaigns and formulation of institutional OER policies (Mwinyimbegu, 2018).

De Jong et al. (2019) has worked upon a case study to explore and engage academic libraries to support teaching through open education. The case study was done at the Delft University of Technology, Delft, The Netherlands, by the library. The case study also recommended a simplified and applied acceptance model of innovation and share recommendations for academic libraries to facilitate adoption of OE into learning practices.

The authors using case study of University of Houston and University of Washington OER publishing programs, have discovered that there is a need for greater focus on decision making and workflows. The authors further inform about challenges and opportunities for academic librarians in supporting OER initiatives and how to sustain and scale OER programs with shifting institutional support (Santiago & Ray, 2020)

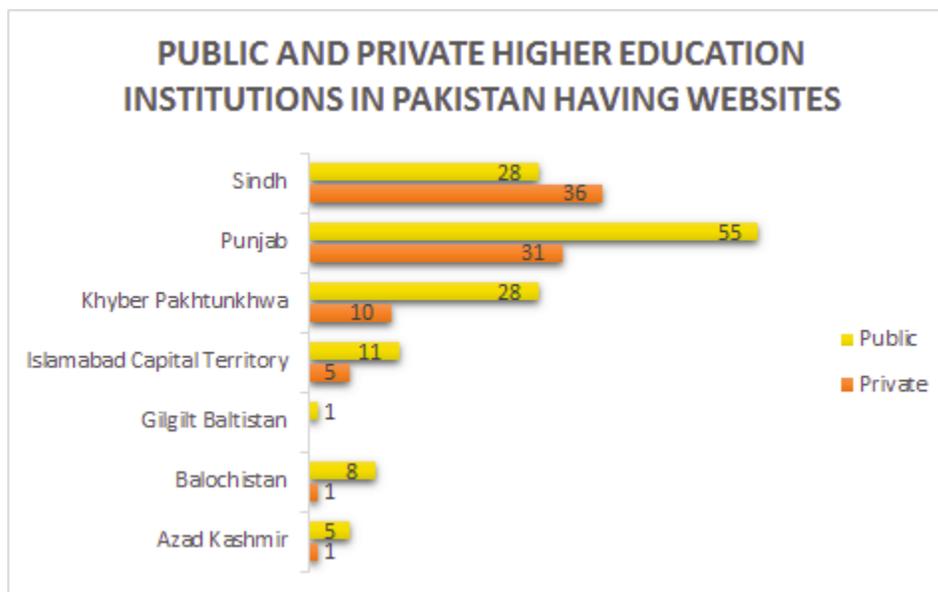
The OER creation brings itself the challenge of not only putting time and effort into the creation of academic content which is free, but updating it is taxing especially when the author is also a faculty member. Similarly very few authors have a complete understanding of copyright laws as the creators of the Open Education Resources. (Schellinger & Coghill, 2020).

Data Analysis and findings

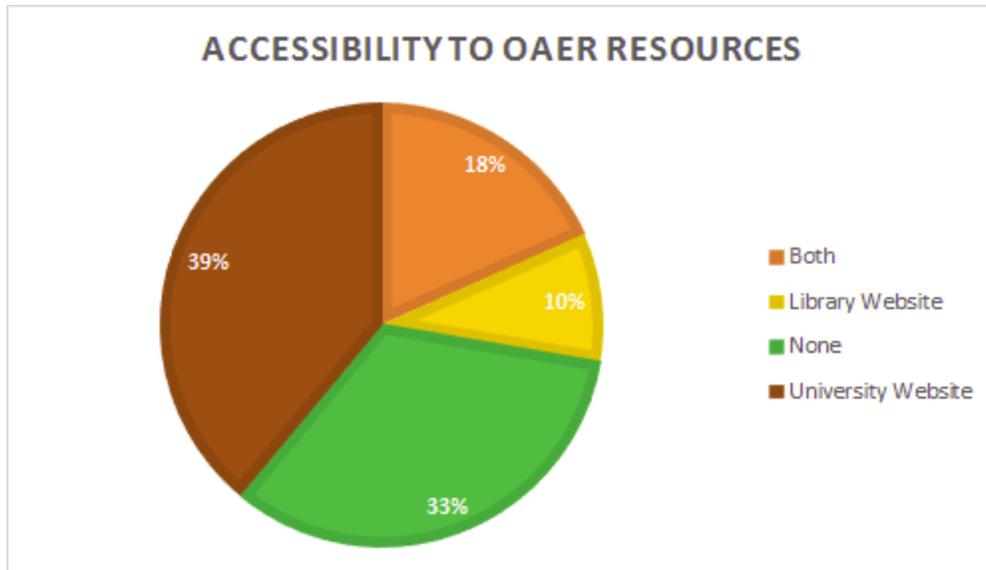
Open educational resources (OER) are rapidly gaining importance as a global movement which has the potential to increase equitable access to quality education in alignment with the Sustainable Development Goal 4 (SDG4) (Abeywardena, 2017). The Open Access movement and considering Open Access Education Resources (OAER) as a quality learning resource is still at the infancy stage in Pakistan.

This study catered to 220 Higher Education Institutions recognized by Higher Education Commission (HEC) Pakistan both from the private and public sector. A total of 84 institutions were private universities and 136 were from the public sector.

The geographic distribution including both public and private sector institutions comprised of 29% institutions from Sindh, 39% from Punjab, 4% from Balochistan, 7% from Islamabad Capital Territory, 17% from Khyber Pakhtunkhwa, 3% from Azad Jammu and Kashmir and (1%) represented Gilgit Baltistan. The number of higher education institutions having websites is mentioned in the graph below:



During COVID-19 pandemic the university and library websites became the magnets or central source for keeping up to date with the happenings and providing information resources online. The access to free information resources could have been provided on front page or in the form of a library guide. While doing search on the library website, it is important to know how accurately the website responds when search is executed. The analysis of both university and library websites revealed that majority do not have a separate tab for the identification of Open Access and Education Resources (OAER) neither a lib guide is made available. The data further revealed that 39% of the universities provide the links to OAER on the Homepage, while 19% provided links or access to OAER resources on the library websites. It was further noted that 18% of universities have made links to accessible OAER on both the university and Library Website. 33% of the institutions were found to have not provided OAER information on both the platforms.



During COVID-19 pandemic, a number of Massive open online course providers invited universities to join hands with them to address accessibility issue. A total of 8 universities were found to subscribed to Coursera while one university had a subscription to Edx. The study of websites revealed that 14 institutions have managed to put links to other free courseware. The links included MIT open courseware, Latif Ebrahim Jamal (LEJ) Knowledge Hub’s free online video library (<https://www.lej4learning.com.pk/>), virtual university of Pakistan open courseware (<https://ocw.vu.edu.pk/>) and Khan Academy.

Access and link available with Open Education Resources which may include open textbooks, open access journals, online line tutorials, streaming videos, Open data and digital repository was also surveyed. It was revealed that 32% of the universities or institutions have provided links or have made open education resources accessible by listing them either on their website or library website while 68% of the institutions’ website did not contain any links to open education resources. The links included repositories for open educational materials (<https://www.ccoer.org/using-oer/find-oer/general-oer/>), open access teaching resources for online learning and teaching (<https://www.merlot.org/merlot/index.htm>), thesis and dissertation repositories(<http://pr.hec.gov.pk/jspui/>)(<https://oatd.org/>)(<https://biblioboard.com/opendissertations/>)

Open Access Journals is another important resource which is now emerging, gaining popularity and acceptance as an avenue to find and publish scholarly articles. A number of proprietary online database publishers have also started sharing the open access content on their portals. During COVID-19, a number of publishers provided access to all the resources for almost one year. The review of institutional websites revealed that 18% of the universities provide links or information to open access journals while 68% did not mention any of the open-access journals. It was also observed that few of the institutions created a separate link providing access to COVID-19 open education resources. Some of the URLs found include <https://www.pulibrary.edu.pk/covid.php> <https://duet.edu.pk/covid-19/>

Open Access Databases provide access to open access resources including books, journals, articles, repositories, images, and much more for e.g. DOAJ. The availability of open-access databases is one of the important areas of this research study which shows that 12% of universities give links or detail about the open-access databases while 88% didn't provide any of the links or information about open access databases.

Higher Education Institutions play a major role in scholarly publishing to promote research and scholarly endeavors. Pakistan's higher education institutions have slowly and gradually embarked upon this journey of providing access to their publications through Open Journal System (OJS) which is "open source journal management and publishing software developed, supported, and freely distributed by the Public Knowledge Project under the GNU General Public License" (*Open Journal Systems / Public Knowledge Project*, n.d.)

According to the research findings, 40% of universities are publishing scholarly journals that are open access and publically accessible, while 60% of the institutions are either keeping them in print or not publishing them online. The journals hosted online are licensed using creative commons attribution 4.0 international license.

Institutional Repository

Online Institutional repository is also one of the ways to house scholarly outputs of the university. It also serves as an avenue for long term preservation of scholarly and research materials. The outputs could be stored as full text or in portable document format (PDF). The repositories can also house policy documents and institutional history. The repository could be made publicly accessible or kept on the intranet of an institution for internal community access.

The study of 220 higher education institutions showed that 36 universities have institutional repositories, however not all of them are open access while 184 universities don't maintain an institutional repository. This is to note that not all the materials shared on the institutional repository have open content license, therefore, the institution has to communicate licensing terms and usage policies, which were also not evident in the documents.

Open Access Teaching Resources

Open access teaching resources aid faculty in the process of teaching and learning. The pandemic forced faculty to move towards online teaching and onus was also placed on them to devise creative ways and adopt modern teaching methods during online classes. At some of the institutions, the center for teaching and learning took the responsibility of updating the knowledge and skills of faculty members to grapple with online transition and teaching. It was observed that 53 universities provided links and resources related to online teaching and learning whereas 167 institutions did not provide any link or information about the resources. It is also valuable to note that National Academy of Higher Education (NAHE), a division of HEC prepared and shared a comprehensive list of online teaching and learning resources on their website (<https://hec.gov.pk/english/services/faculty/NAHE/Pages/Online-Resources.aspx>), however links to this resource was not found on university or library websites.

Linked Open Data

Nowadays, the cloud computing, data science including mapping and use of GIS data is gaining a lot of attention. A number of public sector institutions around the world have started sharing their data as open data for research, study and exploration. The National Centre for Big Data and Cloud Computing has been established at Lahore University of Management Sciences (LUMS) in collaboration with HEC, Pakistan. Through this initiative a lot of open data about Pakistan in various fields is available to explore and reuse (<https://opendata.com.pk/>). While this is still in an infancy phase, the researchers took account of existing higher education institution in Pakistan and verified whether access to Open data is made available or links to Open data are made available on library or university websites. Currently the university and library websites of 220 higher education institutions do not have links to Open Data. This is an emerging area where both universities and academic libraries can pitch in and provide patrons access to open data sets and resources.

Recommendations

Based on the literature review and findings of the website analysis, the authors would like to share the following recommendations.

- De Jong et al. (2019) has recommended that academic libraries cannot implement large scale adoption of OE practices without the cooperation of other stakeholders. Universities and government should strive to develop national and international policies and regulations in order to propel OE forward and embed it as part of an institutional strategic program. The same recommendation goes for the university libraries and authorities regulating universities in Pakistan. To start with, an OER task force could be constituted at the policy level to ascertain the process and possibilities of OER provision.
- For influencing the mindset towards OER adoption, a careful analysis of external factors for e.g. content, communities, support, and policies and regulations should be carried out. These factors if adjusted well could lead towards positive results and outcomes (de Jong et al., 2019).
- The literature review demonstrates that academic librarians could play a pivotal role in introducing, advocating and sustaining OER movement in Pakistan. But before moving in this direction, it is important to build capacities of library professionals working in the university libraries in areas of institutionalizing OER and demands it places on the library professionals in terms of enhancing their knowledge and skills.
- The capacities of the academic librarians could be built by helping them join professional networks and associations working for the promotion of Open Education Resources such as OER Knowledge cloud (<https://www.oerknowledgecloud.org/>). A nationwide program and movement could also be created for this purpose.
- Higher Education Commission should constitute an online space as a portal of Open Education Resources including Open Textbooks.
- Faculty members with the help of librarians should be trained on how to create and reuse open access textbooks. The librarians could also help faculty members share the resources on the library or university websites.

- The librarians should also play a key role in creating awareness and training for students and faculty members of their institutions for introducing OER and aid this training by updating their institutional and library websites with links to Open Access and Education Resources (OAER) on a timely basis.
- Sheikh (2020) has reported that there are 259 journals published by universities in Pakistan out of which on 50 are available on Directory of Open Access Journal (DOAJ). Since online transition has already happened, Higher Education Commission Pakistan should encourage universities to put their intellectual outputs and academic journals on OJS and including a link in the DOAJ.
- The University librarians should promote the configuration and installation of Digital repositories for resource sharing. They should be encouraged to learn software as well as metadata standards required to upload scholarly materials in the repositories. IT departments within the universities should facilitate in setting up the institutional repositories on cloud or local server machines.
- Librarians could also integrate links to open textbooks generated by the institution or already available books in the searchable OPAC. Links to Open Textbooks could also be displayed on the OPAC interface.
- University libraries and librarians could also promote the details of OER and OER movement through in house library displays and social media.
- Funds could be allocated by the university administration to encourage open access publishing,
- Currently, there is no study available on textbook affordability and its related challenges for Pakistani Higher Education students. A separate study could be carried out which may contribute in use of OER by faculty and institutions.
- It is also recommended that the library schools should review and enrich their curricula and prepare the next generation of librarians to equip themselves with essential online digital literacy skills including Open Education Resources (OER) inclusion (Martzoukou, 2020).

Conclusion

This study summarized the benefits of Open Access and Education Resources (OAER) and how Pakistani university libraries can take advantage of it, especially knowing that the online transition has already happened. The study also broadens the understanding of different types of Open Education Resources (OER) and how academic libraries and librarians can integrate them as a valuable resource for supporting learning in the classroom and the institution. A number of libraries offer information literacy sessions as well as introducing students to tools and methods to evaluate the reliability of different information sources. Libraries in Pakistan could also take this opportunity to include the efficacy and effectiveness of OER as an information source and above all how students and faculty members could become key contributors of publishing and reusing Open Education Resources.

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