CHAPTER 1

CHAPTER 1 INTRODUCTION

1.1. Background of the Study

The tremendous breakthroughs in globalization and technology have ushered in a new era of global digitalization, which is more empowered by technology and accelerated by knowledge and information diffusion. The advent of this global digital age has significant consequences for changing and reforming education. The dissemination of knowledge as a result of information and communication technology (ICT) has greatly improved accessibility for the general public. As a result, the availability of information in the form of educational resources is expanding quickly. The increasing rate of ICT use on a global scale has resulted in a significant expansion of knowledge among the younger generation. This has broadened the possibilities for using, producing, and disseminating a large variety of educational resources to meet the varied needs of the students. Educational resources are valued by higher education institutions as important tools for enhancing the teaching-learning process (Onaifo, 2016). A plethora of educational resources are being created by teachers worldwide on the internet. Nonetheless, many of these educational resources are subject to control by copyright regulations, thereby requiring consent from the copyright holder or adherence to other authorized principles or provisions (Cronin, 2018; Fitzgerald, et al., 2006). Many authors (OECD, 2007; Meinke, 2020; Elder, Buck, Gallant, Seiferle-Valencia, & Ashok, 2022) voiced that making use of the intellectual property of others without their explicit consent is a violation of copyright law. Engaging in actions such as replication, alteration, public presentation, and distribution of works protected by the author's rights may constitute unlawful conduct in the absence of authorized consent from the creator/author. This implies that educational resources are, to a considerable extent, 'locked' or 'restricted' (Prabhala, 2010); making it difficult to utilize, reuse, and alter them freely and openly. Henceforth, a promising substitute that encourages openness, accessibility, and collaboration in the educational field, enabling educational materials to be utilized and disseminated more liberally, while simultaneously upholding the proprietary rights of content creators, has been advocated (Prabhala, 2010). Thus, the United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2002) proposed the concept of "***Open Educational Resources***" (OERs) to describe a global phenomenon, an innovative approach that promotes unrestricted access to knowledge as a potential solution to bridge the

knowledge gap (Nasongkhla et al, 2014). This global movement flourishes to revolutionize the existing education scenario, by serving as a means of promoting a more inclusive and equitable learning milieu.

Higher Education in North-East India

A cluster of eight states constitutes the North-Eastern region of India – Assam, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, and Tripura.

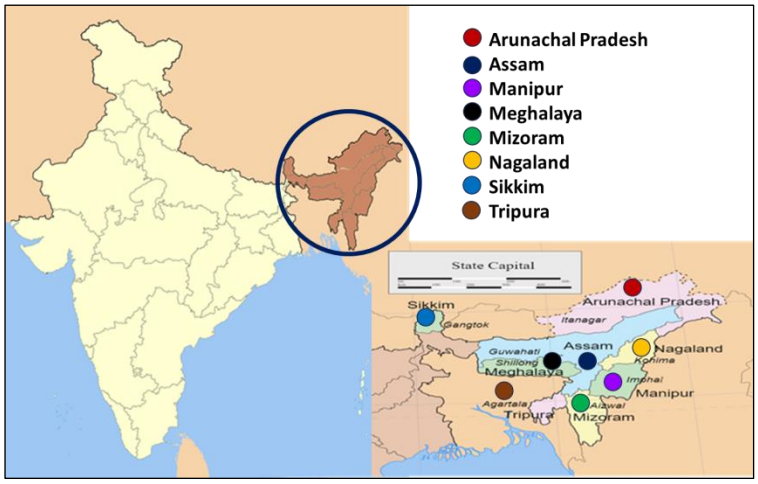

Fig 1.1: Geographical location of North-East India.

When it comes to education, these locations, which are frequently referred to as 'remote' or 'peripheral', suffer a variety of obstacles. Higher educational institutions (HEIs), such as universities, colleges, and technical institutes, have an important role in nourishing talent, promoting research, and making valuable contributions to the socio-economic progress of the region. However, studies have shown that higher education suffers poor instruction, language barriers, lack of research resources and innovative educational practices, insufficient number of higher institutions, limited access to high-quality and affordable education, theoretically based curricula, insufficient funding for library upkeep, commercialization of higher education and the limited educational opportunities for marginalised communities (Kaushal, 2016; Singh, 2018; Boruah, 2018; Haokip, 2019). Regardless of obstacles, the region is home to world-class universities that draw students from all over the world and offer quality education (Chauhan, 2022), thereby contributing to educational excellence. The higher education sector has seen substantial changes, demonstrating a dedication to improvement and the integration of ICT to tackle a variety of obstacles. Northeast

India's technological and educational breakthroughs have propelled the region into global competitiveness. In response to all these issues, most specifically, OER can serve as an invaluable asset in regions where there is a huge gap in educational opportunities for effectively addressing the educational divide. In the higher educational institutions of Northeast India, the adoption and integration of OER represent a commitment to provide opportunities for learning that are egalitarian and progressive. Therefore, this study intends to study the dynamics of OER adoption and attitude in the context of North-East India.

1.2. Tracing the Origins of Open Educational Resources (OERs)

Our understanding of how education and learning can be provided has altered significantly since the World Wide Web and networked learning resources first became viable options for the sharing and reuse of educational content in the early 1990s.

In the late 1990s, the trend of the INTERNET and World Wide Web emerged as a new technological revolution; a means to deliver, share and reuse educational materials. This has raised opportunities for creating new content in the digital world. In 1994, Wayne Hodgins (commonly known as the father of learning objects) coined the word '**Learning Object**' in terms of Lego bricks or atoms (to describe how learning objects can be used and reused in different contexts). "LOs were intended to bring with their use, the ability to represent learning material in discrete, small, independent pieces which could be used and reused in various situations with other pieces of learning material" (Allen and Mugisa, 2010). The IEEE Learning Technology Standards Committee defines a learning object

"*is any entity, digital or non-digital that can be used, re-used or referenced during technology-supported learning. Examples of learning objects include multimedia content; instructional content; learning objectives; instructional software and software tools; persons, organizations; or events referenced during technology-supported learning*" (as cited in Wiley, 2002).

The main idea of learning objects was to "break educational content down into small chunks that could be reused in various learning environments, in the spirit of object-

oriented programming". The key contribution of learning objects to the field of OER has been to promote the notion that educational materials can be created and distributed in digital form to be used in a variety of pedagogical contexts (OECD, 2007; Santosh, 2017). Next, in the year 1998, David Wiley introduced the term 'open content' based on the principles of free and open source software (FOSS) to be applied in open content and other educational resources. The idea of open content emerged from Richard Stallman's Free Software and Eric Raymond's Open Source movements. He describes open content as "a copyrightable work that is licensed in a way that provides users with free and perpetual permission to engage in the 5R activities which are retained, reused, revised, remixed, and redistributed" (Wiley, 2014). In the same year, Wiley also released the Open Content License (Open Publication License) based on the General Public Licenses (GPL) promoting the culture of openness in creative works. According to Wiley (2017), digital formats enable the widespread sharing of educational materials through technology, while open licenses make it legally permissible to do so. The core principle of GPL is that it gives a person the right to use, modify, alter the material and distribute it to others while granting them the same rights as their derivative works (Gay, 2002). Subsequent to this, Lawrence Lessig, Hal Abelson, and Eric Eldred commenced the Creative Commons (CC) License in 2001 to increase credibility and confidence and to promote open content in legal terms. CC License was an improvement to Wiley's Open Publication License (OECD, 2007). In the same year, the Massachusetts Institute of Technology (MIT) disclosed the first initiative towards Open CourseWare (OCW) to make every university course publicly accessible for everyone on a non-commercial basis. MIT OCW (2005) envisioned that a vast network of universities around the world offering open access to high-quality educational materials in a variety of disciplines and languages, creating a global Web of Knowledge would improve education worldwide (as cited in Whitfield & Robinson, 2012). This was considered a stepping stone to the movement of OER. Lastly, in the year 2002, UNESCO organized a Forum on the Impact of Open Courseware for Higher Education in Developing Countries. It was in this context that the terminology "Open Educational Resources" (OER) was used for the first time.

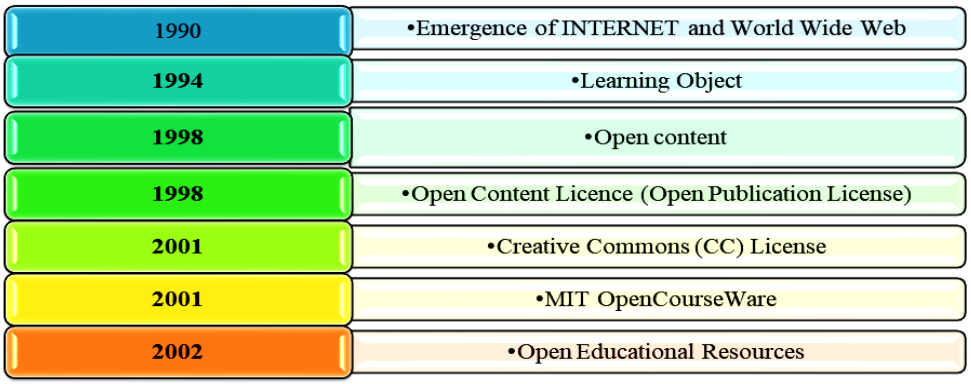

Fig 1.2: History of OER.

1.3. The Evolution of OER in the Indian Education Landscape

In the modern era, India has made some advancements in the direction of the growth and improvement of OERs in India. However, it was through the National Knowledge Commission (NKC, 2005) that the Government of India came to an understanding of the role that OER plays in improving both the quality of education and access to it across the country. Another effective move toward the expansion of OER in India is being taken by the National Mission on Education through Information and Communication Technology which falls under the purview of the Ministry of Human Resource Development (HRD). Recently, in the year 2017, a draft National Policy on OER for Higher Education was prepared and proposed to MHRD. The draft documented that the "policy is released to guide and advise Indian Higher Education institutions regarding the integration of OER in their educational delivery" (Mukhopadhyay, Chander & Kumar, 2018).

1.4. Efforts for Promotion of OER: International and National Guidelines

Regarding the promotion of OERs, a variety of policies and guidelines have been stipulated, at the international level. The next section will go through a few of them.

UNESCO International Institute for Educational Planning (IIEP) (2005)

The UNESCO International Institute for Educational Planning (IIEP) organised an OER forum from October 24 to December 2, 2005, where OERs were recognised as a means of sharing resources and broadening the horizon of knowledge for both students

and teachers. The forum focused on two issues related to OER in higher education: encouraging faculty participation in creating and sharing open content and ensuring proper citation, acknowledgement, and copyright law of the content. The teachers of higher education are the main contributors since they are the ones who create the content and agree to make it publicly accessible and free of charge. Regardless of whether OERs are driven by "bottom-up" individual efforts or "top-down" institutional initiatives, the role of higher education teachers in the development of educational resources is essential. The suggestions that were anticipated for the promotion of OERs were:

- Collaboration and incentives for OER development among academics; incentives like recognizing the contribution to creating and disseminating OER and incorporating OER into academic promotion/tenure portfolios; integrating open content and OER development in academic training and practice; implementing institutional policies that support OER content and foster its openness.
- Establishing a global community that focused on the increased production and use of OERs;
- Communities of interest to revitalize OER in underdeveloped regions;
- Organizations of people committed to expanding OER in certain academic fields;
- Forming groups to evaluate OER usage and impact, identifying gaps in the existing body of knowledge, posing research questions, enhancing existing approaches, and proposing recommendations for OER production;
- Researching user experiences with OER and experimenting with user support mechanisms;
- Discovery of successful OER strategies and collaborative efforts that lead to excellent OER offerings;
- A community of instructors at universities and colleges who are involved in or potentially interested in the production of online instruction.

Cape Town Open Education Declaration (2008)

The Open Society Institute and the Shuttleworth Foundation convened The Cape Town Open Education Declaration was released on 22 January 2008. The declaration

believed that the culture of sharing and exchanging ideas or knowledge should collaborate with the interactive culture of the internet, based on the idea that all people should be able to freely access, customize and share educational resources without exemptions. The declaration addresses that OERs make education more accessible, fostering the participatory culture of learning, producing, sharing, and collaborating that is essential for quickly evolving knowledge societies. The declaration recommended ways to promote awareness and the impact of OERs:

- Encouraging learners and educators to create, use, and adapt OER. Creating and utilizing open educational materials should be deemed vital to education and should be promoted and rewarded appropriately.
- Advocating authors, publishers and educational institutions to make their teaching-learning materials freely available to the public using open licenses, to use, revise, translate, and build upon the resources, as well as distribute them. Resources must be made available in formats that are easy to use and change, that are also compatible with a variety of technological platforms as well as accessible to persons with disabilities.
- Governments, school boards, college and university administrations, and other educational institutions must prioritize open education. Educational resources that are financed by government funds should, ideally, be OER. The use of OERs should be prioritized throughout the accreditation and adoption procedures. OERs should be prominently included in educational resource repositories' collections.

ICDE Task Force on Open Educational Resources (2008)

During the 22nd International Council for Open and Distance Education (ICDE) World Conference, ICDE and UNESCO launched an ICDE Global Task Force on OERs at UNESCO's Headquarters in Paris in November 2006. In June 2007, the main theme of the ICDE Standing Conference of Presidents (ICDE SCOP) meeting was "OER as an instrument for achieving Education for All". The mandate of the task force was to develop a report on the global OERs movement.

First World OER Congress (2012)

The very first UNESCO World OER Congress was held in Paris in 2012, convened by UNESCO and the Commonwealth of Learning (COL), with assistance from the William and Flora Hewlett Foundation. According to the recommendations made in the Paris OER Declaration (2012), national governments should take the lead in advocating and making use of OERs. The proclamation supports the use of open licenses for educational products that are supported by the public (Mishra & Kanwar, 2015). The declaration defines OERs as " teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions" (UNESCO, 2012) (Torres, 2013). The following suggestions on OERs were included in the declaration as advice for various governments (World OER Congress, Paris, 2012):

- Encourage the use of OERs and raise awareness of their availability;
- Create environments that are conducive to the implementation of information and communications technology;
- Strengthen the process of formulating strategies and policies regarding OERs;
- Encourage the knowledge and implementation of open licensing frameworks;
- Provide support for the capacity building necessary for the long-term creation of high-quality educational materials;
- Promote the formation of strategic partnerships for OERs;
- Encourage the development and adaptation of OERs in a variety of languages and cultural contexts;
- Encourage research on OERs;
- Ease the process of locating, obtaining, and sharing OERs;
- Promote open licensing for educational materials that were created using public funds.

Incheon Declaration (2015)

The Incheon Declaration and the Framework for Action, Education 2030, which was adopted on May 21, 2015, at the World Education Forum (WEF 2015), emphasized the commitment of the education community to achieve the goal of the 2030 Agenda for Sustainable Development (SDG4: "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"), recognizing the significant role that education plays as a primary driver of development. The Incheon Declaration declared that 'a tertiary education system that is well-established, properly regulated, and supported by technology, OERs, and distance education modalities has the potential to increase access, equity, quality, and relevance, as well as narrow the gap between what is taught at tertiary education institutions and what economies and societies require. In accordance with the many international agreements that are already in place, the provision of tertiary education ought to become gradually free.'

Qingdao Statement (2015)

An international conference on ICT and post-2015 education was held in Qingdao, the People's Republic of China, from May 23rd to May 25th, 2015, under the initiative of UNESCO, the Ministry of Education of the People's Republic of China, and the Chinese National Commission for UNESCO. The purpose of the conference was to gain a better understanding of how to maximize the potential of ICT for education and SDGs. It ended up becoming the very first worldwide statement on the use of ICT in educational settings. The results of the conference were published in the form of a document known as the Qingdao Declaration. This document highlights the notion that "OERs provide educational stakeholders with opportunities to improve the quality of and expand access to, textbooks and other forms of learning content, to catalyze the innovative use of the content, and to foster knowledge creation. We commit to developing sector-wide strategies and capacity-building programmes to fully realize the potential of OERs to expand access to lifelong learning opportunities and achieve quality education."

Second World OER Congress/Ljubljana OER Action Plan (2017)

The UNESCO and the Government of Slovenia, in conjunction with the Commonwealth of Learning (COL) and the William and Flora Hewlett Foundation, jointly hosted the 2nd World OER Congress at Ljubljana (Slovenia) in the year 2017. The goals of the 2nd World OER Congress were to highlight the world's best practices in regard to OER policies, initiatives, and experts; to identify recommendations that are demonstrably best practices for the mainstreaming of OERs; and to examine the possible solutions to meet the challenges faced in mainstreaming OERs into education systems worldwide. The theme "OER for Inclusive and Equitable Quality Education: From Commitment to Action" served as the primary focus of the 2nd World OER Congress. As a result, the importance of the role that OER plays in the accomplishment of the 2030 Agenda for Sustainable Development and, most importantly, SDG 4 on Quality Education cannot be overstated. Following suggestions were made to stakeholders (teachers, teacher trainers, librarians, students, parents, and educational policymakers) at the governmental and institutional level by the Ljubljana OER action plan (Ljubljana OER action plan, 2017):

- Increasing users' abilities to locate OERs, as well as their ability to reuse, produce, and distribute such resources;
- Language and Cultural concerns;
- Ensuring that everyone has access to high-quality OERs in a fair and inclusive manner;
- Creating sustainable business models;
- Developing supportive policy environments.

40th General Conference of UNESCO on OER (2019)

During its 40th General Conference, which took place in Paris from the 12th to the 27th of November 2019, UNESCO put up many suggestions regarding OERs. Recognizing the fact that, in the process of constructing inclusive knowledge societies, OER can support quality education that is equitable, inclusive, open, and participatory, as well as enhance academic freedom and professional autonomy of teachers by

broadening the scope of materials available for teaching and learning. The Conference brought to light the following objectives:

- Strengthening the ability of many stakeholders/academics to produce, access, reuse, modify, and redistribute OERs at international, national, and institutional levels covering all sectors of education; raising awareness on how OERs can increase quality access to educational and research resources; awareness on copyright license and open licenses; promoting digital literacy skills for OER creation and use; and organizing pre-service and in-service training programmes for OER use, creation and support their incorporation into learning, teaching and research.
- Encouraging governments and educational institutions to design and execute policies and regulatory frameworks to promote educational resources which are generated with public funds to be openly licensed or devoted to the public domain as appropriate; developing and OER quality assurance mechanism; forming a network of experts for OER teacher professional development and acknowledging OER creation as an academic or professional excellence; publishing accessible OER in public repositories using standard open file formats; infusing OER policies into national policy frameworks and agendas; addressing OER role on inclusive and equitable quality education; enhancing research on OER; enforcing regulations to safeguard users privacy and data for OER use and creation, OER infrastructure, and associated services.
- Fostering quality, inclusive, and equitable OER access to all learners irrespective of gender, physical ability, and socio-economic status, as well as learners who were in vulnerable situations, remote rural areas, areas affected by conflicts and natural disasters, etc.; ensuring OER that meets the needs of diverse learners; generating gender-sensitive, culturally-linguistically appropriate, and local language OER; investing for ICT infrastructure and broadband to rural and urban communities; boosting OER research and development; adapting standard benchmarks and criteria for OER quality assurance.
- Promote inclusive, comprehensive, and integrated OER sustainability models; evaluate the policies and regulations to ease the creation, ownership,

translation, modifications, curation, dissemination, and storing of OER; raise awareness for OER co-creation, participation and community partnerships; framing regulations that promote OER creation fulfilling the national and international standards; advocating linguistic translation of open licenses; enabling stakeholders input and constant OER enhancement; and leveraging inter-institutional, national, regional, and worldwide cooperation to source, create, and enhance OER models.

- Collaborating with international, national, and regional countries for OER development; identifying international funding mechanisms; creating peer networks to create and share OER considering the subject area, language diversity, and levels of education; incorporating OER provisions in international agreements in the field of education; developing an international framework for copyright and open licenses policies; strengthening to implement OER for promoting universal values.

Few guidelines have been defined concerning the promotion of OER in India. Those were discussed below:

National Knowledge Commission (2005)

Knowledge and Information are often regarded as the most important factors influencing success in the 21st century, and the extent to which India can establish itself as a globally competitive competitor will be heavily dependent on the country's knowledge resources. This massive undertaking entails the creation of a road map for reform that focuses on increasing access to knowledge, fundamentally improving education systems and their delivery, reshaping the structures of research, development, and innovation, and utilizing knowledge applications to generate better services. In light of this situation, Prime Minister Dr Manmohan Singh, under the leadership of Mr Sam Pitroda, established the NKC in June 2005 to develop a plan for revamping India’s knowledge-based institutions and infrastructure to better prepare the country to face the challenges of the future. In 2007, the NKC issued a statement that claimed that improving the quality of education and widening its availability is crucial to our competitiveness in the global knowledge economy. Broadband Internet access is one of the most effective strategies to encourage the creation and distribution of high-

quality Open Access (OA) materials and OER. This would make it possible to have broad and simple access to educational materials of high quality, which in turn would significantly enhance the learning environment for all students. NKC recommended the following steps to enhance the standard of open access in India:

- A "National E-content and Curriculum Initiative" must be started in an effort to accelerate OER development, adaption, and use.
- India needs to take advantage of emerging educational efforts on a global and national scale since they are easily accessible for adoption and adaption and act as a model for further development of content.
- At the level of policy, all research publications published by Indian writers that received significant support from the government or the public must be made accessible under Open Access and must be stored in the standard Open Access format at least on the website of the author.
- It is recommended that a national academic OA portal be built.
- The government needs to provide funding for the digitalization of books and periodicals in an open format that is not protected by copyright.
- A new high-quality OCR software package should be funded separately to convert new and old typefaces in numerous Indian languages into ISCI/ASCI code and retrieve OA portals and servers constantly.
- A network-enabled delivery infrastructure with an emphasis on access and delivery needs to be established.
- Teacher training and faculty development programmes on the use and creation of OERs have to be addressed to realize the strengths of OERs, which include wider access and increased quality.
- There must be more learning management systems and other tools for publishing, quizzing, and collaborating available to users. The assessment approach needs to be based on how the content and pedagogy in OER are being used.

National Mission on Education through ICT (NMEICT, 2009)

The government of India, acting through the Union Ministry of Human Resource Development (MHRD), initiated a programme known as the National Mission on

Education through Information and Communication Technology (NMEICT) in February 2009, during the 11th Five Year Plan. The scheme tries to harness ICT to provide high-quality, individualized, and interactive knowledge modules over the internet/intranet for all higher education learners. This strategy includes content development, networking, and access devices for institutions and students. This mission has two key elements: content creation and connectivity and access devices for educational institutions and students. Under the flagship of NMEICT, Open Licensing Policy Guidelines were released. The core element of these guidelines is that all educational materials and information products (content, software, and technology) should be treated as national resources and placed under an appropriate open licensing regime that protects the moral rights of the contributor.

New Delhi Declaration on Education (2016)

At the 4th Meeting of BRICS Education Ministers, which took place on September 30, 2016, in New Delhi, the New Delhi Declaration on Education was adopted for the sole purpose of achieving the Sustainable Development Goals (Goal 4) and the 'Education 2030 Framework for Action'. Both of these goals aim to "ensure inclusive and equitable quality education and promote life-long learning opportunities for all." The BRICS Ministers include government officials from the Russian Federation, the Federative Republic of Brazil, the Republic of India, the People's Republic of China, and the Republic of South Africa. The declaration suggested increasing the use of ICTs to broaden the educational opportunities available to students, improve the quality of education provided in classrooms, encourage the professional growth of educators, and empower educational planning and management. It was also suggested that a nodal institution and an institutional network be identified and established to facilitate the dissemination of ICT policies, OERs, and other electronic resources, such as electronic libraries, among the member nations of the BRICS group.

1.5. An Introduction to OER

The OER movement has grown over the years, which has led to an expansion of both the concept and the definition of the term. The phrase is defined in a variety of ways by a variety of writers, organizations, and foundations:

Table 1.1: Definitions of OER by various authors/organizations

Authors	Year	Definitions
UNESCO Forum on Open Courseware for Higher Education	2002	*"OERs are defined as 'technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes'. They are typically made freely available over the Web or the Internet. Their principal use is by teachers and educational institutions support course development, but they can also be used directly by students. OERs include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabi, curricula and teachers' guides."*
Commonwealth of Learning (COL)	2002	*"Publicly available resources that may be used for educational purposes and have been deposited (by donation) by a variety of sources to one or more of the many online repositories. The range in types of materials is much broader…from suitability for children to college students to professionals. These materials are more often smaller modules rather than complete lesson plans or complete courses."*
William and Flora Hewlett Foundation	2007	*"OERs are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. OERs include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge."*

Organization for Economic Co-operation and Development (OECD)	2007	*"Digitized materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research. OER includes learning content, software tools to develop, use, and distribute content, and implementation resources such as open licenses."*
OECD's Centre for Educational Research and Innovation (OECD-CERI)	2012	*"OERs are digital learning resources offered online (although sometimes in print) freely and openly to teachers, educators, students, and independent learners in order to be used, shared, combined, adapted, and expanded in teaching, learning and research. They include learning content, software tools to develop, use and distribute, and implementation resources such as open licenses. The learning content is educational material of a wide variety, from full courses to smaller units such as diagrams or test questions. It may include text, images, audio, video, simulations, games, portals and the like.*"
OER Commons	n.d.	*"OERs are teaching and learning materials that you may freely use and reuse, without charge. OER often have a Creative Commons or GNU license that state specifically how the material may be used, reused, adapted, and shared."*
The Scholarly Publishing and Academic Resources Coalition (SPARC)	n.d.	*"OERs are teaching, learning, and research resources that are free of cost and access barriers, and which also carry legal permission for open use. Generally, this permission is granted by the use of an open license (for example, Creative Commons licenses) which allows anyone to freely use, adapt, and share the resource—anytime, anywhere."*

Creative Commons	n.d.	*"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."*

The concept of OER as defined by Atkins, Brown, and Hammond (2007) in their report to the William and Flora Hewlett Foundation represents a groundbreaking and powerful phenomenon that recognizes the global knowledge base as a universal asset accessible to all. The rise of technological innovations and the ubiquitous nature of the Internet have facilitated the democratization of knowledge sharing, use and re-use, enabling universal access to this valuable resource. Atroszko (2015) articulates that OER reflects the fundamental principles of open education, which are founded upon the belief that knowledge is a public good, granting all individuals the freedom to use, customize, improve and redistribute educational resources without any restrictions. Likewise, Misra (2013) also stated that OER is based on openness - the right to access, alter, and redistribute digital materials for education and research purposes.

It is widely accepted that OERs are a potent tool for improving educational processes and equipping future generations of learners, educators, and workers with the competencies, knowledge and skills they need to thrive in the information economy (Geser, 2012). OERs, as defined by Das (2014), are a "mix of open contents and educational materials" that enable, with the help of technology, various stakeholders to create, use, and remix materials with the goals of lowering costs, increasing access, and enhancing educational quality across all levels (Kanwar, Kodhandaraman and Umar, 2010). OER is an opportunity to expand access to learning materials of a higher standard, while at the same time enabling those materials, through open licensing, to be transformed and contextualized according to need-specific (Miao, Mishra, Orr and Janssen, 2019). It is either a resource-based learning tool (Mansoori, 2014) or an instructional tool (Cobb, 2019) that acts as an impetus for efficient and high-quality learning in the future; offering individualized and flexible learning possibilities (Butcher, 2015). As stated by Hayman (2018b) in her thesis, OER is "*digitally stored, openly available content materials that are explicitly openly licensed (using Creative Commons or other open licensing standard). Creators/author(s) grant permission and*

help ensure discoverability and ease-of-use for download, storage, adoption, adaptation, and re-sharing of these resources as part of learning experiences. Content types may include video, audio, text, textbooks, images, illustrations, animations, and simulations that are editable and adhere to inclusive design principles for accessibility".

Phung (2018) described OER as freely accessing digital resources that are available online with an open license for a variety of educational purposes, such as teaching, learning, assessing, and academic research created by a subject expert or publisher. According to Butcher and Moore (2015), OERs are learning resources that allow for modification or remix following the policy of open licensing or the materials that are under the public domain (no exclusive intellectual property right exists) and enable users for 'customization' (McDowell, 2010). OERs are open resources that allow for the sharing of information and may also be modified and combined with other open resources or content that has been self-generated to build new materials that more precisely address the expectations of both students and educators (Berti, 2018).

OER is a type of educational content that does not impose any restrictions on the end-user in terms of technical barriers, price barriers and legal permission barriers (Hylen, 2006). According to Elder (2019), OERs are any form of educational materials, ranging from syllabi to whole courses, that are provided for free under an open license. This license allows for the resources to be modified and redistributed. To further distinguish OER from other resources, he says, "A resource cannot be labelled as an OER if it is not freely available or licensed under an open source."

OER is an innovation in the field of education to develop, disseminate and utilize free and open access to resources (Nasongkhla et al., 2014) to a wide range of subject matter through online databases (Mncube, Tanner and Chigona, 2021) that provide equal access, cost-effectiveness, quality educational materials and resources, and professional teacher development (Lane and McAndrew, 2010). Pawlowski, Pirkkalainen, Gervacio, Nordin and Embi (2014) assert OER as "any digital object which can be freely accessed modified and (re-)used for educational purposes". OER should incorporate Open Courseware Content, Open Source development tools, and Open Standards and licensing tools, according to the UNESCO-IIEP Forum (2001) as

cited in Schaffert and Geser (2008). OERs are set of educational resources that are specially designed for teaching-learning purposes, for teachers and students, to support education that can be openly availed, reused, and altered (UNESCO & COL, 2011) without the need to pay license fees or seek permission from the copyright holder (Butcher, 2011). As said by Pulist (2016)**,** OER can be defined as "instructional or informative resources in the digital format having an educational value". Anand & Rathore (2021) stated that OERs as "technically-enabled educational resources which are open in nature, for references, uses and endorsement by a group of people or organization for non-profit making purposes." OER is all about how we may use, reuse, and repurpose intellectual capital to advance knowledge and understanding in all of its forms (Hunter-Jones, 2012). Such content has either been granted a free license, accessed using any information technology (Dudek, 2022) or generated openly to allow others to reuse, improve, and repurpose it for educational purposes (Janowska, 2016).

OER is a product of open distribution as described by Dragicevic, Pavlidou & Tsui (2020) because they are found in the public domain and are not delivered to users through conventional commercial distribution channels. They are also a learning resource that is available for open consumption because anyone can access and benefit from their value. OERs are resources designed to improve teaching-learning resources and increase faculty and students' opportunities to access knowledge (Albright, 2005). Kanwar (2018) defines OER as "*an empowerment process, facilitated by technology in which various types of stakeholders are able to interact, collaborate, create and use materials and processes that are freely available, for enhancing access, reducing costs and improving the quality of education at all levels*". While in the report of Adoption of OER at City University, Bangladesh: A capacity enhancement programme, Roy Choudhury (2021) describes OER as "*OER provides an alternative to costly textbooks which are used in higher education, and can allow content to be edited and adapted to a variety of environments, say, in classroom, print of hardcopy, etc. Open textbooks for the university courses can save money on increasingly expensive commercial textbooks".*

Tuomi (2013) asserts that OER constitutes a public benefit from an economic standpoint, defining them as "accumulated assets that are available in a non-

discriminatory way to educators, students and self-learners for learning and education". OER is an accelerator for lifelong learning, continual professional growth and promotion of social justice, a great way for global academic collaboration and networking in teaching and learning (Ossiannilsson, 2019).

Some educational materials, such as presentations, lecture notes, assignments, lesson plans, etc., have been uploaded onto the internet with some form of copyright protection. This makes it impossible for other people to share or modify them in any way unless they have permission from the author (the owner of the copyright), or the author himself makes the material open to everyone. Whereas the OER are distinguished by their ability to be freely and lawfully downloaded for use, remixing, and redistribution of the resulting works, with the authors retaining credit for their original creation under certain CC licenses. This sets OERs apart from other digital teaching and learning resources that are already accessible on the internet (Krelja Kurelovic, 2016). Thus, the definition of OER can be summed up as any digital resources, such as textbooks, research articles, audio, videos, images, online courses as well as software, that is used by students and teachers for teaching-learning and is either licensed under the creative commons or the public domain.

1.6. OER attributes: Understanding the Multifaceted Attributes of Openness

Open, Educational and Resources: First and foremost, OERs are characterized by the fact that they are openly accessible online. The word '**open**' in OER is viewed as openness in terms of the 4 A's – accessible, appropriate, accredited, affordable" (Daniel, 2006). Walker (2005) defines openness in terms of "convenient, effective, affordable, and sustainable and available to every learner and teacher worldwide" (as cited in MacKinnon, Pasfield-Neofitou, Manns, & Grant, 2016); while Downes (2006) says openness in terms of no-cost or minimum cost of the resources to the user. Kawachi (2013) asserted that 'open' in OER means education "where constraints are minimized, compared with alternative practices, with respect to people, language, places, time, pace, methods of study, ideas, physical and/or online access, cost, flexibility, or any combination of these". E**ducational** implies instructional resources that are specifically designed for other purposes than learning and education that were used in formal educational settings as well as informal or non-formal learning. Zhiting

& Ping (2009) described the term 'educational' in the context that the content such as courseware, learning objects, teaching tools, etc.; are prepared for teachers, students, and self-learners who are involved in education and are the primary resource consumers solely used for educational practices (as cited in Wang and Zhao, 2011). OER is not a single entity; rather, it is a collection of enormous **resources**, to enrich the learning experiences such as journals and articles, textbooks, videos, audio, pictures, PowerPoint presentations, online courses, and so on. The Open Educational Quality Initiative (OPAL) report 2011 identified some of the OER resources, which are as follows:

- Open courseware and content.
- Open software tools (e.g. learning management systems).
- Open material used for the e-learning capacity building of educational professionals.
- Repositories of learning objects.
- Free educational courses.

Eaton (2022) adds open-source software and models, professional development and informal study materials under OER. Elder (2022) points out diverse material types that come under OER:

- Activities and Assignments like labs, homework, and tests;
- Course Guides: syllabi and student guides;
- Courseware: lectures, modules, and full courses;
- Instructor Materials: lesson plans and teaching strategies;
- Mixed Media: illustrations, games, videos, podcasts, simulations, and interactive materials;
- Reading Materials: case studies, data sets, lecture notes, primary sources, textbooks, and other readings.

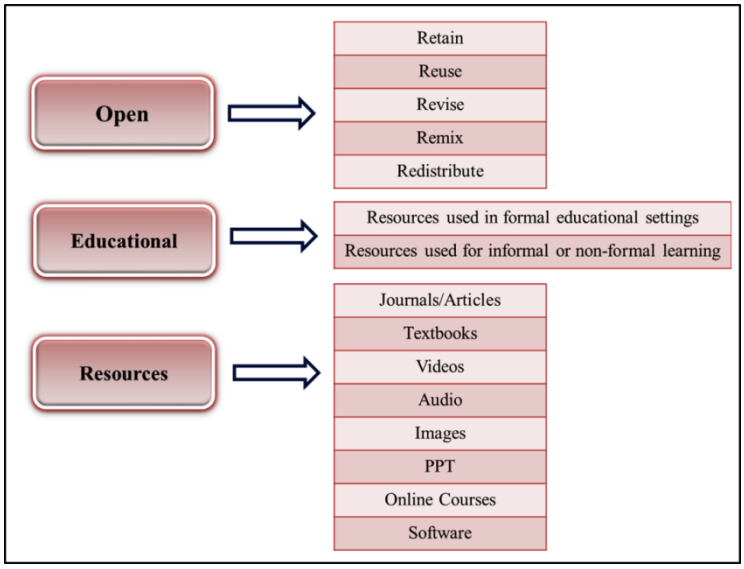

Fig 1.3: Meaning of the term "Open Educational Resources".

5R's of OER: Wiley (2007) expands upon the idea of OER by proposing the 4R's framework. The framework illustrates how people may make use of OER:

- To "reuse" something is to use it without altering it in any way.
- To "revise" is to make changes so that the material better meets the requirements and needs of the learners.
- "Remix" is to blend or synthesize the modified or original material with additional content to better meet the learning goals and needs.
- "Redistribute" is to share with others either the original material or a modified or remixed version of the material.

Later, in 2014, he expanded the framework by adding another R for "Retain", which means to download, save, and store the material with you despite any digital rights management restrictions (DRM) constraints (Bates, 2015).

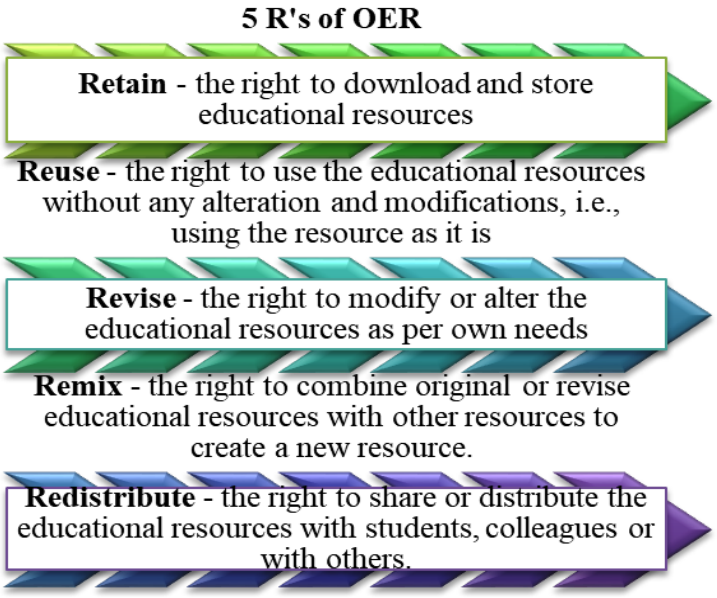

Fig 1.4: 5R's Framework of Open Educational Resources.

Open License: Another important attribute of OER is the Open License. Because of the ease with which digital information can be reproduced and distributed, "Open License" has emerged to safeguard the rights of content creators (UNESCO & COL, 2011). One of the key advantages of OER is that information is available under open licenses, which encourages innovation and experimentation as noted by Weller, Arcos, Farrow, Pitt, & McAndrew (2015). According to Pulist (2018), by releasing their work under open licenses including CC licenses or public domain with little or no restrictions on use, re-use, remixing, etc., the creators and users of OER can benefit from and contribute to the knowledge society. The open license vests the power to retain (keeping a copy), reuse (using it as it is), revise (adapting, adjusting, or modifying it), remix (mixing diverse content to build something new), and redistribute (sharing copies with others), without violating the copyright laws. Traditional copyright restrictions "lockdown" educational materials and prohibit distribution if no open license is specified (Bliss, Tonks & Patrick, 2013).

Accessible and Inclusiveness: The OER movement is an attempt to leverage the power of the internet to expand people's access to educational resources and expand their horizons (Navarrete & Lujan-Mora, 2013). Everyone can assess these resources, regardless of any geographical, technical, or economic barriers. OER can assist both lifelong and informal learning for people of all ages and levels of schooling. Such

resources are available in different formats and different languages. Instead of providing a one-size-fits-all textbook curriculum, the alteration, modification and remixing feature of OER enables to tailor students' individualized needs. OERs are a valuable supplementary resource for learning materials that can be easily accessed via user-friendly websites, without paying any cost. OER is the means by which affordable educational resources can be made available to everyone, regardless of circumstances (Ngimwa & Wilson, 2012), evolving as a potent resource to facilitate information access (Elder, 2022). OERs are created in an electronic format that makes them accessible for translation into other digital formats, such as those used by assistive technologies for students with visual or auditory impairments. Promoting SDG (Goal 4) which states that "by 2030, erase gender gaps in education and ensure equal access to all levels of education and vocational training for the most disadvantaged, including individuals with disabilities, indigenous peoples, and children in vulnerable situations" (UN, 2015), OER can be a tactic to achieve this objective (Politis et al., 2014; McGreal, 2017; UNESCO, 2019; Iniesto et al., 2021). The rise of OER has expanded many doors of opportunity and access to education for people with disabilities (Majeed, 2018; Brahim, Khribi, & Jemni, 2017).

1.7. Understanding the Concept of Creative Commons (CC) License

The foundation of CC was undertaken to mitigate the inherent conflict between the ability of authors to share digital works on a worldwide scale and the regulatory framework of copyright law (Creative Commons Organization, 2020). The non-profit organization CC licenses were established on the principle that "many citizens of the Internet want to share their work – and the power to reuse, modify, and distribute their work – with others on generous terms" (Bissell, 2009). Creative Commons' fundamental mission is to foster a culture of development, growth and productivity toward the end of achieving the goal of universal access to education, knowledge, and research (Creative Commons, 2011) and ensuring lawful sharing and repurposing of artistic, educational and scientific works (Bourcier, 2010). According to Lessig (2004), the laws governing copyright prevent users from accessing, remixing, and sharing things that are protected by copyright in a digital setting. It should be highlighted that due to the rigidity and complexity of copyright laws, even those individuals who wish to make their copyright content freely available for others are unable to do so without

extensive legal work (McGeever, 2006). As a result, and for this reason, the working group came up with a set of licenses that creators and users could utilize to freely share and use their creative works without giving up any of their rights (Awujoola & Phillips, 2020). In the year 2001, Lawrence Lessig, Hal Abelson, and Eric Eldred, along with the Center for the Public Domain, established the idea of Creative Commons (CC), which is an organization based in the United States. The first CC license was issued in December 2002.

It is not a substitute for copyright, but rather within the framework of copyright rules: a transition from "all rights reserved" to "some rights reserved" (Guibault, 2011; Giannopoulou, 2022); a CC license enables the copying, downloading, editing, combining, and sharing of resources through a pool of flexible set of licenses. The CC license has been understood broadly by various authors:

- "CC is a set of legal tools, a nonprofit organization, a global network and a movement - all inspired by people's willingness to share their creativity and knowledge and enabled by a set of open copyright licenses" (Creative Commons Organization, 2020, p. 1).
- CC can be defined as a "legal and social framework in the form of licenses that complement copyright by permitting sharing and reuse of published content with conditions" (Collins, Milloy & Stone, 2013).
- "CC licenses act as a source of legal instruments for those who want to give up some of their rights in favour of the community and the dissemination of cultural works" (Branco & Britto, 2014).
- "CC is a licensing system under which authors or producers of a work offer some of their rights to others to re-use their work under certain specified conditions" (Korn & Oppenheim, 2008).
- "CC licenses let people easily change their copyright terms from the default of 'all rights reserved' to 'some rights reserved'. Copyright holders retain their copyright and add one of six CC licenses to share some permissions with the public to reuse and redistribute their work" (Cozzolino & Green, 2019).
- "CC is an internationally active, non-profit organization that provides free licenses for creators to use so they can make their work available to the public.

These licenses allow creators to permit others to use their work under certain conditions" (Aesoph, 2019).

- "CC licenses are standardized open content copyright licenses which grant permission to use copyrighted works, in accordance with the terms of the particular set of template clauses applied by the licensor (who may be the copyright owner or another person who has the authority to license the material" (Fitzgerald, Hooper & Fitzgerald, 2010).

There are four elements that make up the CC license:

- Attribution (BY) ⓘ: The licensee has the right to make copies, distribute them, remix and make changes to them so long as they give the appropriate credit as specified by the author.
- Share Alike (SA) ⓢ: The licensee may only copy, modify, and redistribute derivative works under the same terms as the original work's license.
- No-Derivatives (ND) ⊜: The licensee is not allowed to alter the derivative work in any way but is allowed to use, copy, and distribute it with proper attribution.
- Noncommercial (NC) ⊘: The licensee may make copies, distribute them, remix and make other changes to the derivative work, but only for non-profit, non-commercial and educational purposes.

Based on these four elements, there are a total of six different CC licenses (as depicted in Table 1.2), each of which grants a different set of permissions, ranging from the license with the most open permissions to the license with the least open permissions.

Table 1.2: Description of CC licenses

License Type	Description
Creative Commons Attribution (CC BY) 	We are free to repurpose, remix, alter, and even utilize the content for commercial purposes so long as we provide credit to the original author. It is one of the CC licenses that impose the fewest restrictions.

Creative Commons Attribution-Share Alike (CC BY-SA) 	Permits the user to reuse, remix, edit, distribute, and even utilize the content for commercial purposes as long as the appropriate citation is included and the new work is published under the same license as the original one.
Creative Commons Attribution-Non-Derivative (CC BY-ND) 	Permits us to distribute the original work, including for commercial purposes, on the condition that the author is given credit and the content of the original is not altered. That means we are unable to make any changes to the content.
Creative Commons Attribution-Non-Commercial-Share Alike (CC BY-NC-SA) 	The original content may be reused, modified, distributed with citation, and published under the same license condition as the new work; however, commercial usage of the content is not permitted.
Creative Commons Attribution-Non-Commercial (CC BY-NC) 	Provides the user an opportunity to share, remix, and alter the original work while giving credit to the author, but does so only for non-commercial purposes.
Creative Commons Attribution-Non-Commercial- Non-Derivatives (CC BY-NC-ND) 	Permits the user to download and distribute the work with other people, without any modifications, and for non-commercial purposes, with the condition that the author must be cited. This license is considered to be the most restrictive of the six main licenses.

Open licensing gives users significantly more liberty in how they access, store, alter, and share materials than conventional copyright practices (Stokes, 2022). This one-of-a-kind tool gives teachers the ability to personalize learning materials to meet the requirements of their specific classes and the specific requirements of their students, taking into account the varied abilities, interests, and goals of their students. With an open license, users and teachers can easily modify and repurpose educational materials for use in other languages and cultural settings without having to seek permission from

the original authors (Pande, 2018). The culture of freely sharing creative and original works across the globe is strengthened by the use of CC licenses. In addition to this, it offers creators the chance to select how their works will be used and share the resources at their disposal. CC has the potential to provide a solution to a large number of issues and disagreements that are brought about by the laws governing copyright in today's digital era. The primary motive for the inception of CC was the realization that the efforts of copyright holders to secure control over their materials posed a danger to user autonomy and restricted the free exchange of knowledge and resources (Kim, 2008). Fitzgerald (2007) pointed out that CC offers a practical means of exchanging ideas and collaborating, which enables the realm of digital content, thereby opening up new opportunities for the reuse of inactive copyright asset materials. CC promotes and fosters a culture of creative sharing that is up-to-date, successful, and digital, while also working to improve the broader educational and research environment (McKenzie, 2020). It was suggested by Kapitzke, Dezuanni, and Iyer (2011) that the ideas of civic equality and cultural engagement are at the heart of the CC license, making it conducive to open access and collaborative sharing. To facilitate reuse and sharing, Park (2016) viewed CC licenses as the "road infrastructure" underlying the OER ecosystem. With the use of CC licenses, institutions can share information with a wider audience while still maintaining some degree of control over their intellectual works. This demonstrates how, in the context of education, a CC license encourages collaboration and community-building in addition to dissemination (Carroll, 2006). In the near future, as Heath (2021) proclaimed CC licenses will be the norm for intellectual property. Thus, the application of CC will result in improved support and prospects for researchers, teachers, students and society as a whole.

1.8. From Policy to Practice: International and National OER Initiatives

1.8.1. *A Look into International OER Portals and Gateways*

The **Commonwealth of Learning (COL)** is an international organization that was established in 1987 by the Commonwealth Heads of Government from all of the countries. Its sole mission is to encourage the growth of open learning and distance education all over the world and to share best practices. COL is dedicated to providing high-quality education and fostering equal access to high-quality learning

opportunities throughout life for all people, with the end objective of accelerating progress toward attaining sustainable development goals (Goal 4). **Open Education Global (OEG)** is an international, non-profit organization that promotes the growth of open education and its usage in different parts of the globe. OEG is built on a membership model. In the beginning, it was known as the Open Courseware Consortium (OCWC) when it was established in 2008. It was relaunched as Open Education Global in the year 2019. The empowerment of people via the pursuit of education is Open Education Global's vision. UNESCO established a worldwide OER Community wiki in 2005 with the assistance of the Hewlett Foundation to facilitate the exchange of knowledge and collaborate in the development and use of OERs. Together with the Free Culture Movement, **Wiki Educator** is working to facilitate the slow but steady expansion of OERs. Sir John Daniel, President and Chief Executive Officer of the COL, was the one who first conceptualized and established Wiki Educator. It emphasizes the development of free material and assists in the creation of OERs. Since the year 2001, the **Hewlett Foundation** has been awarding significant sums of money in the form of grants to educational groups and institutions that work to create and distribute open educational materials. The fundamental principle upon which the foundation is based is the notion that both knowledge and education are public goods and that no person should be prevented from gaining knowledge because of a lack of access to certain resources or because of geographical constraints. **OER Commons** is a cost-free online public library that was established in 2007 by the Institute for the Study of Knowledge Management in Education (ISKME). The Tech Museum of Innovation's Tech Awards: Technology Benefiting Humanity recognized OER Commons as a deserving recipient in the year 2007. OER Commons provides OER of high quality at all levels, beginning with elementary school and continuing through higher education. These OERs are designed to meet the requirements of both educators and students. It has a variety of resources such as case studies, full courses, interactive videos, lectures, lesson plans, modules, simulations, textbooks, and so on. The content that is available on this site is licensed under a Creative Commons Attribution-Non-Commercial-Share Alike License. In 1999, Dr. Richard Baraniuk from Rice University established **OpenStax,** which was formerly known as Connexions. OpenStax is a digital learning repository. Due to the absence of conventional textbooks and courses, this platform was created to provide teachers and students with the chance to exchange

and freely modify educational content including courses, books, and reports. **Openly Available Sources Integrated Search (OASIS)** is a database that was created and released by the Milne Library at SUNY Geneseo. OASIS gives users all over the world the ability to search a wide variety of open educational resources, such as textbooks, courses, interactive simulations, public domain books, audiobooks, modules, open access books, videos, and podcasts of different disciplines. OASIS is also the only platform that enables users to restrict their searches according to creative commons licenses or by faculty approval (Valenza, 2018). **Project Gutenberg** developed by Michael Hart in 1971 is a digital library that now has over 61,000 free eBooks available for download. The primary objective of the project was to promote the production and dissemination of eBooks. The vast majority of these eBooks are considered to be in the public domain. There are almost fifty different language versions of the eBooks that are available at Project Gutenberg. **Open SUNY Textbooks** is an open-access textbook publishing initiative formed by the State University of New York libraries and is funded by SUNY Innovative Instruction Technology Grants. It provides high-quality, cost-effective educational resources where faculties are engaged as authors and peer-reviewers and libraries as publishing services and infrastructure. It offers educational resources that are of high quality at an affordable price. Faculty members are encouraged to participate as authors and peer reviewers, and libraries are used as publishing services and infrastructure. All the contents that can be found on this website are distributed under a CC License. The **Directory of Open Access Books (DOAB)** is a database that contains scientific monographs that have been evaluated by other researchers and are available in an open-access format. The OAPEN Foundation provides this service to the public. The Directory of Open Access Books (DOAB) was officially launched in July 2013 at the Open Access Monographs in the Humanities and Social Sciences Conference at the British Library in London (Dhanavandan, 2016). The database contains information from all academic fields; however, the humanities, legal studies, and social sciences get the most attention. Every book in the DOAB collection is offered under a CC license. The fundamental goal of the DOAB is to encourage an increase in the production as well as the distribution of Open Access books. **Multimedia Educational Materials for Learning and Online Teaching (MERLOT)** was one of the first organizations to pioneer the practice of sharing and finding OERs. It is a

digital archive that can be accessed by anybody; created specifically for educators and students in higher education. Its mission is to increase the number and quality of online learning resources that have been peer-reviewed to achieve the objective of enhancing the efficiency of the teaching-learning process. MERLOT is comprised of 22 distinct kinds of content, including animation, assessment tools, e-portfolios, online courses, modules, journal articles, and many more. The digital repository for educational materials in the state of Florida is known as the **Orange Grove repository**. Educators are allowed to search for, use, remix, share, and contribute various educational resources through the repository. The repository includes open courseware, open textbooks, 3D object models, learning modules, and videos, lesson plans, instructional units, objects, and videos, as well as other relevant resources. **Open Course Library (OCL)** is a collection of high-quality, free-to-use online course materials. These materials include syllabi, course activities, readings, and assessments that have been produced by a variety of subject matter specialists. All the materials are shared under a Creative Commons Attribution (CC-BY) license. The Open Textbook Library's mission is to make affordable textbooks available to students and to provide faculty members access to high-quality open materials. With funding from the William and Flora Hewlett Foundation, Carnegie Mellon University launched the **Open Learning Initiative (OLI)** in 2002, a breakthrough in online learning for higher education. The initial purpose of OLI was to assist individual students in achieving the same learning outcomes as others from conventional courses by creating web-based learning environments (Kaufman, et al., 2013). **Saylor Academy** is a nonprofit initiative founded by Michael J. Saylor working on free and open education since 2008 to offer free and open online courses to all. It offers degree courses, professional development courses, or any other casual learning courses from disciplines like arts, history, biology, business administration, chemistry, economics, learning skills, mathematics, English, philosophy, physics, political science, professional development, psychology, sociology, etc.

1.8.2. *A Look into National OER Portals and Gateways*

On August 13, 2013, CIET and NCERT collaborated to create the **National Repository of Open Educational Resources (NROER)** for use across all levels of education, beginning with primary education and extending to higher education.

Documents, interactive, audios, videos, and electronic books on topics such as language, mathematics, environmental studies, science, physics, biology, chemistry, social science, political science, geography, history, economics, sociology, psychology, business studies, commerce, accountancy, art, and education are covered in NROER's extensive collection of resources. These resources are available in English as well as many other regional languages. **National Programme on Technology Enhanced Learning (NPTEL)** was established in 2003 through a collaborative effort between the Indian Institute of Science (IIS) in Bangalore and seven Indian Institutes of Technology (IITs), including Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati, and Roorkee. NPTEL is primarily geared toward students in the fields of science and engineering. The contents of the courses were created based on the model curriculum provided by the All India Council for Technical Education (AICTE) and other major affiliating Universities in India. Higher education, professional education, distance education, and ongoing open learning are all given higher priority by NPTEL. The primary language used in NPTEL courses is English. However, as of late, NPTEL has begun the process of translating the course material it offers into eight distinct languages, namely Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Tamil, and Telugu. The Ministry of Human Resource Development (MHRD) launched the **SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds)** platform as part of the NMEICT programme to offer free Massive Open Online Courses on a variety of topics. It seeks to address the three fundamental tenets of education policy: access, equity, and quality. This platform enables the hosting of all courses from class IX to the postgraduate level so that they can be accessed anywhere, at any time, and without any cost. All of the courses were created by reputed teachers and institutions. Nine National Coordinators – AICTE (All India Council for Technical Education), NPTEL (National Programme on Technology Enhanced Learning), UGC (University Grants Commission), CEC (Consortium for Educational Communication), NCERT (National Council of Educational Research and Training), NIOS (National Institute of Open Schooling), IGNOU (Indira Gandhi National Open University), IIMB (Indian Institute of Management, Bangalore) and NITTTR (National Institute of Technical Teachers Training and Research) guarantee high-quality content production and delivery. The **National Institute of Open Schooling (NIOS)** developed OER for vocational programmes aimed at students in secondary and senior secondary levels.

This initiative's primary goal was to create OERs in the form of role-based modules; to assist learners in earning a living through OER vocational education programmes; to create and manage study centres and the services they provide for the continuous development of learners' careers and vocational skills and capacities. (Prasad, 2014, p. 26). Students of science, technology, and engineering at the undergraduate and post-graduate levels are the target audience for the audio-visual teaching-learning materials that have been developed as part of **Project OSCAR (Open Source Courseware Animations Repository)**, which was initiated by the Indian Institute of Technology in Mumbai as part of the National Mission on Education through ICT (NMEICT). In addition to this, it offers learning items appropriate for elementary school students in the disciplines of biology, chemistry, physics, and mathematics. The work is released under a Creative Commons license that requires attribution but prohibits commercial use and requires that it be shared identically. On September 5, 2017, the National Council for Education Research and Training (NCERT), under the auspices of the Ministry of Education, launched **DIKSHA (Digital Infrastructure for Knowledge Sharing)**, a national platform for open learning intended for use in the field of school education. It was built based on the concepts of open access, as well as open licensing. The educational materials available via the site include things like quizzes, evaluations, question banks, and preparations for tests; practice and homework; explanatory content; lesson plans and instructor tools; and training for both teachers and leaders. DIKSHA covers the curriculum of the NCERT, CBSE, NIOS, and SCERT boards throughout India and may be accessible by both instructors and students in a total of 18 different languages. It provides instructional materials for kids in classes 1 through 12 on a variety of topics, including mathematics, English, Assamese, Hindi, biology, commerce, accountancy, physics, chemistry, education, social science, and geography, among other topics. The **National Digital Library of India (NDLI)** is an educational repository that was launched on June 19, 2018, by the Honorable Minister of Human Resource Development, Prakash Javadekar. It is sponsored by the Ministry of Education, Government of India, and is part of the National Mission on Education through Information and Communication Technology (NMEICT) flagship programme. The Indian Institute of Technology (IIT) Kharagpur is the organization responsible for its operation and maintenance. The repository includes learning resources in the form of textbooks, photos, audio, videos,

dissertations, papers, conference proceedings, notes, and other materials for students at all levels, from elementary to post-graduate, and it also includes adult education and technical education. The repository maintains material in a variety of regional languages in addition to English. This content comes from the fields of science, technology, humanities, and social science. It is essential to take notice of the fact that, within this repository, only a subset of the available educational materials has been granted permission to be used under the Creative Commons License. Under the aegis of the National Mission on Education through Information and Communication Technology, **Vidya-Mitra,** an online learning portal was also launched. The portal provides access to a large variety of different types of digital information via a unified user experience. For students at the secondary and senior secondary, undergraduate, and graduate levels, it encompasses the subject areas of the arts, humanities, and languages; engineering and technology; physical and basic sciences; medical and health sciences; life sciences and social sciences. The Creative Commons Attribution-Share Alike (CC BY-SA) license governs the publication of the material that may be accessed via the Vidya-Mitra site. A repository of Indian theses called **Shodhganga** was formed on 5 May 2016, as the UGC mandated that university researchers submit electronic versions of their theses and dissertations to allow open access to the academic community worldwide. These could not only ensure easy access and archiving of Indian doctoral theses but will also help in raising the standard and quality of research. Shodhganga stands for the reservoir of Indian intellectual output stored in a repository hosted and maintained by the INFLIBNET Centre. The content submitted under the Creative Commons License Attribution-Noncommercial-Share Alike 4.0 International is encouraged by Shodhganga. As part of the National Mission on Education through Information and Communication Technology (NMEICT), the Ministry of Education (MoE), the Government of India, and IIT Bombay created the **FOSSEE (Free/Libre and Open Source Software for Education)** project. The project's goal is to increase the usage of FLOSS software in educational and scientific settings. This project strives to eliminate dependency on proprietary software in educational institutions. Some examples of free and open source software (FOSS) activities are the Textbook Companion (TBC), Lab Migration, FOSS Forum, other conferences, seminars, and hands-on experience workshops. The Creative Commons Attribution-Share Alike 4.0 International License governs the use of this work.

1.9. Conceptualization of OER Adoption

There has been a remarkable increase in the growth of OER. The understanding of OER adoption holds significant importance in the field of higher education. The adoption of OER in the context of higher education can be conceptualised as a continuum that covers several levels of engagement, that extend from passive adoption (i.e., usage) to active involvement (i.e., creation). Through the dual lenses of use and creation, OER adoption signifies the transformation of higher education in the digital age. As stated by DeVries (2013), besides using pre-existing OER, the act of adoption can also involve the production of new material or the alteration of existing ones, to subsequently share these contributions with the wider educational community. Wiley's (2014) 5r's framework of OER - Retain, Reuse, Revise, Remix, and Redistribute is a transition from the more passive stages of maintaining and utilising OER to the active stages of revising, remixing, and redistributing. Thus, it equally emphasises creation and sharing in addition to using. The first two R's are primarily concerned with usage. The latter three highlight creation as teachers use already existing resources and adapt, combine, or share them in new forms. In 2014, Hodgkinson-Williams proposed using the term "adoption" as the broad idea that describes the various practices and policy development related to OER. Creating, utilising, reusing, adapting (revising, re-mixing), sharing, and archiving educational resources are all included in this. According to McKerlich, Ives and McGreal (2017), the use and creation of OER are crucial components of adoption, and both are necessary for fully realising the perks of OER. Again, Hodgkinson-Williams, Arinto, Cartmill and King (2017) have also defined use and creation as phases of OER adoption. In the work of Cox and Trotter (2017a), the word "OER adoption" is meant to serve as an umbrella term that embraces both the 'use' of OERs and the 'creation' of OERs. The use of OER involves a variety of practices, such as the repurposing, remixing, revising, retaining, and redistributing of educational content that is initially created by someone other than the user. In contrast, the creation of OER involves teachers granting an open license to their original materials or creative efforts by means of revision or remixing. In addition, Cox and Trotter (2017b) designed an "OER Adoption Pyramid" that showcases the process of determining whether to use and create OER at either an individual or institutional level (elaborated in Section 1.12.1). The research conducted

by Algers and Silva-Fletcher (2015); Mishra and Singh (2017); Kasinathan and Ranganathan (2017) has also provided support for this.

1.10. The Promising Potentials of OER Adoption

In the past few years, higher education has experienced a phenomenal expansion to satisfy the rising demand for quality education for all. This facet has acquired even more popularity as a direct result of the rapid developments that have taken place in ICT. In today's highly globalized society, there is a consistently growing need for labour that is both talented and knowledgeable. Higher education has a huge impact on supporting societal advancement and national economic competitiveness in today's knowledge-seeking culture (COL, 2011). In light of this, having universal access to high-quality higher education has emerged as a critical determinant in determining growth and development. People in today's information society are required to use various forms of ICT to gain access to knowledge to keep up with the most recent advances. The role of ICT in higher education cannot be overstated. As Wims & Lawler (2007) noted "while education unlocks the door to development, increasingly it is information technologies that can unlock the door to education". The proliferation of ICTs has resulted in several educational breakthroughs, one of which is the development of OER (Harvey & Bond, 2022).

Why is OER increasingly becoming essential to classroom learning for teachers and students in higher education? We can get a start on answering this question by investigating the potential opportunities presented by OER.

There is a growing problem of educational inequalities across the board, and OER can provide a solution that is both credible and affordable (Panigrahi, 2018; UNESCO and COL, 2017; Dudek, 2022). According to Orr, Rimini, and Damme (2015), OER has the potential to make a significant contribution toward resolving the educational problems that are prevalent in the system.

According to the OECD (2007), the goal of the OER movement was to remove the restrictions that prevented individuals from freely accessing educational resources because they were locked behind passwords within proprietary systems. This makes it difficult for individuals to gain unrestricted access to the information. The philosophy

that underpins the OER movement is that the creation of educational resources should be primarily aimed at promoting the freedom to share knowledge and for the welfare and use of the people without any commercial restrictions; in other words, the knowledge should be legally, socially, and technologically free and open for all, and this is the central tenet of the OER movement (Misra, 2013). OER Commons (n.d.) disclosed that the right to high-quality education governs the global OER movement. OER enables systemic change in teaching and learning content by engaging academics in innovative participatory practices and effective learning technology.

Since its inception, OER has attracted the attention of universities all over the world and facilitated the sharing of information on a global scale because of its accessibility and reusability features (Miracle, 2020). One of the fundamental tenets of OER is the idea that everyone has the right to an education. According to Ahammad (2019), OER paves the way for universal education, which encompasses the provision of education to all individuals, without discrimination or exclusion based on any demographic or socioeconomic factors. As a result, OER aims to make information and knowledge more useful, relevant, and accessible to the public (Butcher, 2011). In a contemporary knowledge-seeking society, OER has the potential to foster a participatory culture of using, sharing, learning, and working collaboratively.

The OER movement shows great promise in higher education by increasing access to learning materials (Venegas-Muggli & Westermann, 2019; Stein, Cechinel, & Ramos, 2023) making learning opportunities more flexible, and decreasing the price of education, and boosting the quality and diversity of available materials. It holds significant promise for breaking down geographical and socio-economic barriers to higher education for students all around the world (Gani, 2010; Butcher & Hoosen, 2012; Pounds & Bostock, 2019; Francis & Antique, 2022). OER offers students content from a wide range of disciplines, flexible in integrating it with the courses; saving time and effort and improving the educational value by creating a collaborative learning environment between teachers and learners and promoting user-centric and lifelong education (Geser, 2007). OER provides easy access to high-quality course materials developed by specialists from reputable universities and academic institutions throughout the globe. These materials are designed to facilitate use, reuse, and modifications and are released under open intellectual property licenses

(Navarrete, Lujan-Mora, & Penafiel; 2016). The price of textbooks is a substantial contributor to the overall expense of higher education, which continues to rise each year and puts it out of reach for an increasing number of students (Wiley, Green, & Soares, 2012; Yano & Myers, 2019). To this, OER can be a great solution for minimizing textbook costs. OER has been demonstrated to aid in cost savings and provide immediate access to materials, according to research findings of Jhangiani & Jhangiani (2017); Hilton, Fischer, Wiley & William (2016); Jung, Bauer, & Heaps (2017). It is becoming increasingly apparent that there is a free and open alternative to costly textbooks and resources in the form of OERs at no cost and under open licenses or in the public domain (Arumugam, 2016).

In the opinion of Mishra & Kanwar (2015), OERs are viewed as a powerful tool for capacity development and boosting the quality of educational resources due to collaboration with developing countries. Previous research has proposed that rather than textbooks published by traditional publishers or digital materials, OER can boost students' access to critical learning materials, as well as teachers' academic freedom (Francis, 2021), which ultimately leads to improved student learning results (Orwenjo and Erastus, 2021). OER encourages the adoption of innovative pedagogical practices (Pande, 2018; Torto, 2019; Bossu & Willems, 2017), by promoting teachers' ongoing professional growth and engagement. OER with new pedagogies, well-designed learning objects, and various learning activities may engage students and teachers in active learning and help them develop material for diverse, inclusive, dynamic knowledge societies (UNESCO, 2019). OERs allow instructors to share their expertise worldwide, enabling networked learning and cooperation with other professionals in the same subject (Henderson & Ostashewski, 2018; Dutta, 2016; Perifanou & Economides, 2022). The adoption of OER creates a culture of sharing educational materials (Adil et al., 2022; UNESCO Institute for Information Technologies in Education, 2010; Schuwer & Janssen, 2018b) and helps to gain global recognition for their work (OECD, 2007; Mulder, 2012). OER provides a massive opportunity for teachers to empower themselves in their academic and professional fields. These resources are the result of collaborative efforts of a global community, to promote global educational equity by broadening people's access to information and educational opportunities (Bissell, 2007). Bateman, Lane, & Moon (2012) believed

that what teachers throughout the world hold as a guiding principle –a willingness to share knowledge can be fostered through the use of OER. According to the views expressed by CSF (2013), the OER intends to "encourage teachers and other content creators, to share their content, engage in peer review, and adapt as well as adopt resources to enrich their professional practice".

In educational settings, the availability of these publicly available resources enables curriculum, education level, culture and language, and context-specific customizations (Walker, Hennessy & Pimmer, 2022). As stated by the European Commission (2013), OER is essential because it encourages the development of innovative learning environments in which users can modify the information to better suit their requirements. Users can alter these resources as per their requirements, expanding the accessibility of resources to all individuals (Santosh & Panda, 2018).

Huttner, Green, and Cowher (2018) highlight four advantages of OER as a means to boost educational output: Firstly, OER can be used without any cost by anyone: students, teachers, or educational institutions. Second, open licensing can help teachers adapt quickly to new pedagogical approaches and meet the needs of a wider range of students. Third, OER can speed up the entire innovation process in education, from curriculum creation through pedagogical refinement. And lastly, openness improves learning and encourages greater participation from the community in it.

OERs have the potential to be a key aid in promoting inclusive and equitable quality education, because, they are learning resources that are freely accessible and useful. They have the potential to have a substantial impact on education at all levels, from pre-kindergarten through lifelong learning, including technical and vocational training (McGreal, 2017). OER can bridge gaps between non-formal, informal, and formal learning, according to the OECD (2007) and D'Antoni (2009b); thus improving quality and accessible educational materials for a broad spectrum of teaching and learning needs.

OER has great potential to achieve the SDG (Goal 4) which aims to ensure inclusiveness, quality and lifelong education. This is possible because OER has the potential to become a sustainable innovation if we take a learner-centric approach,

foster decentralized institutional structures, and adopt a participatory approach (Kanwar, 2018). Kanwar, Kodhandaraman and Umar (2010) believed that the landscape of education in the twenty-first century is susceptible to being significantly reshaped by OER. By allowing for the free use and repurposing of high-quality educational resources, OER provides the potential for sustainable growth in the improvement of access to and the quality of education. Therefore, OER functions as a 'transformational force' that aids educational institutions in responding to changing societal demands by developing a higher-quality learning environment (Tuomi, 2013). In this way, OER is contributing to the three primary goals of higher education "access, equity, and quality".

1.10.1. *Lessons Learned: Reflecting on OER's Response to the COVID-19 Pandemic*

The universal outbreak of the COVID-19 pandemic has undeniably exerted a profound and significant mark on all facets of the educational landscape. Its impact has manifested itself in the form of extensive disruptions to traditional pedagogical practices and learning approaches worldwide. However, sustaining the standard of quality education in a completely digital setting posed significant difficulties. It can be confidently argued that the absence of open approaches would have resulted in a more prolonged and severe impact of the pandemic (Stracke et al., 2022). In light of the massive challenges caused by the COVID-19 pandemic, the University Grants Commission (UGC) and the Ministry of Human Resource Development (MHRD) have put forward a set of guidelines, wherein they advise higher educational institutions to harness the potential of ICT as a means to deliver education through online platforms It has also placed significant emphasis on promoting and advocating the use of OER accessible through diverse online platforms, such as Swayam, e-PG Pathshala, Shodhganga etc. (UGC, 2020). The integration of ICT tools and OER presents an opportunity for educational institutions to effectively maintain access to high-quality learning materials for students amidst the ongoing pandemic. According to Verma, Prashanth, Greco, Khosla, and Singh (2022), many of the educational obstacles that emerged as a result of the COVID-19 pandemic have been overcome with OER, as an appropriate means to offer uninterrupted, online, remote learning. The global academic community has recognised the significant worth of OER in the wake of the COVID-19 pandemic, which unequivocally showcased how OER facilitates teachers in adapting

to new circumstances (Huang et al., 2020; Gerard, et al., 2022; Ouahib, Bendaoud, Shlaka, & Berrada, 2023). This change has not only demonstrated the resilience of the education sector but also highlighted the importance of OER in ensuring access to education for all, even in difficult times. OERs have emerged as an indispensable pedagogical tool for facilitating teaching and learning. These resources have proven to be useful in enabling scientists and researchers to strengthen their research efforts amidst the ongoing global crisis. Moreover, the use of OERs extends beyond the confines of this difficult period, offering a means to expand the horizons of knowledge and research in a sustained manner (Singh, 2022). Cheung, Wong and Cheong Li (2023) reported that in light of the attributes of open and unrestricted accessibility, OER has functioned as an ideal and advantageous means of assistance for learners in their learning process and also have proven to be instrumental in facilitating teachers efforts to maintain the continuity of students' learning in a home-based setting (Lo, Tlili & Huang, 2022) amidst the global crisis. The significance of OER has been further amplified in subsequent years. Bordoloi, Das, and Das (2021) noted that amidst the COVID-19 lockdown, the Indian Government introduced the "Bharat Padhe Online" initiative, which aimed to prompt teachers to transition from the traditional way of imparting knowledge to online and blended learning modes. This initiative encouraged teachers to develop digital educational content, foster the exchange of ideas and innovations through public platforms, and actively contribute to the creation of educational blogs, wikis, and OERs. There is a persuasive argument that OER could enhance equity in learning even after the pandemic. Van Allen and Katz (2020) advocate for the adoption of OER by educators as a means to broaden the range of students' access to learning materials, as well as to modify or repurpose such resources to optimise student engagement and facilitate effective learning experiences amidst the global crisis. Today, in light of the current crisis, there has been a strong emphasis placed on the significance of giving wider accessibility of resources and OER, in addition to assisting resilient and sustainable infrastructures. Even though OERs are not a silver bullet for solving all of education's issues, they have demonstrated their endurance in such hard situations (Ouahib, Bendaoud, Shlaka, & Berrada, 2023). Prior to the onset of the COVID-19 pandemic, UNESCO had already emphasised the significance of OER contents. Further to this, in the post-COVID-19 education landscape, UNESCO emphasises the importance of equipping teachers and students

with OER and digital tools through online platforms. These platforms should offer users clear instructions, well-structured learning materials, and robust systems for monitoring the learning process (Chen, 2020).

Thus, the disruption of traditional in-person learning called for the need to rely on OER as a valuable resource for students as well as teachers, providing them with freely available and easily accessible learning materials. The availability of OER assisted in narrowing the knowledge gap that was caused by a lack of access to physical textbooks and other materials, which in turn enabled ongoing learning even in remote areas. Looking beyond the pandemic, OER continues to be of great importance. The advent of the global epidemic has undeniably acted as a catalyst in the process of recognising the importance of OER in the field of higher education and motivating educational institutions and professionals to embrace the potential of these resources. Moving forward, benefiting students, teachers, and institutions equally, OER will continue to play an essential role in the development of an education system that is more fair, adaptive, and learner-centred.

1.11. The Challenges of OER adoption

Despite the significant advance that the OER movement has achieved toward achieving equality and equity in the provision of education to all people at all levels, it is nevertheless confronted by several challenges. According to recent research, the rate of OER adoption in developing countries is still in its nascent stage in comparison to that of countries in the developed world (Murphy, 2013; Alkhasawneh, 2020). Numerous challenges are noted in the existing research on the adoption of OER in higher education (OECD, 2007; Babson Survey Research Group, 2014; Henderson & Ostashewski, 2018; Carson, 2020).

One of the most significant obstacles standing in the way of the widespread adoption of OER is the fact that many teachers are still not aware of its existence. Teachers lacked the knowledge or skills to adopt OER. It appears that their lack of practical experiences or ICT/OER skills and competencies cannot serve as a foundation for the adoption of OER practices in higher education. This was evident from the studies conducted by Datt & Singh, 2021; Orwenjo & Erastus, 2018; Thompson & Muir,

2020; Cardoso, Morgado & Teixeira, 2019; Menzli, Smirani, Boulahia & Hadjouni, 2022). Research studies have shown that teachers lack an understanding of open licenses and CC licenses and how they work (Hylen, 2008; Richter & Ehlers, 2010; De los Arcos, Cannell, & Mcllwhan, 2019). Many potential users are unsure as to whether or not their use of OER based on 5R's is legal. As a result, some teachers avoid the situation and do not utilize OER. Even though teachers are eager to share their content with others, they worry about giving up intellectual property rights by doing so (Menzli, Smirani, Boulahia & Hadjouni, 2022). Another key challenge to OER adoption has been teachers' lack of interest or commitment to sharing. In addition, some teachers even do not understand the need to share their work as OER (Bossu, Brown & Bull, 2012; Schuwer & Janssen, 2018a) since the value of OER is not recognized at the institutional or governmental level (Hunter-Jones, 2012; Kandiero, 2015; Mishra, 2017b), or because there are no status or incentive mechanisms associated to its creation (Dakka, & Dakka, 2017; Mishra, 2017b). Reluctance to use and share resources, or a negative outlook on doing so, might be a barrier to OER adoption (Murphy, 2013; Menzli, Smirani, Boulahia & Hadjouni, 2022). It is also important to point out that many teachers reported receiving little support from their institutions in the process of creating and utilizing OERs (Van Der Merwe, 2013; Rodes, Gewerc-Barujel & Llamas-Nistal, 2019). It can be challenging to assess the worth and quality of OER. One of the key concerns of faculty members who are considering adopting OER is its quality. It was found that there was some uncertainty over the OER's level of quality in the studies conducted by Mahendraprabu, Kumar, Mani & Kumar (2021), Allen & Seaman (2016) and Belikov & Bodily (2016). According to Guthrie, Katherine & Peter (2018), teachers were concerned about how the OER content benefits in comparison to the traditional textbooks. Zobel (2015) pointed out that the perceived quality of OER is not the same as that of a traditionally published textbook, which stands as a hindrance to embracing OER. A substantial body of research asserts that the adoption of OER suffers because of poor internet connectivity (Kandiero, 2015; Phalachandra & Abeywardena, 2016; Cooney, 2016). Further, the adoption of OER is hindered by the lack of hardware and software resources (D'Antonio, 2009a; Datt & Singh, 2021; Hunter-Jones, 2012; Tlili et al., 2022). Another challenge of OER adoption as argued by Tovar Caro & Lesko (2014), Dsouza (2021), and Arcebuche (2022) is localizing or finding relevant OER which is

also time-consuming (Wright & Reeves, 2019; Martin & Kimmons, 2020; Forgette, 2020). A lack of awareness of the pedagogical applications of OERs may also hinder educators' abilities to identify appropriate OERs or understand effective ways of incorporating such resources into instruction (Roza, 2016; Hassall, 2017; Hoosen, Butcher & Knyazeva, 2019; Petrich, 2020). The OER movement is confronted with issues related to its long-run sustainability of OER according to Murphy (2013); Kaufman & Campana, (2019); Lim, Wee, Shannalyn & Teo (2017); Hylen (2006). There are two aspects to the OER sustainability challenge: the first is the maintenance of OER production, and the second is the maintenance of OER sharing (Wiley, 2009). The OPAL report (2011) raised five barriers to the use and development of OERs: personal issues, such as a lack of trust, and systemic issues, such as a lack of institutional support for the use of OERs, lack of technological tools for sharing and adapting OER content, insufficient skills and time; quality or availability of OERs. All of these issues pose serious challenges to the long-term sustainability of OER in higher education (Andrade et al., 2011). Therefore, if these hurdles and constraints are not addressed, the potential of OER to advance learning and teaching in higher education systems may be significantly limited.

1.12. Factors facilitating OER adoption

The OER revolution unquestionably brought about changes in higher education practices in the 21st century. Extensive previous studies have demonstrated a wide variety of beneficial effects that OER can have in the field of higher education (Baas, Admiraal, & Van den Berg, 2019; Yano & Myers, 2019; Kanwar, Kodhandaraman & Umar, 2010). The manner in which OERs are adopted for pedagogical purposes is contingent on the interplay of a variety of factors. According to Krelja Kurelovic (2018), various factors can facilitate the adoption of OER as a standard operating procedure in higher education.

1.12.1. *Theoretical Framework*

As its theoretical framework, this research utilized Trotter and Cox's (2016) OER adoption pyramid. Whether the focus is on the teachers or the institution as the agent of analysis, this framework's significance lies in the fact that it makes it possible to

understand the factors that are involved in the adoption of OER in an educational setting. Cox and Trotter (2016) constructed an analytical framework called the OER adoption pyramid by combining various parameters that can facilitate OER adoption in higher education institutes. Within this framework, they found six essential factors that influence the adoption of OER.

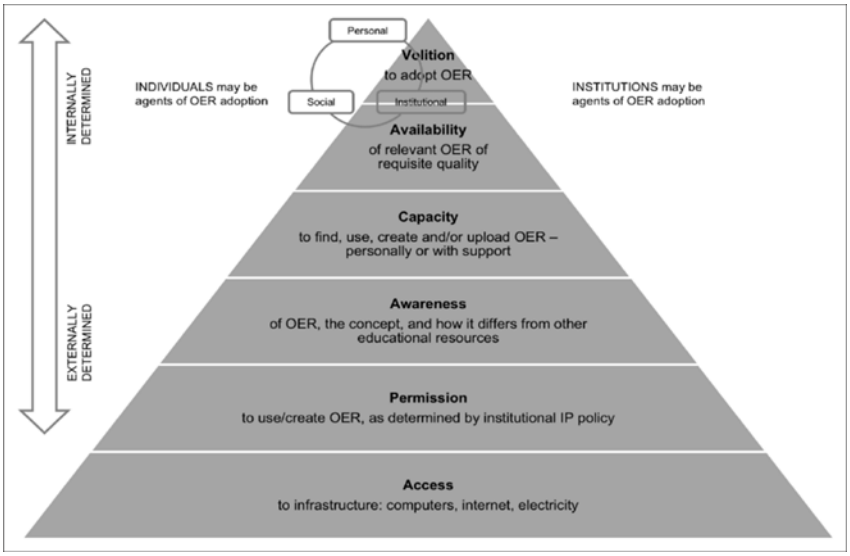

Fig 1.5: OER Adoption Pyramid (Cox and Trotter, 2016).

The first factor that is essential for the adoption of OER in higher education is Accessibility. This refers to having access to the necessary hardware, software and physical infrastructure, such as computers, electricity, and internet connectivity. The availability and accessibility of ICT resources are the primary factor that determines how successfully OER may be adopted and integrated into teaching in higher education institutions. As opined by Teye, & Duah (2022), and Muriithi, Horner & Pemberton (2016), any strategy for the adoption and integration of ICT will only be successful if there is access to, and availability of, various ICT technologies. Legal permission for teachers to either distribute teaching resources as OER or use OER in the curriculum is the next prerequisite for effective OER adoption. The term "permission" refers to the legal right to use or generate OERs. For users, the OER license determines permission parameters and for creators, institutional IP policies usually determine whether teachers or institutions will hold copyright over teaching materials produced at the institution. Awareness among users and authors on the concept of OER, the CC license, and how it is distinct from other types of educational

materials (often those with copyright restrictions) is the third aspect that contributes to the adoption of OER. People need to be knowledgeable about OER either to make use of it or create it. It is essential to have sufficient knowledge of any invention or technology to ensure the successful implementation and adoption of the technology (Mustapha, Man, Shah, Kamarulzaman & Tafida, 2022). Fourthly, the adoption of OER necessitates that teachers possess a certain capacity for the requisite technological, semantic, and competency skills. It is difficult for teachers to adopt OERs until and unless they have skills in the use and creation of OERs themselves or the institutions offer them technical support. The ability of teachers to make effective use of OER in the classroom is a critical factor in determining the extent to which these practices will be adopted and incorporated (Japhet & Tar, 2018). Muriithi, Horner & Pemberton (2016) commented that users tend to develop a greater sense of confidence in their use of technology if they are aware that assistance will be available to them. Next, for users, the term availability refers to the degree to which OER applies to a given academic discipline, as well as its content, scope, level, language, formats and other characteristics. For OER creators, the term availability describes whether or not the provider has instructional resources on hand that may be freely and openly distributed to users. A major factor for teachers to adopt OER is the availability and relevance of OER (Mishra, 2017b; Baas, Admiraal & Van Den Berg, 2019). The last aspect that inhibits OER adoption is called “Volition”, and it refers to the motivation to adopt OER both at the personal and institutional level. If the agent, in this case, the teacher (this study focused on the personal level of volition) has access, permission, awareness, capability, and availability to adopt OER, then the agent’s volition or motivation becomes the most important aspect in determining whether or not they will use or develop OER. According to Rolfe (2012) and Tang, Lin and Qian (2020), it is essential to have a good grasp of the motivations and characteristics of potential users to successfully adopt or embrace OER practices. Thus, the OER adoption pyramid served as a tool for determining what criteria or factors promote the adoption of OER in higher educational institutions.

1.12.2. *Conceptual Framework*

The adoption of OER has emerged as a powerful catalyst, restructuring traditional teaching, and learning approaches and unleashing new possibilities. This evolution

relates to the integration of ICT, which is driving a significant shift in the landscape of education. Technology has completely changed the way that education is delivered, which has opened the door to innovative, student-oriented approaches. The attitude of teachers plays a significant influence in determining the extent to which OERs are adopted, which is an essential component of educational innovation. This influence is well-documented in the academic research conducted by Jurado and Pettersson (2015); Belikov and Bodily (2016). It is the attitude of teachers that plays a pivotal role in determining their openness and willingness to the adoption of OER. Teachers with positive attitudes are more equipped to explore the world of free and open educational resources because they are curious about what cutting-edge and novel teaching materials are available for them at no cost. They are more likely to integrate OER into their lesson plans and curricula effortlessly. Therefore, having a positive attitude is essential to cultivate a culture of openness, innovation, and effective adoption of OER in educational settings. Ossiannilsson, Altinay and Altinay (2016) remarked that "Opening up education requires a change in attitudes and mindset". The process of opening education requires not only a change in instructional strategies but also a holistic change in attitudes and mindset. To make this change, teachers need to embrace collaboration, resource sharing, and a firm belief in the principles of openness. Therefore, considering the teachers' attitudes and context is crucial in understanding and adopting OER effectively. Teachers are at the forefront of the learning process, and their experiences, beliefs, and challenges greatly influence the success of OER.

The attitude of teachers to adopt something "new", particularly OER, is the result of several significant factors that are interconnected (Wijnen, Walma van der Molen and Voogt, 2023). At the outset, the technological infrastructure that is already in place is a significant factor that plays a vital role in defining the accessibility of resources (Access). The second factor that determines a teacher's attitude is the extent to which they are permitted to adopt OER into their teaching activities (Permission), Next, the awareness of the benefits and specific nature of OER (awareness), as well as knowledge of one's own skills to utilise and create OER (Capacity) makes a significant influence on teachers' attitude. The quantity and quality of the materials that are available to teachers also play a role in shaping their attitudes (Availability) and lastly,

intrinsic motivation - which reflects the teacher's internal drive to adopt OER—emerges as a critical factor (Motivation) influences teachers' attitude towards OER adoption. Detailed explanations of these six key factors can be found in the section on the theoretical framework (1.12.1).

To promote a technologically enhanced learning environment, it is necessary to understand teachers' attitude towards the adoption of OER. With the aim to shed light on the complex interplay between teachers' attitude and OER adoption, the conceptual framework presented in Figure 1.6 aims to highlight the factors that facilitate OER adoption in HEIs. The presence of teachers' positive attitude is important, although, facilitating factors such as access, permission, awareness, capacity, availability, and volition, collectively shape the environment in which teachers work. These factors have a significant impact on the practicality and desirability of adopting OER. The conceptual framework offers an overview of how teachers' attitudes towards OER and facilitating factors may influence the adoption of OER in higher education in Northeast India.

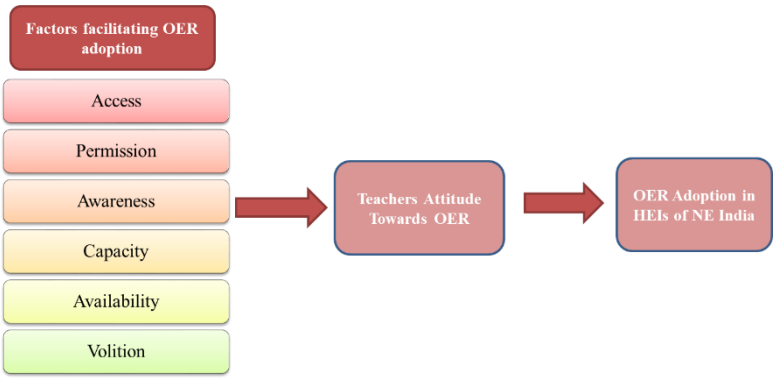

Fig 1.6: Conceptual Framework of the study.

1.13. Significance of the Study

The proliferation of ICT has led to the availability of a plethora of educational resources that may be accessed online. These types of educational content are typically produced by teachers of higher education institutions, academic organizations, universities, the government, and research institutes. The educational content that is made available for free on various platforms to be universally accessed, used, and shared without copyright restrictions, etc. is commonly referred to as OER. Young,

Daly, & Stone (2017) have remarked that "the future of education is open". Earlier, teachers and students had to rely on limited materials kept within their reach or at institutions. But now, they can access a wealth of information from other institutions and even from the Internet. This alteration has expanded the scope of resources and enriched the concept of knowledge sharing. OER is a huge boon to the implementation of initiatives aimed at achieving equity, expansion, and excellence in today's educational institutions (Thakran & Sharma, 2016). As D'Antoni (2009b) pointed out the fact that OER is the hub of a variety of initiatives that address the requirement to "unlock knowledge" and provide open access to information for everyone. The literature suggests that OER has the potential to alleviate some of the problems associated with educational provision in developing countries, especially with higher education provision. This sector is considered a solid foundation in terms of human resources development, which is essential for the country's long-term sustainable development (COL, 2017). According to UNESCO (2012), COL (2011) and OECD (2007), it has been suggested that OER can eliminate the expense of content development, foster the growth of communities of knowledge practitioners, and broaden access to educational resources for students through the provisions of open licenses. Consequently, in light of the significance of OER within the educational system, and most specifically at the level of higher education, there is a demand for adoption. The successful incorporation or adoption of OER in higher education is determined by how teachers embrace the concept. When considering the rapidly expanding availability of OER on a worldwide scale, it is essential to evaluate the current condition of teachers' attitudes regarding OER as well as their concerns about its use (Mishra, 2017a). The adoption of OER is believed to have a significant impact on the future of higher education; therefore, efforts should be made to give adequate support and resources to guarantee that the area advances in a manner that is beneficial to both teachers and students. This study investigates the perspectives held by teachers working in higher education institutions regarding the use and creation of OER, and the findings shed light on how teachers in the context of North-East India conceptualize and adopt OER in higher education. The study's findings may lead to novel understandings that help technology experts, policymakers, and educational institutions better understand teachers' experiences on effectiveness and challenges with OER use and creation, and thus better suggest solutions and develop policies and

standards that accommodate the adoption of OER as pedagogical tools to support learning.

1.14. Rationale of the Study

The OER movement is a developing trend in the field of higher education. This trend is arising as a result of the widespread adoption of technology and access to the Internet all over the world. In the field of higher education, one of the most pressing concerns is how to best leverage OER, with the aim of enhancing the overall quality of education. According to Thomas (2017), the use of OER plays a crucial role in enhancing both the accessibility and quality of education in both developed and developing nations. The goals of "Education for All" and "Sustainable Development Goal 4" can both be significantly advanced with the help of OER. OER are resources that support the dissemination of high-quality education that is egalitarian, inclusive, open, and participatory. Additionally, they support the academic freedom and professional autonomy of teachers. The opportunities for open and free sharing that are offered by OER make it possible for everyone, everywhere, and at any time to harness the benefits of the accessible nature of OER. A more collaborative approach unites the traditions of knowledge creation and sharing to facilitate an educational environment that is more adaptable to the needs of individual students. There is a possibility that OER could help higher education institutions reach out to underrepresented student groups, increase enrollment in higher education, and offer learning opportunities for those who are unable to use more conventional learning (Dutta, 2016). As a result, it is of the utmost importance for institutions of higher education to make use of the benefits and possibilities offered by OER. OERs that are of high quality help teachers save time and effort on the creation of resources, and they also boost student learning both inside and outside of the classroom (Karunanayaka and Naidu, 2014). Richter & McPherson (2012) and Moore (2013) found that OER had the potential to revolutionize education around the world, especially in developing countries, by providing free, high-quality educational materials (Ganapathi, 2017). The National Knowledge Commission (NKC) of India was established in 2005 to bridge the "knowledge gap" of the 21st century and improve the country's educational system. So, to improve the standard of India's higher education, the Commission decided in December 2005 to look into the possibilities presented by OERs. Further to this, the

NKC made the subsequent recommendation that an important strategy for addressing the issues is to make use of OER that are available all over the world and open access (OA) as a means of significantly expanding the availability of educational resources of a high-quality all over the world (Kumar, 2007). The movement of OER can become successful only if the educational stakeholders play an important role in its adoption i.e. if they use and create OER as part of the teaching and learning process. The 21st-century teachers are considered to have a substantial impact on the progression of the knowledge society. To keep up with the ever-evolving educational landscape, Misra (2012) argues that today's teachers must be lifelong learners, advocates for innovative pedagogical practices, skilled technologists, creators of new educational resources, and developers of new learning tools. Teachers are the main proponents of OER since they are required to use it in their classroom instruction and are expected to develop open educational materials for teaching-learning purposes. Even the NKC (2007) advocated for enhancing faculty development and teacher training in the field of OER. Digital materials are available to teachers, and they can access them, alter them, and utilize them in their classes (Berti, 2018). As said by Belikov and Bodily (2016), the future of OERs will likely be determined by how individual faculty members perceive the concept. Considering the significant role of teachers in the adoption of OERs, conducting empirical investigations on the experiences of teachers would serve to enhance the existing knowledge base relating to the adoption of OERs in the field of higher education (Allen and Seaman, 2014). OER provides teachers with the opportunity to share their pedagogical materials and teaching strategies available to other colleagues, allowing them to establish professional connections with learners and teachers from other educational institutions (Santosh, 2017). There is a vast amount of potential for OER to be utilized in the field of education. Nevertheless, Conole (2012) asserts that to make them beneficial to students and teachers, it is essential to know and comprehend how students and teachers are using them. (Alves, Miranda & Morais, 2014). Even though OERs are becoming increasingly significant in the field of higher education, the OER movement is only just beginning to gain support. A considerably smaller number of studies have been carried out in the North-East region of India on teachers of higher education institutions on OER. Therefore, in light of this perspective, the researcher plans to carry out the study on the teachers of higher education institutes in the North-East region of India. This setting paves the way for a

more in-depth study to be conducted to investigate the attitude and adoption of OER among teachers of higher education institutions. Therefore, it is equally important to examine the factors that influence the adoption of OER by teachers in the classroom. It is also essential that research be conducted into the effectiveness and difficulties encountered by teachers in utilizing and developing OER. This research will also help researchers and policymakers identify variables that support or hinder OER adoption in higher education institutions so that best practices can be scaled up and problem areas addressed through training or policy. It is anticipated that the findings of the study will make a major contribution toward the adoption of OER in higher learning institutions.

1.15. Statement of the Problem

Increased reliance on ICTs, particularly OERs, in the education sector, has led to a notable global phenomenon. The increasing spread of the Internet has sparked a resurgence of interest in the role that OERs play in higher education. First of all, the importance of OER is evident in the global south, where the expense of traditional textbooks prevents students from pursuing higher education (Jung, Bauer, & Heaps, 2017; Yano & Myers, 2019; Roy Choudhury, 2021), many also view OERs as a means of facilitating the provision of knowledge and vital information to HEIs for teaching and research (Chae and Jenkins, 2015; Henderson and Ostashewski, 2018; Venegas-Muggli & Westermann, 2019). Furthermore, in countries or in educational institutions, where copyright regulations are rigid, authentic free and open resources which have been issued with appropriate licences are essential, enabling students as well as teachers with unrestricted access to these resources and offering an alternative avenue for sharing it. Thirdly, since diverse viewpoints and ideas are exchanged, faculty members can collaborate on their works with one another, strengthening their professional ties (Mishra and Kanwar, 2015; Francis, 2021; Perifanou and Economides, 2022). Coffey (2023) and Tuomi (2013) have observed that Higher Education Institutions (HEIs) are growing increasingly dependent on OERs as a means of delivering improved learning and teaching instances. Understanding the adoption of OERs in higher education is of utmost importance. Hence, the primary area of attention in this study is higher education institutions, specifically the faculty members of Central Universities in North-East India.

With the setting up of several central universities and institutes of national importance in the past decade, the Northeastern region is experiencing a significant expansion of education. As the Department of Higher Education under the Ministry of Education directly oversees central universities, they frequently act as innovators or flag bearers for new educational initiatives in India. Their experiences can be set as an example for other institutions. Also, compared to state-private universities, central universities typically have better infrastructural facilities and funding provisions. This can have a significant impact on the attitude and adoption of OER. The experiences and outcomes from central universities can serve as benchmarks for developing national policies and guidelines on OER. With such empirical research on attitudes and adoption towards OER, universities can make well-informed decisions about adopting these resources into their educational strategies. Considering the importance of OER and noting the absence of any research undertaken on this topic among the faculty members of central universities in North East India, the present research aims to study the attitude and adoption of OER in North East India.

Hence, the present research problem is titled as "A Study on Attitude and Adoption of Open Educational Resources among Teachers in Higher Educational Institutes of North East India".

1.16. 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?

1.17. 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.

1.18. Hypotheses of the Study

The researcher has formulated hypotheses for objective 2 in order to determine if there are any differences in attitude towards OER among teachers, with a specific focus on gender, teaching experience, and academic rank. Again, formulating hypotheses for objective 5 is driven by the intention to investigate the interrelationship between the factors (access, permission, awareness, capability, availability, and volition) that influence attitudes towards adopting OER. These hypotheses are:

Hypotheses Related to Objective no 2

$H_0$1. There exists no significant difference between the attitude of teachers towards the adoption of OER with regard to gender.

$H_0$2. There exists no significant difference between the attitude of teachers towards the adoption of OER with regard to years of teaching experience.

$H_0$3. There exists no significant difference between the attitude of teachers towards the adoption of OER with regard to academic rank.

Hypotheses Related to Objective no 5

$H_0$4. There exists no relationship between access to the infrastructural facility and the attitude of the teachers towards the adoption of OER.

$H_0$5. There exists no relationship between permission and the attitude of the teachers towards the adoption of OER.

$H_0$6. There exists no relationship between awareness and the attitude of the teachers towards the adoption of OER.

$H_0$7. There exists no relationship between the capacity and attitude of the teachers towards the adoption of OER.

$H_0$8. There exists no relationship between the availability and attitude of the teachers towards the adoption of OER.

$H_0$9. There exists no relationship between the volition and attitude of the teachers towards the adoption of OER.

1.19. Operational Definitions

The researcher has provided a clear definition of the important terms used in the study, as outlined below:

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 - 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, 2017b; Mishra and Singh, 2017; Kasinathan and Ranganathan, 2017). Thus, in this study, the term "OER adoption" refers to the usage and creation of OER by teachers at higher educational institutions in North-East India.

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.

1.20. Delimitation of the Study

1. The study will be delimited to only the Central Universities of North East India.
2. The study will be delimited to only central universities providing disciplines in Humanities and Social Sciences.
3. The study is delimited to only 7 departments of humanities and social sciences disciplines- English, Hindi, Education, Sociology, Mass Communication and Journalism, History, and Political Science.