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IMPACT OF OPEN EDUCATIONAL RESOURCES ON HIGHER EDUCATION IN OPEN KNOWLEDGE ERA: A STUDY AMONG THE STUDENTS OF INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

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Abstract

The concept of "Open Educational Resources (OER)" is gaining eminence in the field of education on a global scale. The exponential growth of technology in the contemporary era has resulted in an unprecedented need for instant accessibility of information and services. Consequently, to investigate the effects of open educational resources on students in higher education institutions, a survey was conducted by the authors. The findings from the survey indicate that there exists a relatively low to moderate level of awareness regarding Open Educational Resources (OER) among students enrolled in higher education institutions in India. Besides, it was observed that the utilisation of OERs in higher education has a positive influence, suggesting the necessity to enhance awareness among students. By doing so, students can effectively utilise these resources to improve their academic performance.

Keywords: *Open Educational Resources, Awareness, Impact of OER, Higher Education, Students of IIT Jodhpur*

1. INTRODUCTION

The notion of "Open Educational Resources (OER)" is gaining prominence in the field of education globally. The exponential technological progress in the present period has created a significant need for instant accessibility to all things. Furthermore, learners are expressing a desire for a self-paced and independent learning experience. These advancements have created opportunities and pathways for other methods of sharing knowledge. The necessity of efficient resource sharing for a healthier future remains valid alongside the generation of new knowledge. Thus, OER is seen as a highly significant method for both learning and sharing knowledge.

UNESCO defined the OER as “Open Educational Resources (OER) are 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. OER form part of ‘Open Solutions’, alongside Free and Open Source software (FOSS), Open Access (OA), Open Data (OD) and crowdsourcing platforms.” (UNESCO, 2017)

According to David Wiley, "open content" and "open educational resources" refer to any work that can be copyrighted (excluding software) and is either in the public domain or licensed in a way that allows users to freely and indefinitely engage in activities such as retaining, reusing, revising, remixing, and redistributing. (Wiley, n.d.).

Open License is defined by the Open Knowledge Foundation as “… a document that specifies what can and cannot be done with work (whether sound, text, image, or multimedia). It grants permissions and states restrictions. Broadly speaking, an open license grants permission to access, re-use and redistribute a work with few or no restrictions”(*Open Definition: Defining Open in Open Data, Open Content and Open Knowledge*, n.d.)

2. OBJECTIVES OF THE STUDY

The authors took up the present study with the following objectives:

1. To investigate the familiarity about OER and concept of copyright and licensing the students of IIT Jodhpur

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2. To understand what purpose and types of OERs are used among these students,
3. To investigate the impact of OERs on education among these students

3. LITERATURE REVIEW

To trace the relevance of the topic and to understand what kind of studies have already been conducted globally, a detailed review of existing literature has been done by the authors, which is presented below.

Till now, to investigate and understand the impact of open educational resources on higher education, numerous studies have been carried out, globally.

Nusbaum & Cuttler (2020) conducted a study to examine the hidden impact of OER. They conducted a study to assess the impact of OER on students' perceptions of the instructor's teaching classes and evaluating their syllabuses. The costs were also assessed. Study 1 found that students rated open textbooks higher than commercial textbooks. They surveyed a total of 774 students, of whom 369 (open textbook n = 228 and closed textbook n = 169) reported reading their assigned textbooks, whereas the remaining students did not report. In Study 2, there was a significant difference between the cost group and the open group in terms of instructor perceptions and course selection. In study 2, the open group spent less money than the cost group. According to their findings, using the OER affects students' perceptions of their instructors and their choice of classes. The impact of OER is highlighted beyond just student outcomes.

Colvard et al. (2018) have researched the impact of OER on student success metrics. This paper highlighted the challenges facing students in higher education today, as well as their learning and success. They took 21,822 students' large-scale samples to measure the impact of OER on course-level faculty adoption. The study revealed that the OER adoption saved the students' money and improved the student grade while decreasing the D, F, and withdrawal letter grades. Also, it indicated that the course grade improved with a greater rate and decreased DFW with a better rate.

A case study was conducted to evaluate the impact of OER on students' learning outcomes using the no-cost materials for the course Human Factors and Ergonomics. They have taken data from five semesters, i.e., spring 2014, fall 2014, spring 2015, fall 2015, and spring 2016, of students' exam grades, course grades, and students' opinions, pre- and post-implementation. They've implemented the no-cost materials from the spring 2015 semester. The study revealed no significant differences in the students' class performance for the course. It also highlighted that the no-cost materials had not shown any negative effect on students learning (Choi & Carpenter, 2017).

Grimaldi et al. (2019) have carried out research to measure the impact of OER on student learning. For this research, they used the simulation method. The paper highlighted that OER could reduce student costs and improve equity in higher education. While examining the OER learning benefits, they got mixed results. Also, it pointed out that most of the studies showed null effects. They noted in their paper that numerous studies have investigated the efficacy of Open Educational Resources (OER). However, regrettably, they do not provide much information about the potential impact of OER on student learning.

Hilton (2016) conducted a literature survey on open educational resources and college textbook choices. He pointed out that increasing the price of textbooks has led to experimenting with or finding a substitute for OER. In this paper, Hilton synthesizes the results of 16 studies that examined the influence of OER on students' learning and outcomes, as well as the perceptions of college students and instructors about OER. This study revealed that students typically achieve the same learning outcomes when OER is used and instantly saves outstanding amounts. Also, he noted that students and faculty were sanguine about OER.

Arcos et al. (2014) conducted a survey study that served as the basis for the report, "OER Evidence Report 2013–2014: Building Understanding of Open Education." They have conducted a survey and collected data from informal learners, formal learners, educators, and librarians; they took n = 6046 samples and analysed them. They discovered that OERs improved students' satisfaction and grades, helped them complete the course of study, and reduced the cost of study materials. They mentioned that the overall impact of OER is positive.

There was no found any study on impact measure of open educational resources in India.

4. METHODOLOGY

A survey was undertaken at IIT Jodhpur to examine the impact of Open Educational Resources (OER) on higher education. The scope of this study includes undergraduate students, postgraduate students, and research scholars at IIT Jodhpur. The sample for this study consists of undergraduate and postgraduate students, as well as research scholars at IIT Jodhpur. Data collection for this study involved the administration of a standardized questionnaire. The acquired data was examined using suitable statistical methods.

4.1 Scope and limitation

Though the scope of the study is vast, for the purpose of focus and precision, it was limited to the students at IIT Jodhpur.

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4.2 Sampling

In the Academic Year 2023-24, there are approximately 4700 undergraduate and postgraduate students, as well as research researchers, registered in various programs at IIT Jodhpur. This survey selected students enrolled at different academic levels. A survey questionnaire was sent via email to a total of 300 students (n=300), and 26 of them, accounting for 8.67% of the total, replied.

4.3 Research Instrument

A web-based structured questionnaire was created using the QuestionPro survey software. The object was divided into two distinct pieces. Section 1 is designated for gathering fundamental details about participants, including their name, email, age group, gender, and programme. Section 2 is dedicated to gathering data on Open Educational Resources (OER). It consists of three closed-ended questions with binary "yes or no" answers, four multiple-choice questions, and three questions using a scale called Likert.

4.4 Data Collection

The data was collected through an online structured questionnaire that was distributed to the participants by email.

4.5 Data Analysis and Interpretation

The data acquired from the online structured questionnaire need both qualitative and quantitative statistical analysis. Consequently, the data was systematically arranged, compiled, and subsequently examined using QuestionPro and Microsoft Excel.

4.5.1 Section I: Basic Information

The demographic data of the respondents, which was gathered via the questionnaire, has been organised and explained in the following table.

Table 1: Gender-wise distribution of respondents

Gender	**No. of Respondents**	**Percentage (%)**
Male	22	84.62%
Female	4	15.38%
Transgender	0	0.00%
Grand Total	**26**	**100.00%**

Table 1 shows the gender-wise distribution of respondents. Out of the 26 respondents, 22 are male (84.62%), 4 are female (15.38%), and 0 transgender.

Table 2: Age group-wise distribution of respondents

Age Group	**No. of Respondents**	**Percentage (%)**
Below 17 Years	0	0.00%
17-20 Years	11	42.31%
21-25 Years	10	38.46%
26-30 Years	3	11.54%
31-35 Years	1	3.85%
35-40 Years	0	0.00%
Above 40 Years	1	3.85%
Grand Total	**26**	**100.00%**

Table 2 shows the age group-wise distribution of the respondents. Out of the 26 respondents, 11 (42.31%) respondents fall in the 17-20 years age group, 10 (38.46%) fall in the 21-25 years age group, 3 (11.54%) fall in the 26-30 years age group. None fall into the Below 17 and 35-40 age groups.

Table 3: Program level of respondents

Program Level	**No. of Respondents**	**Percentage (%)**
Undergraduate	16	61.54%
Postgraduate	7	26.92%
Research Scholar	3	11.54%
Other	0	0.00%
Grand Total	**26**	**100.00%**

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Table 3 shows the program level of the respondents. Out of the 26 respondents 16 (61.54%) undergraduate students, 7 (26.92%) postgraduate students and 3 (11.54%) research scholars. None of in the other. A majority respondents were undergraduate students.

Table 4: Discipline-wise distribution of respondents

Discipline	No. of Respondents	Percentage (%)
Humanities & Social Sciences	2	7.69%
Science	5	19.23%
Engineering & Technology	18	69.23%
Management & Commerce	1	3.85%
Medical & Health Sciences	0	0.00%
Grand Total	**26**	**100%**

The above Table 4 shows discipline wise respondents' distribution. Total 26 respondents, out of them 18 (69.23%) form Engineering & Technology, followed by 5 (19.23%) from science and 2 (7.69%) from Humanities & Social Sciences. The engineering and technology disciplined students significantly took part in the survey.

4.5.2 Section II: Information about the awareness and impact of Open Educational Resources

Table 5: Use of openly/freely accessible educational resources

Response	No. of Respondents	Percentage (%)
Yes	22	84.62%
No	4	15.38%
Grand Total	**26**	**100%**

Table 5 shows, while 84.62% of the students at IIT Jodhpur are using openly/freely accessible educational resources in their course of study, 15.38% students are not.

Table 6: Awareness about the term "Open Educational Resources"

Response	No. of Respondents	Percentage (%)
Yes	18	69.23%
No	8	30.77%
Grand Total	**26**	**100%**

Table 6 reveals, while 69.23% of respondents have heard the term "Open Educational Resources (OER)", 30.77%% of respondents have not heard the term.

Table 7: Awareness on Copyright/ Licensing

Types of Copyrights/Licenses	n	Aware		Somewhat aware		Unaware	
Public Domain	26	10	38.46%	13	50.00%	3	11.54%
Creative Commons	26	7	26.92%	11	42.31%	8	30.77%
All Rights Reserved	26	11	42.31%	12	46.15%	3	11.54%
BSD License	26	2	7.69%	9	34.62%	15	57.69%
GNU General Public License (GNU GPL	26	5	19.23%	10	38.46%	11	42.31%

Table 7 shows the level of awareness on copyright and various licensing. Out of 26 respondents, 38.46% of respondents aware, 50% of respondents somewhat aware about the concept of "Public Domain" license. While 42.31% of respondents somewhat aware and 30.77% of Unaware on "Creative Commons." With "All right reserve" a traditional copyright, 42.31% of respondents aware, 46.15% of somewhat aware, and 11.54% of respondents not familiar. Two more open licensing for open source, "BSD license" and "GNU General Public License", 34.62% and 38.46% of respondents somewhat aware and 57.69% & 42.31% of respondents unaware or not familiar with the concepts respectively. Overall, the awareness about the Creative Commons, BSD License and GNU GPL is very less and Public Domain and All rights reserved is comparatively moderate among the respondents. However, they were not very clear about the concepts of copyright and licensing.

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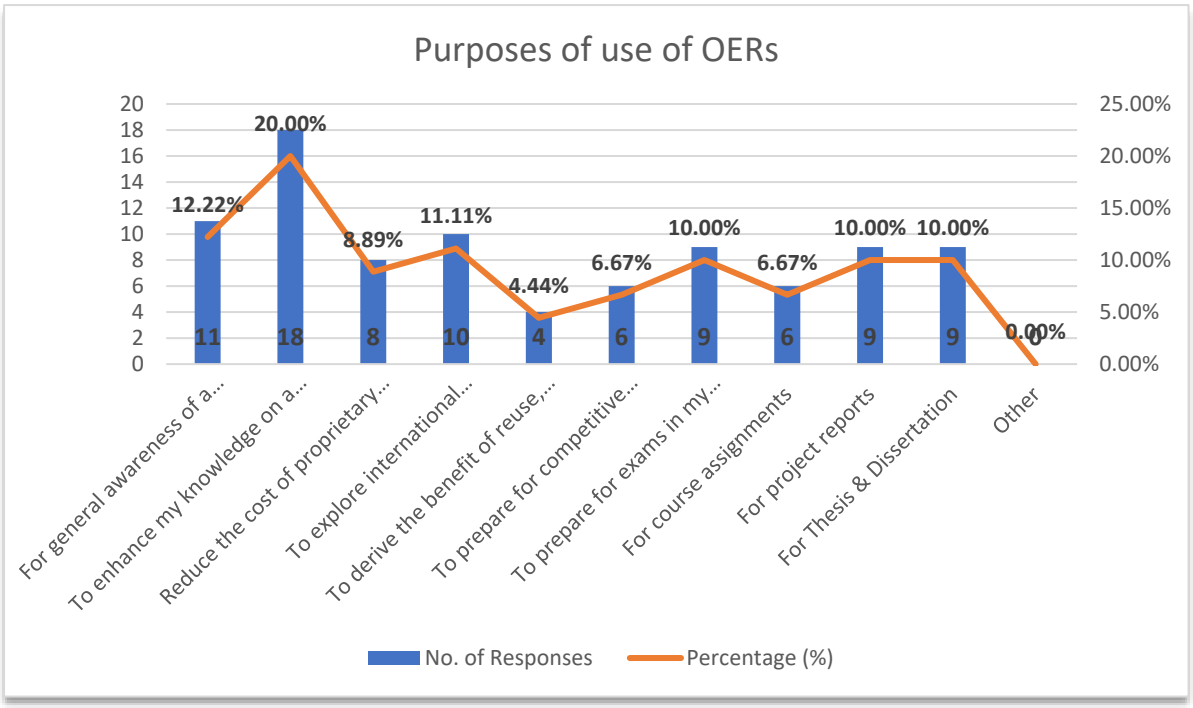

Figure 1: Purposes for using Open Educational Resources

The Figure 1 shows the purposes for using open educational resources by students at IIT Jodhpur. A majority of students at IIT Jodhpur using the OERs for enhancing the knowledge on a course (20%), general awareness on subject (12.22%) and exploring international instructor on subject or course (11.11%).

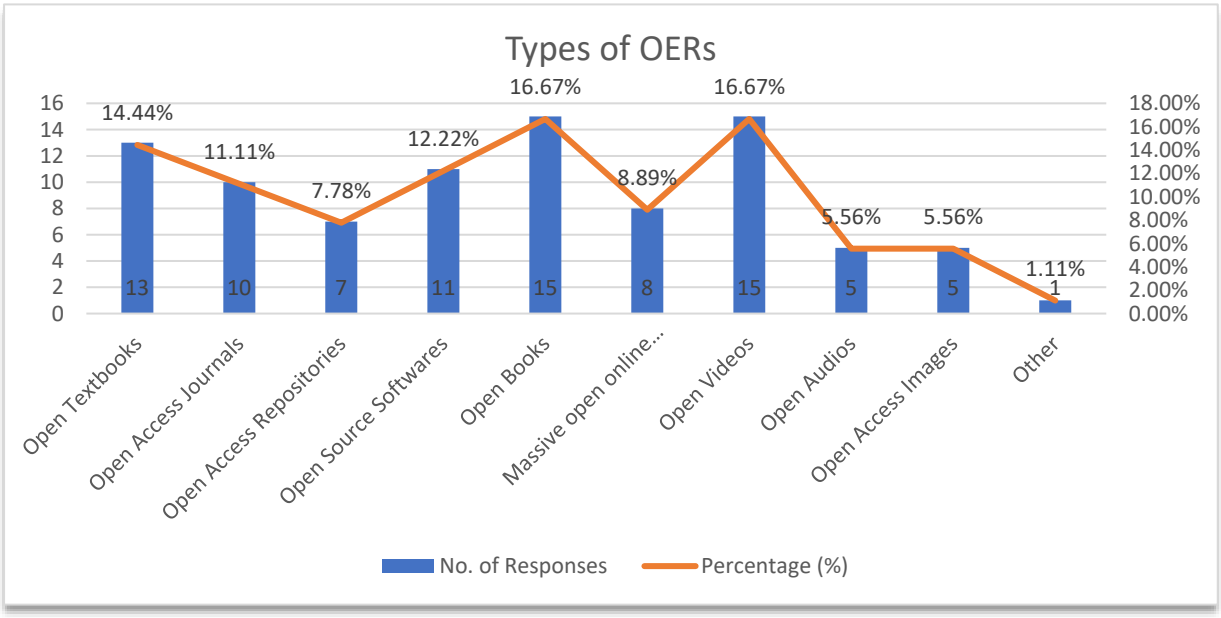

Figure 2: Types of Open Educational Resources Accessed/Used

Figure 2 shows the popular OERs among the students at IIT Jodhpur. The students at IIT Jodhpur preferred to accessed or used these resources Open Books (16.67%), Open Videos (16.67%), Open Textbooks (14.44%), Open Source Softwares (12.22%) and Open Access Journals (11.11%). It highlighted mix of preference of resources due to the respondents were difference categories such as undergraduate, postgraduate and research scholars. Overall, all major types of OERs used.

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Table 8: Impact of Open Educational Resources (heat-map)

Statement	SA	A	N	D	SD	Overall
Reduced cost of learning and research materials	6	10	9	0	1	26
	23.08%	38.46%	34.62%	0.00%	3.85%	100.00%
Greater range of learning methods	4	11	10	0	1	26
	15.38%	42.31%	38.46%	0.00%	3.85%	100.00%
Materials can be used flexibly	4	12	9	0	1	26
	15.38%	46.15%	34.62%	0.00%	3.85%	100.00%
Materials can be accessed at any time	7	10	8	0	1	26
	26.92%	38.46%	30.77%	0.00%	3.85%	100.00%
Materials can be adapted to suit our needs	3	10	11	1	1	26
	11.54%	38.46%	42.31%	3.85%	3.85%	100.00%
Use of resources for improving study skills	4	11	11	0	0	26
	15.38%	42.31%	42.31%	0.00%	0.00%	100.00%
Materials can be used for improving non-native language skills	4	12	10	0	0	26
	15.38%	46.15%	38.46%	0.00%	0.00%	100.00%
Materials are available in different languages	3	7	11	5	0	26
	11.54%	26.92%	42.31%	19.23%	0.00%	100.00%
Availability of culturally-relevant materials	4	4	16	2	0	26
	15.38%	15.38%	61.54%	7.69%	0.00%	100.00%
OERs sharpen and enhance my existing knowledge on subject and course	7	8	9	1	1	26
	26.92%	30.77%	34.62%	3.85%	3.85%	100.00%
It helps me to increase performance in mid-term and term end exam	5	10	9	1	1	26
	19.23%	38.46%	34.62%	3.85%	3.85%	100.00%
It supports to prepare assignments for course	4	11	10	1	0	26
	15.38%	42.31%	38.46%	3.85%	0.00%	100.00%
It helps me to increase performance in competitive exams	4	12	9	0	1	26
	15.38%	46.15%	34.62%	0.00%	3.85%	100.00%
I have developed new skill by using OER	5	9	10	1	1	26
	19.23%	34.62%	38.46%	3.85%	3.85%	100.00%
Min				Max		

**SA - Strongly Agree, A - Agree, N - Neutral, D - Disagree, SD - Strongly Disagree*

Table 8, a heat map, shows that a majority of respondents strongly agreed (23.08%) and agreed (38.46%) that OERs "reduce the cost of learning and research materials." A significant proportion (61.54%) agreed and strongly agreed with the statement "materials can be used flexibly." It indicates that OER offers cost-effective and adaptable alternatives to traditional learning resources. A substantial percentage of respondents (57.69%) agreed and strongly agreed that OER provides a "greater range of learning methods." This suggests that OER accommodates various learning styles and preferences, contributing to a more inclusive educational experience. Strong agreement (65.38%) in the data underscores the accessibility of OER resources, emphasising the ability to access materials at any time. Moreover, a significant proportion (50%) affirms that we can adapt materials to suit our needs, underscoring OER's flexibility in meeting diverse learning requirements. Respondents generally perceive OER positively in terms of its impact on academic performance. A considerable percentage agrees that OER enhances existing knowledge (57.69%), supports performance in exams and assignments (57.69%), and even contributes to skill development (57.69%). This suggests that OER can effectively complement traditional teaching methods and aid in achieving academic success. While there is agreement that OER materials are available in different languages (38.46%), there are mixed opinions regarding their cultural relevance. A significant proportion of respondents (61.54%) express neutrality or disagreement regarding the availability of culturally relevant materials. This highlights a potential area for improvement in ensuring that OER adequately addresses the linguistic and cultural diversity of students. However, there is room for improvement in addressing language diversity and cultural relevance to maximise the benefits of OER for all students.

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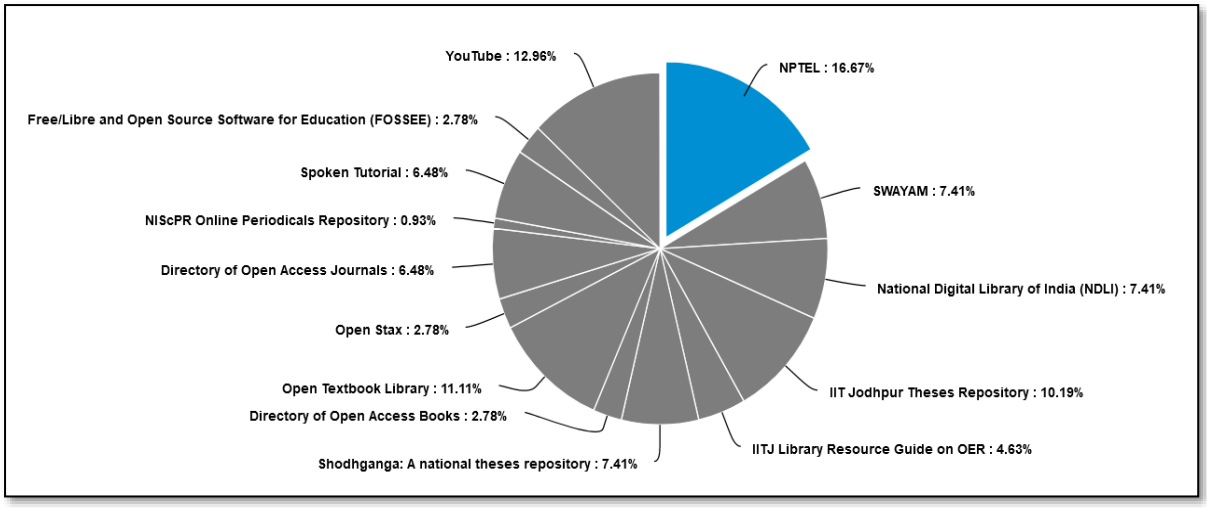

Figure 3: Use of OERs Platforms by Students at IIT Jodhpur

Figure 3 shows use of OERs by students at IIT Jodhpur which developed by various organisations of India and Global. A majority respondents use NPTEL (16.67%) MOOCS and YouTube (12.98%), Open Textbook Library (11.11%) and IIT Jodhpur Theses Repository (10.19%).

CONCLUSION AND RECOMMENDATION

The survey was initiated by the researchers with the intention of examining the level of familiarity among undergraduate students, postgraduate students, and research scholars at IIT Jodhpur regarding Open Educational Resources (OERs), as well as their understanding of copyright and open licensing concepts. Additionally, the researchers sought to identify the types of OERs that are commonly utilised and the purposes for which they are utilised. Furthermore, the study aimed to investigate the impact of OERs on the education of the groups of students and scholars.

Based on the data collected from the online structured questionnaire administered to the students at IIT Jodhpur and subsequent analysis, the following conclusions can be drawn.

1. The low rate of response from the female, and form postgraduate students and research scholars.
2. Most resources used by Engineering & Technology discipline; other disciplines have low rate of use of OERs.
3. There is a low to moderate familiarity about OERs and concepts of copyright and open licensing among all level of students at IIT Jodhpur.
4. The students used the OERs for enhancing their knowledge on subject & course and exploring international instructor on their subject and couse.
5. The respondents, majorly preferred to use open books, open textbooks, open-source software, and open access journals depending on their academic level and need.
6. The data received form respondents indicated that OER has a predominantly positive impact on higher education, particularly in terms of cost reduction, flexibility, accessibility, and academic performance enhancement. The NPTEL, YouTube, Open Textbook Library and IITJ Theses Repository and so on using by students.

The increasing number of open educational resources, including open courseware, open textbooks, open books, open access journals, and open video lectures, has gained significant momentum. Consequently, it is imperative to disseminate information about the accessibility of these resources to students at all levels. Furthermore, Open Educational Resources (OERs) have been found to have a significant impact on education. One of the key advantages is the cost-saving aspect, as OERs are freely available for use. Additionally, OERs provide increased availability, allowing learners to access educational materials at their convenience from any location. This flexibility in access contributes to the enhancement of academic performance. Moreover, OERs have been recognised as a valuable tool for the development of new skills. Libraries have the potential to play a significant role in curating lists of resources and featuring them on their websites. They can also disseminate information through regular email digests, providing links to domain-specific, subject-specific, and course-specific Open Educational Resources (OERs) in course guides. Additionally, libraries can utilise their social media platforms to

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reach a broader audience. In addition to employing passive methods, libraries have the option to engage in advocacy efforts to promote the availability of Open Educational Resources (OERs). This can be accomplished by incorporating information about OERs into the workshops that libraries organise for their users.

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