

[DOI: 10.20472/EFC.2025.025.007](https://doi.org/10.20472/EFC.2025.025.007)

VILAS B. GAIKAR

Smt. CHM. College, University of Mumbai, India

AN EVALUATIVE STUDY OF OPEN EDUCATIONAL RESOURCES (OERS) FOR OVERALL DEVELOPMENT OF UNDERGRADUATE STUDENTS IN MUMBAI METROPOLITAN REGION

Abstract:

Online education resources (OER) have advanced rapidly because of demand for personalised learning experiences, the spread of online education in the wake of the pandemic, and the intensifying rivalry in the industry. This paper aimed at understanding the awareness of undergraduate students towards the ever-evolving concept of OER. It studies the factors influencing use of OER along with the learning and development outcomes among undergraduate students.

In this study, a survey-based questionnaire was used to collect the data from 605 undergraduate students, who were selected from the Mumbai Metropolitan Region, India, through purposive sampling. It was supplemented with secondary data collected through various sources available in the public domain.

Through this study, it was found out that there is no significant difference between demographic factors and awareness about OER among undergraduate students. It also revealed that factors influencing the use of the OER platform are found to be a significant predictor. It suggests that with the positive increase in factors, the development of undergraduate students is expected to increase as well.

The awareness about OER platforms has considerably increased after the pandemic. Still, there are many undergraduate students who are hesitant to use OER due to factors like lack of proper internet connectivity and technical support, which affects their learning and development in return.

Keywords:

Open Educational Resources (OERs), Continuous learning, Skill enhancement

JEL Classification: A23, C00, I25

1 Introduction

1.1 Concept and context

Open Educational Resources (OERs) are the tools available freely for learning that can be used, changed, and shared. This gives both teachers and students access to high-quality educational knowledge. In 2002, UNESCO came up with the idea of open educational resources (OERs). Since then, many studies have been done to look into its possible pros and cons. There are many different kinds of resources in OERs, such as textbooks, lesson plans, videos, software, and other tools for learning. There are different ways to group things. For example, the 5R Framework splits OERs into groups based on what you can do with them i.e., Retain, Reuse, Revise, Remix, and Redistribute by Wiley (2014). Retain is to create, possess, and manage content. Reuse is to utilise content in a variety of methods. Revise is the permissibility to modify, adapt, or alter the actual content. Remixing is to combine the original or altered content with other publicly available content to create something new. Redistribute is to make the content available for others in the form of original content, modifications or adaptations to others.

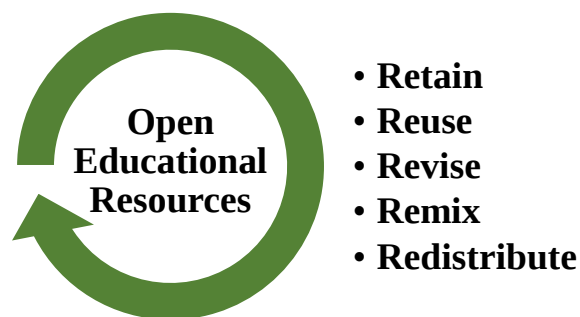


Figure-1: 5Rs of Open Educational Resources (Wiley, 2004)

Using OERs has many benefits, such as saving money, making information easier to find, and coming up with new ways to teach. Hilton et al. (2014) says that OERs can save money for both students and schools. Fischer et al. (2015) say that because OER costs less for students, it makes education more accessible. OERs can make it easier for low-income people to get an education Clements et al. (2012). OERs can help teachers come up with new ways to teach and work together.

Most people still don't use OERs as much as they could because of concerns about quality, copyright and licensing issues, and not having sufficient awareness about them (De los Arcos et al., 2016). Camilleri et al. (2014) say that the level of quality can change if there isn't a standard way to make sure it's good. People are less likely to use OER if they don't understand copyright and licensing (Atenas et al., 2015). (Belikov & Bodily, 2016) Many teachers don't know what OERs are or what they might be good for. Even though OER has benefits, it can be hard to use because not everyone knows about it, there aren't enough resources, and people worry about the quality (Cox et al., 2016).

OERs create a significant impact on Teaching and Learning. Research (Colvard et al., 2018; Feldstein et al., 2013; Wiley et al., 2016) has shown that OERs can have a positive effect on student learning results, student engagement, and retention rates. Colvard et al. (2018) found that when schools use OER, student performance, satisfaction, and interest all go up. De los Arcos et al. (2016) say that using OER can also lead to good changes in how teachers teach, like more collaboration and sharing of materials. (Allen et al., 2014) says that many teachers see OER as helpful for teaching and learning and as a way to support educational innovation.

1.2 Definitions

UNESCO, 2002 defines OER as *"Teaching, learning, and research resources that are in the public domain or have been released under an intellectual property license that lets others use them freely and change them."*

William and Flora Hewlett Foundation defines Open Educational Resources, (2015) as *"OER 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.'"*

OECD's Centre for Educational Research and Innovations in Open Educational Resources: A Catalyst for Innovation defines OER as, *"teaching, learning and research materials that make use appropriate tools, such as open licensing, to permit their free reuse, continuous improvement and repurposing by others for educational purposes."*

1.3 Historical Background

The term open content was first used by Wiley (2016) with respect to educational perspective. The term was first used at the UNESCO Forum on the Impact of Open Courseware for Higher Education in Developing Countries in 2002. With the aim of putting all its course materials online with open access, Open Course Ware was initiated by the Massachusetts Institute of Technology (MIT). This made more people like the idea. The Open Education Resources Commons then began in 2007. Many universities and schools now offer open courses, and one can find a lot of free teaching tools in OER repositories like OpenStax and OER Commons. Also, foundations with keen interest for the sake of development, like the Hewlett Foundation, the Gates Foundation, and the Open Society Foundations, have put money into OER projects to help them grow and spread.

In Indian context, with the joint efforts of IITs and IIMs, the first OER was launched with the name NPTEL, National Programme on Technology Enhanced Learning in early 2000. Eventually many such initiatives were introduced even under the banner of Government of India like Spoken Tutorial by Ministry of Human Resource Development, Government of India or the official MOOC platform for India – SWAYAM (Study Webs of Active-learning for Young Aspiring Minds). The use of OERs became inevitable during Covid-19. Its during this period when the University Grants Commission (UGC), highest regulatory body of higher education in India, encouraged the online teaching-learning process with the help of online tools like NPTEL, SWAYAM, Spoken Tutorial,

etc. Use of such e-learning platforms have been encouraged in the National Educational Policy, 2020 by Ministry of Human Resource Development, Government of India. As per the National Credit Framework, Ministry of Education of India, even online learning will benefit students with some credit points.

1.4 Present Study

With the advent of technology and ease of use, the perception about OER among students is positive Manju et al., (2021) whereas internet penetration and lack of awareness still acts as a major barrier in the usage of OER Datt et al., (2021). This paper aims to provide a gist of awareness about various OER platforms among Undergraduate students and the factors simulating the inclination of them towards OER in the Mumbai Metropolitan Region. Further, it also presents the learning and development outcomes among students after the use of OER.

1.4.1 Objectives:

- 1) To understand the awareness about different OER platforms among Undergraduate students.
- 2) To study the factors affecting the preference towards OER among Undergraduate students
- 3) To examine the development of Undergraduate students due to the use of OER.

2 Review of Literature

A systematic study of the literature on the progress of open educational resources (OER) in Africa used content and bibliometric analysis to look for patterns and trends in this growing field. It found three main themes: policy and institutional structures, how OER is used and what effect it has, and how OER is made and stays around. The paper has information about OER in Africa and shows where infrastructure and funding need to be improved. Tlili et al., (2022). Oliveira et al. (2021) identify quality models unique to different OER contexts, including Massive Open Online Courses (MOOCs) and OpenCourseWare (OCW). These methods offer prescriptions or structures for assessing and certifying OER content. The paper explores the identification of critical quality features for the openness characteristics of OER in addition to presenting quality models. Retaining, repurposing, remixing, revising, and redistributing educational resources are a few of these abilities. OER are more successful and of higher quality overall when these traits are recognized and taken into account during creation and evaluation. The study of Tshabalala et al., (2020) looks into how using OERs might help students achieve their academic goals. According to the study, a sizable percentage of students felt that using OERs helped them retain knowledge and challenge their thinking. Investigations were also conducted into how students felt using OERs improved their educational experience. The usage of OERs for idea clarification, the improvement of critical thinking abilities, and data analysis satisfied several students.

With the number of disabled students growing all over the world, schools and colleges are not doing a good job of meeting their learning needs. In this kind of case, Open Educational Resources

(OER) and Open Educational Practices (OEP) have a lot of potential to help disabled students learn in a way that is easy for them to do. Overall, the study gives important information about the problems disabled students face when trying to get an education and how OER and OEP can help. Zhang et al., (2020). Appiah et al.'s (2020) study found that most teachers and students at Kumasi Technical University knew about OERs and thought they were good, but they didn't use them very often. The writers think this could be because people don't have enough access to technology, don't know how to use open educational resources (OERs), or think that OERs aren't as good as traditional tools. Even though teachers know a lot about OER, another study showed that they don't use it very often. The study also found some problems with accepting and using OER, such as worries about its quality and value, a lack of technical skills and training, and problems with copyright and licensing Peregrino et. al (2020).

The study by Tlili et al. (2020) examines the development of sustainability models for OER by reviewing previous research and soliciting the opinions of subject-matter experts. Several factors, including the financing scheme, institutional and individual support for OER, and the degree to which OER corresponds with educational objectives, have been identified as contributing to the sustainability of OER. It also emphasizes the necessity of a comprehensive OER sustainability strategy that involves policymakers, instructors, students, and technology providers. As a response to the Covid-19 crisis, China built and started using a huge number of online education sites. Zhou et al. (2020) talk about how many students were able to get educational material and take part in virtual classes from their homes because of these platforms. China says that its online learning system is the biggest in the world because it is so big and easy to use. The piece talks about the ways that China can use online education. It talks about how digital tools like livestreaming, video conferencing, and educational apps can be used to give educational content and make learning more interactive. It also shows how important it is for teachers to change how they teach and use technology to connect with kids who live far away.

Colvard et. al., (2018) study looks at how OER changes how well students learn, how long they stay in school, and how often they pass it. The data show that these educational outcomes are better when OER are used. The author Salem Jr., J. A. (2017) talks about how college libraries help with these kinds of projects and how important it is for libraries, professors, and other stakeholders to work together. The article talks about how OER and programmes for making and using cheap course materials could help students stay in school and get their degrees. Seaman et al. (2017) looks at what teachers think about using open educational resources (OER) and what they do about it. It talks about the reasons why teachers decide to use OER or not, as well as the pros and cons of doing so. The study by Wiley, D., et al. (2017) measures how well students learn when they use traditional textbooks and when they use open textbooks. The study is about how science is taught. The results show that students who use open textbooks do as well or better than their peers who use traditional texts. Arinto, P. B. (2017), wrote a paper about how and why OER are used in Southeast Asia. It looks at the problems and benefits of using OER in the area and explains how OER is used there.

Hilton, J. (2016) did a thorough review of studies that looked at how useful OER use was and how people felt about it. It talks about how using OER saves money, how learning works, and how teachers and students feel about it. Hewlett Foundation released a report in 2015 that gave an outline of the OER research that had already been done. It explains how OER helps kids do better in school, gives them access to education, and saves money. The study also talks about issues, such as making sure it is of good quality and will last. Hilton, J. (2016) in studies about how well OER work and how people feel about them compared to standard textbooks in its report. It says that the biggest benefits of OER are that they save money, help kids do better, and make teachers feel good. But it also says that it's important to answer questions about quality and how much time staff members spend teaching. Belikov et al. (2016) look at the pros and cons of using OER from a staff member's point of view. The study looks at how teachers feel about using OER by using a qualitative analysis. It looks at what makes people want to use or not want to use OER and gives important information about how teachers feel about OER adoption. (De los Arcos et al., 2016) share the results of a global survey of K–12 teachers about how they use open educational tools. The study looks at how teachers feel about changing OER to make learning more personal. It shows the good and bad things about using open educational tools in grades K–12. Fischer et al. (2015) look at what happens when different schools use open textbooks. The data show that students who use open textbooks do just as well as, or even better than, their friends who use traditional textbooks. When they use open textbooks, they also save a lot of money.

The survey data from the study by Allen et al. (2014) show how OER are used in higher education in the U.S. Even though many teachers think that OER and its possible benefits are good, not everyone is able to use it because they don't know about it or are worried about its quality. The Consortium of Academic and Research Libraries in Ghana (CARLIGH) has spent a lot of money on OERs, but there hasn't been a full look at how they are used. Camilleri et al. (2014) look at the problems with quality in Open Educational Resources right now. The European Commission's Joint Research Centre asked for the study, which gives an overview of concerns about the quality of OER. It talks about things like quality factors, quality markers, and ways to make sure quality in OER. Hilton III et al. (2014) look at how using free training tools over the course of two semesters can save money. The study looks at how much it costs to use OER and how much it costs to use regular texts. It shows how saving money can be done by using open educational materials (OER). Wiley (2014) talks about the "Access Compromise" and the idea of the "5th R" in the context of open educational materials (OER). The blog post talks about how important it is to make sure that teaching tools are both cheap and easy to get. De los Arcos, et al. (2014) shows how OER changes teaching and learning, including how it could save money, make education more accessible, and help students do better in school. The authors emphasize how important it is to keep doing research on OER to build up a strong body of data.

Feldstein et al. (2013) did a study and found that students who used OER saved an average of \$128 per course. In their 2016 study, Cox et al. look at how institutional culture and policy affect how open educational resources (OER) are used in South African colleges. The writers say that a good implementation of OER needs to take into account structural, cultural, and individual factors.

Hilton III et al. (2013) look at how the maths department of a community college used free educational tools. The study looks at a maths department's choice to use OER as a case study. It talks about why the choice was made, what went wrong, and what happened as a result. It shows how one group used OER and what they learned from it. Clements et al. (2012) look at what teachers think about re-use, quality, and trust as a way to focus on quality for OER that is geared towards the user. The study looks at what teachers think about how OER can be used again and how good it is, as well as what makes them believe in OER. It shows what the user needs to do to figure out how good OER is and how to evaluate it. The article by Caswell et. al., (2008) looks at how OER could help make education easier for everyone. It talks about the pros, cons, and policy effects of using OER in different educational situations. The focus is on how important it is to work together and make sure the quality is good. A lot of research has been done on how using OER can save money. Open educational resources (OER) can help students save a lot of money, according to many studies.

2.1 Hypotheses of the study

H₀: There is no significant difference between demographic factors and awareness about OER among Undergraduate students.

H₀: There is no significant prediction of development of Undergraduate students due to the use of Open Educational Resources (OER) by level of awareness about different OER platforms and factors affecting the preference towards OER among Undergraduate students.

3 Research Methodology

The present study includes the use of both primary and secondary data. The primary data was collected with a survey method from 605 undergraduate students which were selected from the Mumbai Metropolitan Region, India through purposive sampling. Structured questionnaire was formed to understand the level of awareness and the factors influencing usage of OER. Moreover, it was also aimed to understand the learning and development outcomes among undergraduate students due to the use of OER. Secondary data was collected through various sources available on public domains like Ministry of Education of India, National Education Policy 2020, Government of India, reports, journals, etc.

4 Results and Discussions

4.1 Descriptive Statistics

Table 1: Demographic profile

Category	Respondent	Number of Respondents	Percentage
Age Group	Below 18 years	12	2.0
	18 to 20 years	458	75.7
	Above 20 years	135	22.3
Gender	Male	233	38.5
	Female	372	61.5
Stream	Arts	62	10.2
	Commerce	471	77.9
	Science	50	8.3
	Engineering	2	0.3
	Technology	20	3.3
Location of College	Thane	280	46.3
	Mumbai	319	52.7
	Navi Mumbai	6	1.0
Parents' Occupation	Public Sector	115	19.0
	Private Sector	262	43.3
	Any other	228	37.7
Monthly Family Income	Below Rs. 5,000	9	1.5
	Rs. 5,000 to Rs. 10,000	82	13.6
	Rs. 10,000 to Rs. 20,000	176	29.1
	Rs. 20,000 to Rs. 40,000	168	27.8
	Above Rs. 40,000	170	28.1

Source: Calculated from the primary data collected through questionnaire.

Table 2: Descriptive Statistics

Category	N	Mean	Median	SD	Skewness	Kurtosis	W	p
Age Group	605	2.2	2	0.45	0.7962	0.278	0.6	< .001
Gender	605	1.61	2	0.49	-0.4733	-1.782	0.62	< .001
Stream	605	2.09	2	0.7	2.2686	8.092	0.58	< .001
Location	605	1.55	2	0.52	0.0261	-1.497	0.67	< .001
Parents' Occupation	605	2.19	2	0.73	-0.3045	-1.083	0.8	< .001
Monthly Income	605	3.67	4	1.07	-0.2841	-0.883	0.88	< .001

Source: Calculated from the primary data collected through questionnaire.

Overall, the descriptive statistics represents data of 605 undergraduate students. The variable age group is showing mean statistics = 2.2, standard deviation = 0.449, skewness statistic is 0.7962 which shows data is moderately skewed and kurtosis statistic is 0.278 indicating less peaked i.e., platykurtic as the respondents are majorly from the age group of 18 to 20 years. From overall 605 respondents, 38.5% (n=233) were males and 61.5% (n=372) were females with a mean statistic of 1.61, standard deviation of 0.487, skewness = -0.4733 indicating left skewed data and kurtosis = -1.782.

In the case of the students belonging to various streams skewness is 2.2686 and kurtosis is 8.092 indicating more peaked distribution i.e., leptokurtic. The reason for this large departure is that the respondents are majorly from commerce stream.

In case of other variables, the skewness and kurtosis are within the desirable range.

To decide the normality of the data, Shapiro Wilk Test was used. The w-values of Shapiro Wilk Test are greater than 0.5 and p-value is less than 0.001 for all the above variables which indicates that the data is not normally distributed.

Table 3: Reliability Statistics

Construct	Number of Items	Cronbach's Alpha
Factors	06	0.835
Learning and Development Outcome	05	0.888

Source: Calculated from the primary data collected through questionnaire

The Cronbach's Alpha is used to measure internal consistency of the data. Cronbach's Alpha was evaluated as per the guidelines of George and Mallery (2018) where value of alpha greater than 0.8 is considered as good. In this study, the value of α is calculated for the items of two constructs. The first construct is factors affecting use of open educational resources which is measured by 6 items and the value of $\alpha = 0.835$. Further the second construct is learning and development outcomes which is measured by 5 items and the value of $\alpha = 0.888$. These values shows that there exists good internal consistency between different items.

1.2 Testing of Hypotheses:

H₀: There is no significant difference between demographic factors and awareness about OER among Undergraduate students.

Table 4: Age Group and awareness

Kruskal-Wallis			
	χ^2	df	p
Swayam – NPTEL	2.430	2	0.297
Spoken Tutorial	0.336	2	0.846
Coursera	0.121	2	0.942
Udemy	0.113	2	0.945
Unacademy	5.782	2	0.054
YouTube	1.220	2	0.543
Open access journals	0.274	2	0.872
Open textbooks (online books)	3.346	2	0.188

Table 5: Gender and awareness

Kruskal-Wallis			
	χ^2	df	P
Swayam – NPTEL	2.73164	1	0.098
Spoken Tutorial	0.06303	1	0.802
Coursera	0.04458	1	0.833
Udemy	6.50995	1	0.061
Unacademy	0.59671	1	0.44
YouTube	0.17466	1	0.676
Open access journals	0.00461	1	0.946
Open textbooks (online books)	1.89288	1	0.169

Kruskal-Wallis Test applied to test the significant difference between two demographic variables viz., Age Group and Gender and awareness about OER among undergraduate students. In table 3, the p-value is greater than 0.05 for all the items which shows that there is no statistically significant difference between age group and awareness about OER. Similarly, in table 4, the p-value is greater than 0.05 for all the items which shows that there is no statistically significant difference between gender and awareness about OER. Therefore, we fail to reject the null hypothesis which means there is no significant difference between demographic factors and awareness about OER among undergraduate students.

H₀: There is no significant prediction of development of Undergraduate students due to the use of Open Educational Resources (OER) by level of awareness about different OER platforms and factors affecting the preference towards OER among Undergraduate students.

Table 5: Linear Regression

Model Fit Measures										
							Overall Model Test			
Model	R	R ²	Adjusted R ²	AIC	BIC	RMSE	F	df1	df2	p
1	0.642	0.412	0.41	2818	2836	2.47	211	2	602	< .001

Omnibus ANOVA Test					
	Sum of Squares	df	Mean Square	F	p
Awareness about different OER platforms	0.609	1	0.609	0.0994	0.753
Factors influencing the use of OER platform	2560.182	1	2560.182	418.0727	< .001
Residuals	3686.512	602	6.124		
Note. Type 3 sum of squares					

Model Coefficients - Development of Undergraduate students due to the use of Open Educational Resources (OER)				
Predictor	Estimate	SE	t	p
Intercept	6.9029	0.6757	10.215	< .001
Awareness about different OER platforms	0.019	0.0602	0.315	0.753
Factors influencing the use of OER platform	0.5554	0.0272	20.447	< .001

Data Summary				
Cook's Distance				
			Range	
Mean	Median	SD	Min	Max
0.00221	5.03E-04	0.00816	2.61E-07	0.111

Assumption Checks		
Durbin–Watson Test for Autocorrelation		
Autocorrelation	DW Statistic	p
-0.00114	1.95	0.542
Collinearity Statistics		
	VIF	Tolerance
Awareness about different OER platforms	1.01	0.995
Factors influencing the use of OER platform	1.01	0.995
Normality Test (Shapiro-Wilk)		
Statistic	p	
0.965	0.075	

The test the hypothesis regression analysis was applied and following is the result,

1. Model Fit Measures:

- The model explains 41.2% of the variance in the development of undergraduate students due to the use of OER, as indicated by the coefficient of determination (R^2) of 0.412.
- The adjusted R^2 value of 0.41 suggests that the model adjusts for the number of predictors and provides a more reliable estimate of the variance explained.
- The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values of 2818 and 2836, respectively, suggest that the model provides a relatively good fit compared to alternative models with higher AIC and BIC values.
- The root means square error (RMSE) value of 2.47 represents the average difference between the observed and predicted values of the development of undergraduate students due to the use of OER.

2. Omnibus ANOVA Test:

- The overall significance of the model is assessed using the omnibus ANOVA test, which examines the significance of each predictor and the residuals.
- In this case, the results indicate that neither "Awareness about different OER platforms" nor "Factors influencing the use of OER platform" are statistically significant predictors of the development of undergraduate students due to the use of OER.

3. Model Coefficients:

- The intercept term represents the expected level of development of undergraduate students due to the use of OER when all predictors are zero, and it is estimated to be 6.9029.
- The coefficient for "Awareness about different OER platforms" is estimated to be 0.019, but its non-significant p-value of 0.753 suggests that it does not have a meaningful impact on the development of undergraduate students due to the use of OER.
- On the other hand, the coefficient for "Factors influencing the use of OER platform" is estimated to be 0.5554, and its highly significant p-value (< 0.001) indicates a strong and positive relationship with the development of undergraduate students due to the use of OER. In other words, as the factors influencing the use of OER platform increase, the development of undergraduate students is expected to increase as well.

4. Cook's Distance:

- Cook's distance measures the influence of each data point on the model. In this case, there are no extreme values, indicating that no individual data point has a substantial influence on the model's results.

5. Assumption Checks:

- The Durbin-Watson test suggests no significant autocorrelation in the residuals, indicating that the assumption of independence of observations is likely met.
- The collinearity statistics (VIF and Tolerance) for both predictors are close to 1, suggesting that there is no substantial collinearity issue between them.
- The normality test (Shapiro-Wilk) with a statistic of 0.965 and a p-value of 0.075 indicates that the residuals approximately follow a normal distribution, satisfying the assumption of normality.

In conclusion, the model provides a moderate level of fit for explaining the development of undergraduate students due to the use of OER. However, only the factor influencing the use of the OER platform is found to be a significant predictor, suggesting that as this factor increases, the development of undergraduate students is expected to increase as well. The assumption checks indicate that the model meets the assumptions of no autocorrelation, low collinearity, and approximate normality of residuals.

5 Proposed framework and Scope for future research

The present work studies the variables like awareness, factors and learning and development outcomes of OER. It has taken into account the factors inclining towards the usage of OER among the students from the Mumbai Metropolitan Region. The study outlines the learning and development outcomes among the undergraduate students due to the use of OER. This study can be used to identify the gaps to develop user friendly mHealth apps thereby delivering a satisfactory experience to its users. Moreover, the analysis shows the lack of awareness and training among the students which can be increased through improved

measures by parents, teachers and institutions. Additionally, this work has considered samples from a specific geographical location which can be further studied by taking into account other areas and segments. Future research can be extended by taking new variables or dimensions related to OER.

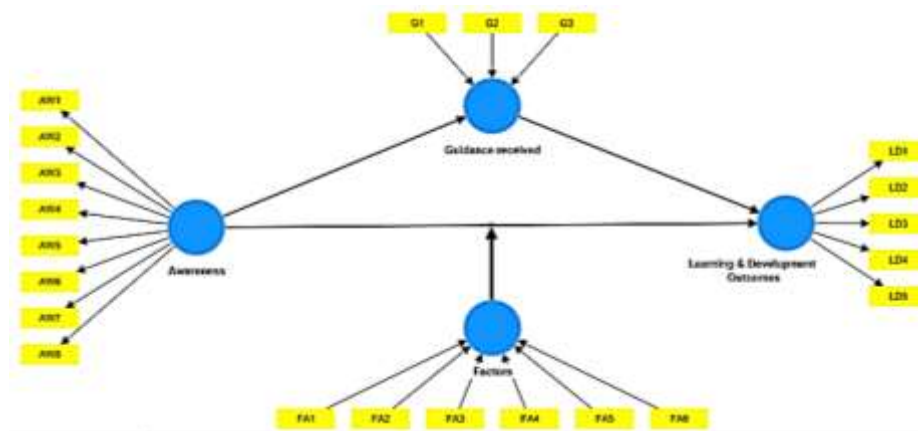


Figure-2: Proposed framework

6 Suggestions

The demand for more adaptable and convenient learning opportunities has led to a dramatic increase in the use of online learning platforms over the past year. As more people seek out convenient and distant educational opportunities, and as new technologies make it possible to create more personalised and engaging classroom settings, the demand for online learning platforms is only likely to rise in the coming years at the world market. The following suggestions can be taken into consideration which were observed during the time of study;

- Creating awareness among students about the availability of various OER platforms.
- Conducting training workshops for students so as to provide hands on experience to them.
- More initiatives by the government and institutions to provide low-cost platforms so as to reach mass audience.
- Provision of infrastructural facilities and technical support to students.
- Use of OER platforms to introduce skill based online courses and aligning it with credit points.
- Courses should be regularly updated so as to meet the recent requirements of the market.
- Open textbooks can be made available of all genres.

7 Conclusion

As per the Statista eservices report (2023), by the end of 2023, the online education market is expected to be worth \$4.73 billion. The market is expected to reach \$9.79 billion by the end of the forecast year (2027) and increase at a CAGR of 19.94% from 2023 to 2027. The online education market has increased substantially after the pandemic due to the ease of remote learning, cost effectiveness, etc. Still, it needs to be promoted to provide inclusive growth and easy access at a greater extent. Awareness about OER should be increased which will eventually increase the penetration of masses. Features like Knowledge upgradation and skill enhancement makes OER platforms popular among students. The role of parents, teachers and institutions plays a vital role in motivating and providing guidance to the students to take up the courses on various OER platforms. In this way, it will be a win-win situation for students as well as OER developers.

REFERENCES

- Allen, I. E., & Seaman, J. (2014). Opening the Curriculum: Open Educational Resources in US Higher Education, 2014. Babson Survey Research Group. <https://eric.ed.gov/?id=ED572730>
- Appiah, J., Essel, H. B., & Amankwa, K. O. (2020). An evocative appraisal of the awareness, attitude and utilisation of open educational resources at Kumasi Technical University. *Library Philosophy and Practice*, 1-18. <https://digitalcommons.unl.edu/libphilprac/3838>
- Arinto, Patricia & Hodgkinson-Williams, Cheryl & King, Thomas & Cartmill, Tess & Willmers, Michelle. (2017). Research on Open Educational Resources for Development in the Global South: Project landscape. Adoption and impact of OER in the Global South. <https://doi.org/10.5281/zenodo.1005330>.
- Atenas, J., Havemann, L. & Priego, E. (2015). Open Data as Open Educational Resources: Towards Transversal Skills and Global Citizenship. *Open Praxis*, 7(4), 377-389. International Council for Open and Distance Education. <https://doi.org/10.5944/openpraxis.7.4.233>
- Belikov, O. M., & Bodily, R. (2016). Incentives and barriers to OER adoption: A qualitative analysis of faculty perceptions. *Open Praxis*, 8(3), 235-246. <https://search.informit.org/doi/10.3316/informit.283536367861626>
- Camilleri, A. F., Ehlers, U. D., & Pawlowski, J. M. (2014). State of the art review of quality issues related to Open Educational Resources (OER). Joint Research Centre, European Commission. DOI: <https://doi.org/10.25656/01:9101>
- Caswell, T., Henson, S., Jensen, M., & Wiley, D. (2008). Open educational resources: Enabling universal education. *International Review of Research in Open and Distributed Learning*, 9(1), 1-11. <https://doi.org/10.19173/irrodl.v9i1.469>
- Clements, K., & Pawlowski, J. M. (2012). User-oriented quality for OER: Understanding teachers' views on re-use, quality, and trust. *Journal of Computer Assisted Learning*, 28(1), 4-14. <https://doi.org/10.1111/j.1365-2729.2011.00450.x>
- Colvard, N. B., Watson, C. E., & Park, H. (2018). The impact of open educational resources on various student success metrics. *International Journal of Teaching and Learning in Higher Education*, 30(2), 262-276. <https://eric.ed.gov/?id=EJ1184998>
- Cox, G., & Trotter, H. (2016). Institutional culture and OER policy: How structure, culture, and agency mediate OER policy potential in South African universities. *International Review of Research in Open and Distributed Learning*, 17(5), 147-164. <https://doi.org/10.19173/irrodl.v17i5.2523>

- Datt, G., & Singh, G. (2021). Acceptance and Barriers of Open Educational Resources in the Context to Indian Higher Education. *Canadian Journal of Learning and Technology*, 47(3). <https://doi.org/10.21432/cjlt28028>
- De los Arcos, B., Farrow, R., Perryman, L. A., Pitt, R., & Weller, M. (2014). OER evidence report 2013-2014. <http://oerresearchhub.files.wordpress.com/2014/11/oerrh-evidence-report-2014.pdf>
- De los Arcos, B., Farrow, R., Pitt, R., Weller, M., & McAndrew, P. (2016). Personalising learning through adaptation: Evidence from a global survey of K-12 teachers' perceptions of their use of open educational resources. *Journal of Online Learning Research*, 2(1), 23-40. <http://oro.open.ac.uk/46145/>
- Feldstein DPS, A. P., Martin, M., Hudson, A., Warren, K., Hilton III, J., & Wiley, D. (2012). Open textbooks and increased student access and outcomes. *European Journal of Open, Distance and E-Learning*. https://scholars.fhsu.edu/learning_tech_facpubs
- Fischer, L., Hilton, J., Robinson, T. J., & Wiley, D. A. (2015). A multi-institutional study of the impact of open textbook adoption on the learning outcomes of post-secondary students. *Journal of Computing in Higher Education*, 27, 159-172. <https://doi.org/10.1007/s12528-015-9101-x>
- Hilton III, J. L., Gaudet, D., Clark, P., Robinson, J., & Wiley, D. (2013). The adoption of open educational resources by one community college math department. *International Review of research in open and distributed learning*, 14(4), 37-50. <https://doi.org/10.19173/irrodl.v14i4.1523>
- Hilton III, J. L., Robinson, T. J., Wiley, D., & Ackerman, J. D. (2014). Cost-savings achieved in two semesters through the adoption of open educational resources. *International Review of Research in Open and Distributed Learning*, 15(2), 67-84. <https://doi.org/10.19173/irrodl.v15i2.1700>
- Hilton, J. (2016). Open educational resources and college textbook choices: A review of research on efficacy and perceptions. *Educational technology research and development*, 64, 573-590. <https://doi.org/10.1007/s11423-016-9434-9>
- M. M. de Oliveira, L. N. Paschoal and E. F. Barbosa, "Quality Models and Quality Attributes for Open Educational Resources: A Systematic Mapping," 2021 IEEE Frontiers in Education Conference (FIE), Lincoln, NE, USA, 2021, pp. 1-9. <https://www.dx.doi.org/10.1109/FIE49875.2021.9637309>
- Manju and Bhatt, Sunil Dr, "Impact Of Open Educational Resources Among The Students And Research Scholars In Delhi" (2021). *Library Philosophy and Practice (e-journal)*. 6286. <https://digitalcommons.unl.edu/libphilprac/6286>

- National Credit Framework, Ministry of Education of India, September 2022. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/National_Credit_Framework.pdf
- National Education Policy 2020, Government of India. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- OPEN EDUCATIONAL RESOURCES, Advancing Widespread Adoption to Improve Instruction and Learning, THE WILLIAM AND FLORA HEWLETT FOUNDATION, December 2015. Retrieved from <https://www.hewlett.org/wp-content/uploads/2017/02/OER-strategy-memo.pdf>
- Orr, D., M. Rimini and D. Van Damme (2015), Open Educational Resources: A Catalyst for Innovation, Educational Research and Innovation, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264247543-en>
- Peregrino, L. P., Caballes, D. G., & Javillonar, M. G. (2020). Public secondary school teachers' awareness of open educational resources (OER). *CiiT International Journal of Programmable Device Circuits and Systems*, 12(4), 76-80. https://www.researchgate.net/publication/349211283_Public_Secondary_School_Teachers'_Awareness_of_Open_Educational_Resources_OER
- Robinson, T. J., Fischer, L., Wiley, D., & Hilton III, J. (2014). The impact of open textbooks on secondary science learning outcomes. *Educational Researcher*, 43(7), 341-351. <https://doi.org/10.3102/0013189X14550275>
- Salem Jr, J. A. (2017). Open pathways to student success: Academic library partnerships for open educational resource and affordable course content creation and adoption. *The Journal of Academic Librarianship*, 43(1), 34-38. <https://doi.org/10.1016/j.acalib.2016.10.003>
- Seaman, J. E., & Seaman, J. (2017). Opening the Textbook: Educational Resources in US Higher Education, 2017. Babson Survey Research Group. <https://eric.ed.gov/?id=ED582411>
- Shear, L., Means, B., and Lundh, P. (2015). Research on Open: OER Research Hub Review and Futures for Research on OER. Menlo Park, CA: SRI International.
- Statista Digital Market Outlook - Segment Report, eservices report 2023 - online education. Retrieved from <https://www.statista.com/study/116028/eservices-report-online-education/>
- Stracke, C. M., Downes, S., Conole, G., Burgos, D., & Nascimbeni, F. (2019). Are MOOCs Open Educational Resources? A Literature Review on History, Definitions and Typologies of OER and MOOCs. *Open Praxis*, 11(4), 331-341. <https://eric.ed.gov/?id=EJ1251318>
- Tadesse, S., & Muluye, W. (2020). The Impact of COVID-19 Pandemic on Education System in Developing Countries: A Review. *Open Journal of Social Sciences*, 08(10), 159–170. <https://doi.org/10.4236/jss.2020.810011>

- Tshabalala, T. (2020). Students' attitudes to open educational resources (OERs). *International Journal of Social Sciences & Educational Studies*, 7(3), 9. <https://ijsses.tiu.edu.iq/wp-content/uploads/2020/09/Students%E2%80%99-Attitudes-to-Open-Educational-Resources-OERs.pdf>
- Tlili, A., Altinay, F., Huang, R., Altinay, Z., Olivier, J., Mishra, S., Jemni, M., & Burgos, D. (2022). Are we there yet? A systematic literature review of Open Educational Resources in Africa: A combined content and bibliometric analysis. In PLoS ONE (Vol. 17, Issue 1 January). Public Library of Science. <https://doi.org/10.1371/journal.pone.0262615>
- Tlili, A., Nascimbeni, F., Burgos, D., Zhang, X., Huang, R., & Chang, T. W. (2020). The evolution of sustainability models for Open Educational Resources: Insights from the literature and experts. *Interactive Learning Environments*, 1-16. <https://doi.org/10.1080/10494820.2020.1839507>
- UGC Guidelines on Examinations and Academic Calendar for the Universities in View of COVID-19 Pandemic and Subsequent Lockdown dt. 27th April, 2020. Retrieved from https://www.ugc.gov.in/pdfnews/4276446_UCG-Guidelines-on-Examinations-and-Academic-Calendar.pdf
- Wiley, D. (2006). "The Current State of Open Educational Resources". Retrieved from <http://opencontent.org/blog/archives/247>
- Wiley, D. (2014). "The Access Compromise and the 5th R". Retrieved from <https://opencontent.org/blog/archives/3221>
- Wiley, D., Williams, L., DeMarte, D., & Hilton, J. (2016). The Tidewater Z-Degree and the INTRO model for sustaining OER adoption. *Education Policy Analysis Archives/Archivos Analíticos de Políticas Educativas*, 24, 1-15. <http://dx.doi.org/10.14507/epaa.v23.1828>
- Zhang, X., Tlili, A., Nascimbeni, F., Burgos, D., Huang, R., Chang, T. W., Jemni, M., & Khribi, M. K. (2020). Accessibility within open educational resources and practices for disabled learners: a systematic literature review. In *Smart Learning Environments* (Vol. 7, Issue 1). Springer. <https://doi.org/10.1186/s40561-019-0113-2>
- Zhou, Longjun and Wu, Shanshan and Zhou, Ming and Li, Fangmei, 'School's Out, But Class' On', The Largest Online Education in the World Today: Taking China's Practical Exploration During The COVID-19 Epidemic Prevention and Control As an Example (March 15, 2020). *Best Evid Chin Edu* 2020; 4(2):501-519. <http://dx.doi.org/10.2139/ssrn.3555520>