A STUDY ON ATTITUDE AND ADOPTION OF OPEN EDUCATIONAL RESOURCES AMONG TEACHERS IN HIGHER EDUCATIONAL INSTITUTES OF NORTH EAST INDIA

A thesis submitted in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

Sunita Saikia

Registration No. TZ155893 of 2015

Department of Education

School of Humanities and Social Sciences

Tezpur University

Napaam, Tezpur - 784028

Assam, India

September, 2023

CHAPTER 6

6.1. Introduction

An effort has been made in this chapter to provide a brief overview of the entire research that has been described in the previous chapters. This chapter serves as a synthesis of the study, presenting a summary of the most significant outcomes, drawing inferences based on those findings, and outlining the educational implications of the research. The chapter is also dedicated to provide recommendations for future research endeavours. This chapter is organized into different sections with the following subheadings:

- ➤ Section 6.2. Overview of the study
- ➤ Section 6.3. Summary of findings
- ➤ Section 6.4. Educational Implications
- ➤ Section 6.5. Future scope of Research
- ➤ Section 6.6. Conclusion

6.2. Overview of the study

The accelerated growth of ICT in the period of globalization has changed educational landscapes due to ubiquitous information accessibility. This has brought a dramatic shift in the teaching-learning process in higher education, enabling learners to have access to educational resources from all over the world, paving the way for a dynamic learning environment. In a nutshell, the availability of educational materials has resulted in a proliferation of information among both students and faculty in institutions of higher learning. The educational system and teachers, in particular, have come to recognize the value of these materials for enhancing the teaching and learning process. To this end, there has been a global effort to collaborate over the internet and provide a wide range of educational resources that are readily accessible without any cost. As a consequence, UNESCO has called for the adoption of OER in higher education institutions to maximize the potential benefits of such resources in teaching and learning (UNESCO, 2002).

Over the years, various international and national policies have directed and facilitated academic institutions, teachers and students in integrating and leveraging OER effectively within the realm of education. These policies have fostered a culture within academic institutions and among educators that promotes the creation, dissemination, and utilization of OER.

In addition to adhering to international policies and guidelines, India has undertaken measures to advance the promotion and adoption of OER. In India, the OER movement has gained momentum as a result of the National Knowledge Commission (2005), which endorsed the vital role of OER in enhancing the quality and accessibility of education. The OER movement has also been supported by the National Mission on Education through Information and Communication Technology (NMEICT, 2009), which views educational resources as national resources that are distributed in accordance with open licensing policy rules. The New Delhi Declaration on Education (2016) proposed that a nodal organization and institutional network should be established to share ICT policies, OER, and other electronic resources like electronic libraries. These outcomes would set OER as a pivotal instrument for promoting inclusive, equitable and accessible education on a global scale.

OER, as defined by various scholars, are openly available digitalized materials that are explicitly licensed under open or CC licenses, that grant permission to download, store, adapt, and re-share; while also adheres to inclusive design principles for accessibility (Hayman, 2018b; Phung, 2018; Butcher and Moore, 2015; Berti, 2018; Pawlowski, Pirkkalainen, Gervacio, Nordin, and Embi, 2014). The adoption of OER has been identified as a driving force for promoting lifelong learning, professional development, social justice, and global academic collaboration (Ossiannilsson, 2019; Kanwar (2018) Lane and McAndrew, 2010). Previous scholarly works have potentially conceptualized OER as an intriguing concept. According to Atkins, Brown, and Hammond (2007) and Atroszko (2015), knowledge is considered a public good that can be utilized, reused, and shared openly without any limitations. The core principle of OER is the principle of openness, which confers upon individuals the freedom to use, adapt, and disseminate digital resources to serve as supplements to educational and research endeavours. OER is designed to enable the creation, use, and alteration of educational materials, through open licensing to meet the individual needs of learners (Miao, Mishra, Orr, & Janssen, 2019; Butcher, 2015) to reduce expenses, enhance accessibility, and improving the quality of education across all levels (Kanwar, Kodhandaraman, and Umar, 2010). This highlights the gap between OER and online accessible digital resources as noted by Krelja Kurelovic (2016) that OER permits legal downloading, remixing, and redistribution under a CC license,

whereas some online educational materials have copyright protection, prohibiting sharing and modification.

The significance of OER in the context of higher education cannot be overlooked. OER has emerged as a noteworthy educational advancement in response to the increasing need for quality education since it provides widespread access to high-quality educational materials (Harvey and Bond, 2022). Owing to their accessibility and reusability, OER has become popular in universities across the globe, facilitating the global sharing of knowledge (Miracle, 2020) and lowering education costs and improving material quality and quantity. OER is a response to the issue of educational inequality (Panigrahi, 2018; UNESCO and COL, 2017; Dudek, 2022) and a manifestation of the idea that everyone should have equal access to high-quality education (Butcher, 2011). OER provides students with content from a variety of subject areas that can be easily integrated into courses, saving both teachers' and students' time and effort while also enhancing the quality of education acquired; by creating a collaborative learning environment and promoting user-centric education (Geser, 2007). OER has the potential to remove geographical and economic barriers to higher education for students worldwide as evidenced by various studies (Gani, 2010; Butcher and Hoosen, 2012; Pounds and Bostock, 2019; Francis and Antique, 2022). OER fosters teachers' continued professional growth and engagement, which in turn promotes the adoption of innovative pedagogical practices (Pande, 2018; Torto, 2019; Bossu and Williams, 2017). According to the European Commission (2013), OER plays a crucial role in fostering the creation of dynamic learning settings that enable users to adapt information to their specific needs. OER, being readily available and valuable, can advance inclusive and equitable quality education (McGreal, 2017), having a positive impact on all tiers of education and helping to close the gap between non-formal, informal, and formal learning (OECD, 2007; D'Antoni, 2009b). OER allows for the worldwide propagation of instructional knowledge, promoting networked learning and collaboration among educators (Henderson and Ostashewski, 2018; Dutta, 2016; Perifanou and Economides, 2022). Moreover, OER adoption fosters a culture of sharing educational materials (Adil et al. 2022; UNESCO Institute for Information Technologies in Education, 2010; Schuwer and Janssen, 2018a) and helps institutions and teachers acquire global recognition (OECD, 2007; Mulder, 2012). OER has huge potential to accomplish Goal 4 of the SDGs - inclusivity, quality,

and lifelong learning opportunities. A learner-centric perspective, decentralized institutional structures, and a participatory approach can make OER a sustainable innovation (Kanwar, 2018). According to Kanwar, Kodhandaraman, and Umar (2010), OER has the potential to significantly transform the educational landscape in the 21st century. Thus, OER serves as a "transformational force" that helps educational institutions meet changing society needs by creating a better learning environment (Tuomi, 2013) and supporting the three primary goals of higher education: **access, equity, and quality.**

Despite its progress towards equality and equity in education for all, the OER movement faces several obstacles. Recent research indicates that the adoption of OER in developing nations is currently in its early stages, relative to that of developed nations (Murphy, 2013; Alkhasawneh, 2020). The existing literatures on OER in higher education has identified several obstacles (OECD, 2007; Babson Survey Research Group, 2014; Henderson and Ostashewski, 2018; Carson, 2020). Many educators are unaware of OER which is a major barrier to its widespread adoption. Their lack of practical experience or ICT/OER skills and abilities appears to prevent their use of OER in higher education (Datt and Singh, 2021; Orwenjo and Erastus, 2018; Thompson and Muir, 2019; Cardoso, Morgado, and Teixeira, 2019; Menzli, Smirani, Boulahia, and Hadjouni, 2022). As evidenced by the works of Hylen (2008), Richter and Ehlers (2010), and De los Arcos, Cannell, and Mcllwhan (2019), there appears to be a knowledge gap among teachers regarding open licenses and Creative Commons licenses and their operational mechanisms. Several teachers are uncertain regarding the legality of their use of OER that are founded on the principles of the 5R framework. Despite the willingness of teachers to disseminate their educational materials, concerns regarding losing their intellectual property rights remain a significant issue (Menzli, Smirani, Boulahia, & Hadjouni, 2022). Teachers' reluctance to share has also hindered OER adoption. Since OER is not valued at the institutional or governmental level (Hunter-Jones, 2012; Kandiero, 2015; Mishra, 2017b) or because there are no status or incentive mechanisms associated with its creation (Dakka, and Dakka, 2017; Mishra, 2017b), some teachers do not understand the need to share their work as OER (Bossu, Brown and Bull, 2012; Schuwer and Janssen, 2018a). OER adoption may be hampered by reluctance or a negative view of using and sharing resources (Murphy, 2013; Menzli, Smirani, Boulahia and Hadjouni, 2022).

Importantly, many teachers reported receiving insufficient support from their institutions in creating and using OERs (Van Der Merwe, 2013; Rodes, Gewerc-Barujel and Llamas-Nistal, 2019). Teachers considering OER adoption are concerned about its quality. Mahendraprabu, Kumar, Mani and Kumar (2021), Allen and Seaman (2016), and Belikov and Bodily (2016) found some issues regarding the OER's quality. Zobel (2015) noted that OER's perceived quality is lower than that of a traditionally published textbook, which discourages its use. Previous literatures have mentioned that poor internet connectivity (Kandiero, 2015; Phalachandra and Abeywardena, 2016; Cooney, 2016); lack of hardware and software resources (D'Antonio, 2009a; Datt and Singh, 2021; Hunter-Jones, 2012; Tlili et al., 2022); time-consuming in finding localizing OER (Wright, Goldman, and Reeves, 2019; Martin and Kimmons, 2020; Forgette, 2020); limited awareness of the pedagogical applications of OERs (Roza, 2016; Hassall, 2017; Hoosen, Butcher and Knyazeva, 2019; Petrich, 2020); long-term sustainability issues (Murphy, 2013; Kaufman and Campana, 2019; Lim, Wee, Shannalyn and Teo, 2017; Hylen, 2006) were the major challenges in OER adoption. Without addressing these obstacles and limitations, widespread adoption and efficient use of OER may be significantly limited, which would prevent them from having an evolutionary impact on education.

The OER adoption pyramid framework is a conceptual model that demonstrates the various stages of OER adoption in educational contexts. This research made use of the theoretical framework developed by Trotter and Cox (2016), depicting the adoption of OER. Within the confines of this framework, they identified six crucial factors that play a role in the adoption of OER. Access to infrastructural facilities is the bedrock of the OER adoption pyramid. OER adoption in higher education initiates with accessibility. Access to hardware, software and physical infrastructure, such as computers, electricity, and internet connectivity is important for OER adoption and integration in higher education institutions Teye and Duah (2022) and Muriithi, Horner, and Pemberton (2016) believe that any ICT adoption and integration plan must have access to a variety of ICT technologies. Moving up the pyramid, the next level is permission. This stage focuses on the authorization for teachers to distribute educational materials as OER or incorporate OER into the academic program is a crucial requirement for the successful adoption of OER. The third factor in OER adoption is teachers' awareness of OER, the CC license, and how it differs from

traditional copyrighted educational materials. To successfully develop and adapt any idea or technology, appropriate knowledge is needed (Mustapha, Man, Shah, Kamarulzaman and Tafida, 2022). Fourth, using OER requires teachers to have technological skills. The extent to which OER practices are adopted and incorporated depends on teachers' capacity to use them effectively in the classroom (Japhet and Tar, 2018). Following that, OER availability and relevance are key factors in teachers adopting OER (Mishra, 2017b; Baas, Admiraal and Van Den Berg, 2019). The topmost level of the pyramid represents the volition of OER adoption. This pertains to the drive to embrace OER, which can manifest at individual levels. Teachers' volition or motivation emerges as the crucial factor in determining the use or creation of OER. The OER adoption pyramid framework serves as a valuable tool for educational institutions and stakeholders by identifying the essential factors and stages required for successful OER adoption. This framework provides a structured roadmap to navigate the process of adopting OER into higher education.

Significance of the Study

The rise of information and communication technologies has resulted in an upsurge of online educational resources that can be accessed by anybody with internet access. According to Young, Daly, and Stone (2017), "the future of education is open". Teachers and learners used resources that were readily available to them or accessible at their academic establishments. But now, individuals can obtain a vast amount of knowledge from various online sources. OER is a major contribution to advancing efforts in modern educational institutions toward more inclusivity, expansion, and quality education (Thakran and Sharma, 2016). OER may help improve education in underdeveloped nations, especially higher education, according to the literature. According to the Commonwealth of Learning (2017b), this sector of education is regarded as a strong foundation in terms of human resources development, which is critical for the country's long-term sustainable development. UNESCO (2012), COL (2011), and OECD (2007) have posited that OER has the potential to reduce content development costs, grow communities of knowledge practitioners, and increase student access to educational resources via open licenses. Thus, OER adoption is necessary due to its importance in education, particularly higher education. OER adoption in higher education depends on teacher support. Given the increasing global expansion of OER, teachers' views and concerns about its use must be assessed

(Mishra, 2017a). The adoption of OER is anticipated to have a significant impact on the future of higher education. The present research endeavours to examine the attitude of teachers of higher education concerning the creation and use of OER. The outcomes of this study provide insights into how teachers understand and embrace OER in the domain of higher education. The results of this research shed new light that can assist technology professionals, policymakers, and academic institutions in gaining a deeper understanding of the effectiveness and challenges of teachers in the realm of OER. This, in turn, can aid in the development of effective solutions, policies, and standards that allow for the widespread adoption of OER.

Rationale of the Study

The OER movement is gaining momentum in the academic world. This development has recently emerged as a result of a global spread of both technology and internet access. One of the most serious issues in the field of higher education is the question of how best to leverage OER to raise educational standards. Thomas (2017) argues that OER is critical to improving educational access and quality in both developed and developing countries. The adoption of OER is a powerful way to make progress towards the "Education for All" and "Sustainable Development Goal 4" targets. OERs are digital resources that help spread high-quality education that is accessible to all, value diversity, and encourage student participation. They also encourage educators' academic and professional freedom. Due to their free and open sharing, OER can help anybody, anywhere at any time. Dutta (2016) posits that OER aims to facilitate the outreach of higher education institutions to underrepresented student groups, increase enrollment, and provide learning opportunities to individuals who cannot access traditional modes of education. Consequently, higher education institutions should recognize the potential benefits and opportunities of adopting OER. According to the studies conducted by Richter and McPherson (2012) and Moore (2013), OER can bring about a significant transformation in the field of education globally, particularly in underdeveloped nations. This is due to the provision of free, high-quality educational resources (Ganapathi, 2017). India's National Knowledge Commission (NKC, 2005) considered OER to boost India's higher education. The Commission also recommended the use of OER and open access (OA) to significantly increase the availability of high-quality educational resources worldwide (Kumar, 2007). OER can only succeed if educational stakeholders use and create them as part of the teaching

and learning process. Teachers are the primary advocates of OER since they are mandated to use OER in their classroom instruction and are anticipated to create open educational materials to facilitate teaching and learning. Previous literatures (National Knowledge Commission, 2007; Misra, 2012; Belikov and Bodily, 2016) has placed a significant emphasis on the role that teachers play in the adoption of OER in higher education. Despite the growing importance of OERs in the higher education sector, the OER movement is still a new beginning in India. Moreover, there have been surprisingly few studies on the topic of OER among university faculty in the central universities of North-East India. As a consequence of this viewpoint, the researcher intends to conduct the study on the central university faculty members of the North-East region of India. This research allows for a more in-depth investigation of teachers' attitude and adoption of OER. Also, it is important to scrutinize the factors that facilitate the adoption of OER among teachers within the educational setting. It is also extremely important that a study be carried out regarding the effectiveness and challenges associated with the process of utilizing and creating OER from the perspective of OER users and OER creators. This research will also help academics and policymakers identify variables that support or hinder OER adoption in higher education institutions. With this information, researchers will be able to scale up best practices and problem areas will be addressed through training or policy. It is hoped that the results of the study will make a significant contribution toward the adoption of OER at educational institutions of higher learning.

Statement of the Problem

Education has expanded in the Northeastern region during the past decade with the establishment of several major universities and institutes. The Department of Higher Education under the Ministry of Education directly regulates central institutions, hence they often pioneer innovative educational programmes in India. Their experiences can inspire other institutions. Central universities have greater infrastructure and funding than state-private universities. This can greatly affect OER adoption and attitude. Considering the relevance of OER and the lack of research on this topic among central university teachers in North East India, this study intends to explore OER attitudes and adoption. The problem statement for this study is titled as "A study on Attitude and Adoption of Open Educational Resources among Teachers in Higher Educational Institutes of North East India".

Research Questions

1. What is the attitude of teachers towards the adoption of OER in higher educational institutes of Northeast India?

2. Is there any notable difference in the attitude of teachers toward the adoption of OER based on gender, years of teaching experience and academic rank in higher educational institutes of Northeast India?

3. How do teachers in higher educational institutes of Northeast India engage with the 5R's framework (retain, reuse, revise, remix, and redistribute) in the adoption of OER?

4. What is the current state of enabling conditions - access, permission, awareness, capacity, availability, and volition, that facilitates the adoption of OER among teachers in higher educational institutes of Northeast India?

5. What is the relationship between the factors (access, permission, awareness, capacity, availability, and volition) on OER adoption and the overall attitude of teachers toward OER adoption in higher educational institutes of Northeast India?

6. How do OER users and creators perceive the effectiveness of OER adoption?

7. What are the challenges they encounter in the adoption of OER?

Objectives of the Study

1. To study the attitude towards the adoption of OER among the teachers in the higher educational institutes of North East India.

2. To find out the significant differences between the attitude of teachers towards the adoption of OER with regard to gender, years of teaching experiences and academic rank.

3. To investigate the adoption of OER (in terms of 5R's framework- retain, reuse, revise, remix and redistribute) by the teachers in higher educational institutes of North East India.

4. To assess the current state of the enabling conditions (i.e., access, permission, awareness, capacity, availability, and volition) that facilitate teachers' adoption of OER in the higher educational institutes of North East India.

5. To ascertain the relationship between the factors that influence OER adoption and the attitude of the teachers towards OER adoption.

6. To explore the effectiveness and challenges in the adoption of OER in the higher educational institutes of North East India from the perspective of OER users and OER creators.

Hypotheses of the study

NULL HYPOTHESIS (H_01): There exists no significant difference between the attitude of teachers towards the adoption of OER with regard to gender.

NULL HYPOTHESIS (H_02): There exists no significant difference between the attitude of teachers towards the adoption of OER with regard to years of teaching experience.

NULL HYPOTHESIS (H_03): There exists no significant difference between the attitude of teachers towards the adoption of OER with regard to academic rank.

NULL HYPOTHESIS (H_04): There exists no relationship between access to the infrastructural facility and the attitude of the teachers towards the adoption of OER.

NULL HYPOTHESIS (H_05): There exists no relationship between permission and the attitude of the teachers towards the adoption of OER.

NULL HYPOTHESIS (H_06): There exists no relationship between awareness and the attitude of the teachers towards the adoption of OER.

NULL HYPOTHESIS (H_07): There exists no relationship between the capacity and attitude of the teachers towards the adoption of OER.

NULL HYPOTHESIS (H_08): There exists no relationship between the availability and attitude of the teachers towards the adoption of OER.

NULL HYPOTHESIS (H_09): There exists no relationship between the volition and attitude of the teachers towards the adoption of OER.

Operational definition of the terms

Open Educational Resources (OER) - OERs mean educational resources that are digitally available to everyone and everywhere with some Creative Commons licenses. In this study, OERs mean any educational resources like courses; articles; slides; blogs; books; etc. are used or created under a Creative Commons (CC) license by the teachers of higher educational institutes of North-East India.

OER Adoption - In this study, the term "OER adoption" refers to the usage and creation of OER by teachers at higher educational institutions of North-East India.

OER adoption in higher education can be viewed as a continuum that extends from use to creation. This dual connotation is consistent with the principle of openness which holds that these resources are not merely static entities to be used, but rather dynamic resources that may be customised, improved, and distributed. The true potential of OERs can only be unlocked when teachers go beyond the simple act of using OERs and begin to modify and create their materials, adapting existing materials to meet the specific needs of their students and then disseminating their work to the larger community (DeVries, 2013; Algers and Silva-Fletcher, 2015; McKerlich, Ives, and McGreal, 2017; Hodgkinson-Williams, 2014; Hodgkinson-Williams, Arinto, Cartmill, and King, 2017; Cox and Trotter, 2017a; Mishra and Singh, 2017; Kasinathan and Ranganathan, 2017).

Attitude - Attitude refers to the favourable and unfavourable feelings or beliefs of a particular thing, idea, or situation. In this study, attitude is represented by the score obtained by the teachers in the attitude scale towards OER that is developed by the researcher.

Higher educational institutes - In this study, higher educational institutes refer to the central universities of North East India providing higher education in the disciplines of humanities and social sciences.

Disciplines - By the term discipline, the study means the discipline of humanities and social sciences which includes departments of English, Hindi, Education, Sociology, Mass Communication and Journalism, History, And Political Science.

Teachers - In this study, by the term, teachers means faculty members of the discipline of humanities and social sciences in the central universities of North East India.

Research Methodology

Based on the objectives, the study employed a mixed-method research design utilizing a convergent parallel approach to collect and analyze qualitative and quantitative data. The researcher adopted a descriptive survey method to collect data from teachers of higher education institutions in North-East India. In this particular study, the population is comprised of faculty members from the disciplines of humanities and social sciences of all the eight central universities of North-East India.

As of 2022, the total number of faculty members holding the positions of Professors, Associate Professors, and Assistant Professors is 442 in their respective fields. The faculty members belong to various academic disciplines, namely Education, Sociology, Political Science, Mass Communication and Journalism, History, English, and Hindi. This selection of disciplines is consistent across all eight central universities of the North-East region of India. The study employed a concurrent nested sampling method For the quantitative phase, the multistage sampling technique has been used. The total population of the present study comprised 221 faculty members and for the qualitative phase of the study, the researcher conveniently selected 32 OER users and OER creators who voluntarily agreed to participate in the interview session using convenience sampling. The researcher devised four different tools for the present study: an OER Teacher Attitude Scale; a Questionnaire on the Usage of OER; a Questionnaire on Factors Facilitating OER Adoption and a Semi-structured Interview Schedule to gather data on the attitudes, usage, factors, effectiveness and challenges of the adoption of OER in higher educational institutions of North-East India. The researcher personally visited all 8 central universities of North-East India to gather the primary data for the study. The data has been collected during the period spanning from March to November of the year 2022. The researcher applied descriptive and inferential statistics for the analysis of quantitative data, while thematic analysis for the qualitative data. The SPSS program, version 20.0, and Microsoft Excel have been for carrying out the quantitative analysis, whereas the NVivo software for qualitative analysis.

6.3. Summary of Findings

The present study highlights the following major findings of the research objective-wise:

Objective 1: Attitude towards the adoption of OER among the teachers in the higher educational institutes of North East India.

    i.   The analysis of the data revealed that 49% (N=109) of the teachers have a moderate level of attitude towards the adoption of OER.

    ii.   Subsequent to this, 23% (N=51) of teachers had a highly positive attitude towards OER adoption, while 19% (N=42) had a low negative attitude. 5% of them (N=11) have an extremely high positive attitude and only 4%

(N=08) have an extremely low negative attitude towards the adoption of OER.

iii. Furthermore, the analysis of qualitative data revealed that a majority of the interviewees held a moderately positive perspective toward the adoption of OER.

iv. The results of the interviews showed that a total of 37% of people who were interviewed looked into OER as a 'valuable academic resource'. 22% of them regarded OER as 'supplementary materials', 19% of the interviewees reported that they perceived the OER adoption as 'easy to access' resources that were adaptive, flexible, and easy to use. Again, 13% agreed that OER is a form of 'open access' material that is readily accessible in digital format via the internet. Lastly, a mere 9% of the interviewed teachers advocated the OER adoption because they feel it is 'legally and ethically permissible'.

Objective 2: Significant difference between the attitude of teachers towards the adoption of OER with regard to gender, years of teaching experiences and academic rank.

i. There exists no statistically significant difference between the attitude of teachers towards the adoption of OER based on gender. According to the findings of the statistical analysis, the t-value is 0.571 with a df of 219, and the *p*-value is 0.569, both of which are substantially higher than the level of significance of 5%.

ii. There exists no statistically significant difference between the attitude of teachers towards the adoption of OER in relation to their years of teaching experience. The findings of the statistical study indicated that the F value, which is determined to be 0.916, is less than the critical value when compared to the significance level of 0.05 (DF 2, 215 = 3.04).

iii. There exists no statistically significant difference between the attitude of teachers towards the adoption of OER with regard to the academic rank of teachers. According to the results, since F = 2.044 is less than the crucial value (DF 2, 215 = 3.04) at the 0.05 level of significance.

Objective 3: Investigate the adoption of OER (in terms of 5R's framework- retain, reuse, revise, remix and redistribute) by the teachers of higher educational institutes in North East India.

i. It has been identified that 91% of the teachers have downloaded OER, but only 9% of them claim to have never downloaded any OER.

ii. The data revealed that 75% of the teachers have reused the content developed by others in their lessons without making any modifications. 25% of them, however, have not done so.

   ➢ Among the total sample of users who have reused OER, it has been found that 92% and 67% of them have reused articles from scholarly publications and textbooks in their classroom teaching. While 49% of the teachers have reused videos, 43% have reused modules; 34% have reused images, 27% and 11% of the teachers have reused blog posts and audio files.

   ➢ It has been discovered that most teachers about 98% assessed OER through Google Scholar, and 86% from Google Advanced Search. In addition to this, teachers accessed OER from NPTEL (37%) and Open Course Library (32%). While, 28% of respondents assessed OER from other sources, including Project Gutenberg, z-Library, SWAYAM, E-Gyankosh, Youtube, Shodhganga, Inflibnet, NCTEOER, NCERT, and Commonwealth of Learning (COL). The rest of the sources from where teachers assessed OER were OER Commons (23%); Coursera (21%); WikiEducator (20%); NROER (19%); MIT Open CourseWare and College Open Textbooks (11%); Khan Academy (10%). The least utilized sources by the teachers were MERLOT (4%); OSCAR (2%) and Connexions (1%) respectively.

iii. The data revealed that 10% of the teachers always accessed OER in their teaching, while the majority of the teachers (86%) accessed OER sometimes whereas only 5% of the teachers reported that they never used OER in their teaching.

iv. Majority of the teachers (71%) agreed that they accessed OER sometimes, 13% of the teachers claimed they always accessed OER and only 16% of them reported that they have never used OER for professional development.

v. Of the teachers surveyed, 67% said they have modified the content to make it more suitable for their needs, while 33% said they have never revised the original material. Again, only 13% of the teachers admitted to having translated OER content, while the remaining 87% claimed they had never translated any OER materials.

vi. The findings discovered that 39% of teachers engaged in the act of remixing or creating new content by combining the original or revised content with other similar content. Conversely, a majority of teachers, specifically 61%, reported that they have never remixed or created any content by merging it with other similar content.

vii. A majority of 65% of teachers have shared OER with others, while 35% have not shared OER with any individual.

➢ The results showed that the majority of teachers about 90% redistributed the OER with their students. Followed by, 39% of teachers shared the OER with their colleagues, 17% of teachers shared the materials with faculty from other universities. 6% of them also shared OER with other sources or organizations like NCTE, NROER, NCERT, journals for publications, NPTEL, e-PG Pathshala, and SWAYAM. Lastly, 4% of teachers reported that they had shared the OER materials with the Head of the institution.

viii. Only 32% of teachers have created OER, while the majority of teachers, which accounts for 68% of all teachers, have not created any content in the form of OER.

➢ Among all the OER creators, a majority of 72% of teachers have created their OER in the form of articles published in scholarly journals. Additionally, 45% of the teachers have created video content, 28% have created modules, and 23% have created lessons. A smaller percentage of teachers published their OER in the form of blog content (17%), images (13%), and audio recordings (11%) and textbooks (8%).

➢ 44% of the OER creators have published their OER under CC BY-NC-SA (reuse, alter, distribute the work with proper citation and publish the new work under the same license condition, but cannot be used commercially) followed by 38% of teachers under CC BY (reuse, remix, modify, distribute and use the content commercially with proper citation). 28% of

them have published under CC BY-SA (reuse, remix, modify, distribute, use the content even commercially but have to publish the work under the same license conditions); 24% of them under CC BY-ND (distribute, used the content even commercially with a proper citation but cannot be modified by others); and 14% under CC BY-NC-ND (download and distribute the content with others, acknowledge the author, not for commercial purposes and without any alterations) and 6% of teachers have released their OER materials under the CC BY-NC (distributes, remix and alter the original work by acknowledging the author but not for commercial purposes).

➤ According to the survey results, 62% of the OER creators reported that they are not engaged in any collaborative efforts with people from other educational institutions in the creation of OERs. Nevertheless, it is worth noting that a mere 38% of OER creators are engaged actively in collaboration with other agencies or educational institutions for the creation of OER.

ix.   The study revealed that 49% of the teachers preferred **CC BY-NC-ND** (download and distribute the content with others, acknowledge the author, not for commercial purposes and without any alterations); 44% of these teachers preferred **CC BY-NC-SA** (reuse, alter, distribute the work with proper citation and publish the new work under the same license condition, but cannot be used commercially); 42% for **CC BY-NC** (distribute, remix and alter the original work by acknowledging the author but not for commercial purposes); 39% of teachers preferred **CC BY-SA** (reuse, remix, modify, distribute, use the content even commercially but have to publish the work under the same license conditions); 34% of them preferred **CC BY** (reuse, remix, modify, distribute and use the content commercially with proper citation); meanwhile, only 14% of all teachers preferred **CC BY-ND** (distribute, used the content even commercially with a proper citation but cannot be modified by others).

x.   According to the findings from the qualitative analysis, teachers used OER primarily for teaching and learning purposes, as well as to supplement existing materials. On the other hand, the reasons for creating OER were to

disseminate knowledge, increase visibility, and be out of personal motivation or interest in creating OER.

Objective 4: Assess the current state of the enabling conditions (i.e., access, permission, awareness, capacity, availability, and volition) that facilitate teachers' adoption of OER in the higher educational institutes of North East India.

- **i.** The findings related to access are:
  - ➢ 98% of the teachers have access to home internet connection facilities. Only 2% of them do not have access to an internet connection at their homes.
  - ➢ Again, 99% of the teachers answered that they have access to an internet connection at their department or institution, and only 1% of the teachers said they do not have an internet connection at their department or institution.
  - ➢ 79% of the teachers reported that an ICT resource centre is available at their department/institution; while 67% had access to software tools such as learning management tools to deliver content.
  - ➢ On the other hand, 21% of the teachers have personal blog pages to share content.
- ii. The findings related to permission are:
  - ➢ 71% of the teachers claimed that their institutions had a well-defined IPR and copyright policy, and
  - ➢ 74% stated that their institutions do not possess the copyright over the content developed by them.
- iii. The findings related to awareness are: Overall, 44% of the teachers exhibited a moderate level of awareness regarding the concept of OER, open licenses, and CC licensing.
  - ➢ The data revealed that 68% of the teachers demonstrated a strong understanding that OERs refer to free and open resources available on the internet.
  - ➢ 55% of them were aware that OERs are either similar to or fall under the public domain and 62% knew that OERs are digitally available resources that have been published under Creative Commons licenses.

➢ 45% of the teachers were aware that Creative Commons licenses are free and easy-to-use copyright licenses.

➢ 49% and 44% of the teachers agreed that Creative Commons licenses transform "all rights reserved" into "some rights reserved" and protect the moral rights of copyright holders, respectively.

➢ Lastly, only 21% were aware of applying Creative Commons licenses to their work.

iv. The findings related to capacity are: 48% of the teachers showed an overall moderate level of ICT competencies.

➢ It is found that more than half of the teachers (58% and 62%) have a high level of competence regarding the ability to understand basic computer concepts and the ability to locate the necessary educational resources on the internet.

➢ However, it is revealed that most of the teachers have a moderate level of competence in areas such as the ability to create web pages (48%); ability to install and configure application software (56%); ability to create, upload and edit multimedia (57%); ability to navigate different search engines (49%).

➢ On the other hand, only a small percentage of teachers, specifically 7%, have a high level of competence to share and upload OER on the web.

v. The findings related to availability are: About 56% of the teachers showed a moderate level of availability in terms of relevance or quality of the OER content.

➢ The result highlighted that most of the teachers hold a neutral perspective on the following statements: satisfaction with the quality of the free and open educational resources that were developed by others (64%); OER content is relevant to their teaching context (65%); the quality of OER is inferior to the proprietary resources (63%); 61% of the respondents remarked that OER content is presented at a reading level appropriate for higher education students; and 57% believe that OER provides useful and authentic sources of information.

➢ 62% of the teachers showed a neutral opinion that the instructions or exercises provided in the OER content are clear and comprehensive and

that the language of the OER content is free of grammatical, spelling and typological errors.

➤ More than half of the teachers 65% and 63% agreed that they used to ensure the quality and authenticity of the OER before use.

vi. The findings related to volition are: The result indicated that 59% of teachers displayed a high level of volition, which relates to their personal motivation to adopt OER.

➤ 64% of teachers agreed that they would be encouraged to adopt OER if they received professional credit.

➤ A significant proportion of teachers (52%) reported feeling confident about adopting OER, while 69% expressed eagerness to learn more about OER.

➤ More than half of the teachers i.e., 57% and 52% expressed motivation to create and use OER.

Objective 5: Ascertain the relationship between the factors that influence OER adoption and the attitude of the teachers toward OER adoption.

i. The findings presented that access to the internet at home ($rpb=0.009$, $p=0.894$); access to the internet at department/institution ($rpb=0.096$, $p=0.155$); ICT resource centre in department/institution ($rpb=0.038$, $p=0.578$); software tools like learning management tools to deliver content ($rpb=-0.031$, $p=0.651$) and having a personal webpage/blog to share content ($rpb=0.012$, $p=0.854$) have a negligible or insignificant correlation with teachers' attitude towards OER adoption. The correlations between these variables were not significant since the p-value exceeded 0.05 levels. Thus, it proved the null hypothesis and found no correlation between teachers' attitudes toward OER adoption and access to infrastructural facilities.

ii. A defined IPR and copyright policy ($rpb=0.055$, $p=0.416$) and the institution having the copyright over the content ($rpb=0.029$, $p=0.673$) have a weak or insignificant correlation with teachers' attitudes toward OER adoption. Since the p-value exceeded 0.05 level of significance, it accepts the null hypothesis that there is no correlation between permission and the attitude of the teachers toward OER adoption.

iii.   The study revealed that there is a moderately significant positive correlation between teachers' awareness and attitude toward OER adoption. The Pearson correlation coefficient (r) is calculated to be 0.469, at a p-value less than 5% level of significance (0.00<0.05).

iv.   There is a moderately significant positive correlation between teachers' capacity and attitude toward OER adoption. The Pearson correlation coefficient (r) is calculated to be 0.565, at a p-value less than 5% level of significance (0.00<0.05).

v.   There is a moderately significant positive correlation between the availability of OER content and attitude towards OER adoption. The Pearson correlation coefficient (r) is calculated to be 0.540, at a p-value less than 5% level of significance (0.00<0.05).

vi.   There is a moderately significant positive correlation between teachers' volition and attitude toward OER adoption. The Pearson correlation coefficient (r) is calculated to be 0.453, at a p-value less than 5% level of significance (0.00<0.05).

Objective 6: Explore the effectiveness and challenges in the adoption of OER in the higher educational institutes of North East India from the perspective of OER users and OER creators.

i.   The analysis of the interview data revealed that there is significant effectiveness in adopting OER in higher educational institutes of North-East India. According to the comments provided by the interviewed teachers, OER can potentially improve the quality of teaching and learning both for students and teachers.

➢   The teachers who were interviewed identified several benefits of adopting OER in the teaching-learning context. These benefits include providing stakeholders with broad availability of educational resources, enabling personalization of the content, promoting active and self-directed learning, expanding knowledge paradigms, fostering a culture of knowledge sharing, and a cost-effective approach for both students and teachers.

➢   As per the responses provided by the interviewed teachers, OER can function as a constructive tool for the professional growth of teachers in the

realm of higher education. The identified effectiveness of OER adoption in professional development includes the expansion of opportunities for collaboration and innovation, improvement of teachers' pedagogy practices, boosting of teachers' reputation, and improvement of teachers' digital literacy.

ii. This study reveals the challenges encountered in the adoption of OER as identified by the interviewees. These challenges were classified into several sub-themes, including technological, inadequate informational, institutional, academic, ethical, and miscellaneous challenges.

➢ Technological challenges: Teachers have highlighted a lack of technical skills and an unreliable internet connection as the two key technological challenges that limit them from using or creating OERs.

➢ Inadequate informational challenges: Limited knowledge of OER and lack of understanding of open licenses and CC licenses were the inadequate informational challenges in the adoption of OER.

➢ Institutional challenges: The lack of institutional support, the lack of recognition, the limited funding, and the lack of operational OER policies were the institutional barriers that prevented the smooth adoption of OER.

➢ Academic challenges: Time-consuming and workload pressure are some of the academic challenges that hamper the successful adoption of OER.

➢ Ethical challenges: Copyright infringement is the primary ethical challenge that teachers claimed in the adoption of OER.

➢ Miscellaneous challenges: Teachers have also reported some additional problems like a lack of positive attitude, lack of motivation to create OER, concerns over the OER's quality, limited availability of OER for certain topics, problems with customizing the content and resistance to accept change.

6.4. Recommendations

For teachers:

1. The present research shows that teachers in higher education have moderate competence in web page development, application software installation and configuration, multimedia creation, search engine navigation, and sharing and

uploading OER. Therefore, the study highlights there is a vital need of teachers to participate in professional development programs that aim to improve teachers' digital competence. Cultivating digital competencies would enable teachers to actively participate in the OER community by sharing their resources, remixing existing content, and cooperating with colleagues in the creation of OER materials (Ala-Mutka, 2011; Yelubay et al, 2022) which will eventually create a culture of openness and collaboration in higher education.

2. The training programs should provide opportunities for teachers to gain and improve the necessary skills in areas such as the creation of web pages, the use of multimedia tools, and the efficient use of search engines. They must have skills in all these domains to develop engaging and dynamic online learning resources.

3. Teachers should give more emphasis on in-service training programs on OER and its 5R's and UGC and governing bodies should offer more short-term courses on the creation and use of OER to enhance teachers' skills and capabilities in utilizing OER effectively.

4. Teachers need to participate in specialized teacher training programs focusing on copyright and open licensing to address teachers' concerns and perplexity with respect to these matters. These would provide them clear guidelines and resources on CC licenses, appropriate attribution and licensing of OER and how to apply CC license in the process of OER creation.

5. The adoption of OER can be supported through various strategies, such as the creation of specialized online portals at the international, national regional, or institutional level, conducting informative sessions, and leveraging social media channels to showcase success stories and case studies on OER adoption (Huang et al, 2020; Pal and Singh, 2022; Bedenlier and Marín, 2022). The outcome of the study would help teachers to partner with other institutions and OER advocacy groups to raise awareness about OER and exchange successful OER strategies (Alyami, 2020). Teachers should be encouraged to contribute their knowledge to repositories and facilitate international collaboration with other institutions.

6. There is a need to organize awareness campaigns to instruct faculty on the advantages and pedagogical uses of OER and CC licenses. Such initiatives can

effectively raise awareness and knowledge of OER among stakeholders, ultimately driving the widespread adoption of OER in higher education. Norris, Swartz and Kuhlmeier (2023) have also established the fact that lack of knowledge of copyright and CC licenses is a significant dilemma for many creators, adapters, and adopters of OER. Teachers also need to be informed about the steps and websites for creating OER materials and the application of CC licenses.

7. There should be the provision of financial aid to universities or individuals who express a desire to contribute to the domain of OER or open education. Additional incentives, such as the provision of certificates or National OER awards, similar to the National ICT awards for schoolteachers by the MoE in India, as well as public recognition of teachers who dedicate their time and energy towards the creation of OER may also prove effective. This approach shall yield an increased degree of engagement and contribution among teachers within the OER community.

8. Teachers should give priority to integrating OER within the course curriculum. They should possess the ability to identify and locate appropriate OER that are relevant to the learning objectives. Additionally, they should be able to inspire and encourage students to utilise OER materials in the learning process.

For educational administrators and policy makers:

1. The current trend toward digital education necessitates a shift in the approach to training programs and workshops on ICT. Consequently, the findings of the present study would serve to enlighten training programmers, administrators, and educational policymakers to recognize the necessity of transforming the current ICT training curricula. They should unlock the full potential of OER by prioritizing training on how to integrate OER into the course curriculum. Pérez-Rivero, De Obesso, and Núñez-Canal (2021) and Garzón Artacho, et al (2020) suggest that educational authorities must provide faculty with adequate training in digital pedagogy, content creation, the use of technological software, assistive technology, and remixing OER materials. Institutions that take this approach will be at the forefront of the OER adoption movement and the evolving digital world of higher education.

2. The result of the present study would help educational administrators to undertake proactive measures for the betterment of the requisite infrastructure and access to internet services. This would entail a concerted effort on the part of all stakeholders to identify and address the underlying factors that contribute to poor internet connectivity, such as inadequate bandwidth, outdated equipment, and limited coverage.

3. In addition to the essential hardware and software resources, the study highlights the significance of establishing recording studios within educational institutions. This would help teachers effortlessly record their videos for OER purposes. Recording in regular rooms may create unwanted sound effects and lower production quality. To ensure that the video content is high quality and visually appealing, it is important to have access to dedicated facilities and to provide training. Soundproof recording studios with high-quality microphones, cameras, lights, and other equipment can significantly improve the video and audio quality. This would ultimately provide teachers with a conducive and engaging environment in the creation of OER.

4. The study proposed that a mandatory implementation of an Educational Multimedia Research Centre (EMRC) be established within all academic institutions, which would function as a central locus for conducting research and development in the field of technology and OER. Setting up such infrastructural facilities ought to be considered as a standard structure of educational institutions.

5. This study proposed that educational administrators should consider conducting workshops and conferences concerning licensing, fair use, and intellectual property to maintain ethical standards in the academic community. These would help teachers to gain knowledge about the legal and ethical components associated with OER.

6. The present study posits that educational administrators and policymakers should establish an appropriate repository of OER that houses high-quality learning content from various corners of the globe. They ought to design rich and user-friendly OER repositories or platforms that would facilitate easy search and discovery of localized resources through a single interface in a time-efficient manner. The proposed repositories or platforms would serve as a

valuable resource for teachers, students, and other stakeholders in the education sector.

7. The outcome of the study would also help policymakers and educational authorities to support awareness and encourage the adoption of OER by integrating OER-related topics into teacher education curricula and developing policies that encourage teachers to use open licenses for educational resources. This research could assist policymakers in promoting OER as a viable educational resource, supporting and integrating OER projects into educational policies and frameworks, and encouraging teachers and institutions to adopt and contribute to OER.

For other stakeholders in general

1. Governmental bodies and other concerned stakeholders should extend their support towards the allocation of investment for the establishment of a resilient and reliable internet infrastructure, with an emphasis on areas that have been underserved particularly those located in hilly terrain. Further, the study implied that institutions of higher learning collaborate with governmental bodies to secure support and financing in rolling out strong network connections. Such an approach is deemed necessary to enhance the quality of education and research and to ensure that students and faculty members can leverage the full potential of OER in their academic pursuits.

2. UGC, MHRD, and other relevant agencies should take up an initiative to build and promote an open statewide portal and digital OER libraries at the institutional level to provide access to existing OER.

6.5. Future Scope of Research

The present research offers prospects for future research concerning the adoption of OER. Nonetheless, further investigation is required to address the areas that have not been explored in this study:

✓ Future research efforts should also explore the attitude and perspective of faculty members from the discipline of science and engineering regarding OER integration in teaching.

✓ Further research endeavours should investigate the involvement of educational administrators and librarians in the implementation of OER, as well as the

factors that impede or facilitate the integration of OER within academic institutions.

✓ A similar kind of study can be conducted among teachers from the State University and the Private University of Assam.

✓ Research can be conducted to study post graduate students' and research scholars' attitudes and perspectives toward OER.

✓ An experimental study on the effect of OER on teaching-learning environments at different educational levels and fields of study can be carried out.

✓ An experimental study on the effect of OER in developing the professional skills of teachers.

✓ An experimental research to discover the effectiveness of OER in developing the digital skills of students or teachers.

✓ Research can be undertaken to examine the self-efficacy of teachers in developing OER.

✓ The OER adoption pyramid proposed by Trotter and Cox (2017b) has been used to examine the factors facilitating OER adoption in higher education. However, researchers can leverage other technology adoption frameworks to further investigate various factors that might facilitate OER adoption.

✓ Research can be undertaken considering a qualitative approach to better understand the role that OER can play in higher education settings.

6.6. Conclusion

The utilization of open licensing and digital technologies to revolutionize teaching and learning practices is an avenue of new technological paradigms in higher education, as promised by OER. The main vision underlying the OER movement is to provide unrestricted access to educational materials and resources for learners and educators worldwide (OECD, 2007). This vision is grounded in the principles of open access, collaboration, and innovation, and seeks to foster a culture of sharing and reuse in the global education community. The overarching goal of OER is to promote equitable and inclusive education by eliminating financial barriers and enabling learners to access high-quality educational content. The OER movement has gained significant momentum in the past few decades, with numerous initiatives and organizations working towards its development and dissemination. Not surprisingly, the adoption and acceptance of OER have become a noteworthy development in the higher

education landscape. The present trend of transitioning towards OER adoption has been driven by the realization of its capacity to tackle significant predicaments in the realm of higher education, including but not limited to the increasing costs of textbooks, restricted availability of educational materials, and the necessity for innovative pedagogical approaches. OER are educational materials that are licensed in an open manner, enabling unrestricted access, use, adaptation, and dissemination. This evolution can lead to increased accessibility, inclusivity, and adaptability of education to meet the changing needs of both learners and educators (UNESCO, 2019; McGreal, 2017; Iniesto, McAndrew, Minocha, and Coughlan, 2023; Kanwar and Mishra, 2018). The attitude and adoption of OER in higher education have surfaced as noteworthy domains of research and practice in the field of education (Baas, Admiraal, and van den Berg, 2019; Bliss, Hilton, Wiley, and Thanos, 2013). However, the effective integration of OER into the higher education framework is reliant upon the understanding and addressing the attitudes of teachers, administrators, policymakers, and universities towards these resources. The existing research has consistently highlighted the pivotal role played by teachers in the promotion and adoption of OER (Belikov and Bodily, 2016; Mishra, 2017a; Conole, 2012; Forgette, 2020). Thus, the main thrust of the research study is to examine the attitude of teachers towards the adoption of OER, usage of OER, factors that facilitate OER adoption, perceived effectiveness and challenges of OER adoption in the higher educational institutions of North-East India.

The present research has ascertained that a significant proportion of teachers exhibit a moderate attitude toward the adoption of OER. This has yielded optimistic results, indicating that a great number of teachers have expressed a positive outlook on the adoption of OER in the near future. In accordance with several prior research on OER (De Oliveira Neto, Pete, Daryono & Cartmill, 2017; Mtebe and Raisamo, 2014; Ehlers and Kunze, 2021; Karwande, 2020; Kiran, 2017; Cai, Dong, Li and Wong, 2023; Rodés, Gewerc-Barujel, and Llamas-Nistal, 2019; Mishra, 2017b), the present study has also established that the primary factors that significantly facilitate the adoption of OER in higher educational institutions of North-East India are awareness, capacity, availability, and volition, rather than access to the infrastructural facility and permission. Indeed, this study provides further evidence of the great benefits of adopting OER in the teaching-learning context and the professional development of

teachers. The study revealed that the adoption of OER leads to a plethora of benefits such as the provision of a wide range of educational resources to stakeholders, the facilitation of personalized content, the promotion of active and self-directed learning, the expansion of knowledge paradigms, the cultivation of a culture of knowledge sharing, and a cost-effective approach for both students and teachers. Furthermore, the adoption of OER leads to the expansion of opportunities for collaboration and innovation, the enhancement of teachers' pedagogical practices, the elevation of teachers' reputations, and the development of teachers' digital literacy. This has been favoured by studies conducted by Henderson and Ostashewski (2018), Tang (2020), Ashalatha (2021), Krelja Kurelovic (2016), Manju (2022), Karipi (2020), Edelsbrunner, Steiner, Schön, Ebner, and Leitner (2022). Besides, the effectiveness of OER adoption, the research also discovered the major challenges of OER users and OER creators in the adoption of OER. These challenges include a dearth of technical expertise, an unstable internet connection, a limited understanding of OER, open licenses and Creative Commons licenses, insufficient institutional backing, a lack of recognition, inadequate funding, an absence of operational OER policies, time constraints and workload pressures, copyright violations, a negative attitude, a lack of motivation to create OER, concerns regarding the quality of OER, limited availability of OER for specific subjects, difficulties in customizing content, and reluctance to embrace change. These challenges were also highlighted by Mtebe and Raisamo, 2014; Orwenjo and Erastus, 2018; Mishra, 2017b; Cox and Trotter, 2017a; Kumar, Baishya, and Deka, 2021; Tang, 2020; Atenas, Havemann, and Priego, 2014). Consequently, the present research has identified various challenges that call for immediate attention to the successful adoption of OER in the world of higher education. In the midst of challenges, the growing prominence of the OER movement is an indication of an emerging shift towards an education system that is democratic, inclusive, and sustainable on a global scale, driven by openness and global collaboration.