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Educator Perspectives and Intention to Adopt OER in Teaching and Learning in Secondary Schools in Mauritius

Yousra Banoor Rabajalee[1], Bhavish Jugurnath[2] and Mohammad Issack Santally[2]

[2]*Mauritius Institute of Education*

[2]*University of Mauritius*

Abstract: There has been a growing interest in the use of Open Educational Resources (OER) to support educators to adapt, use, re-use, remix and recontextualise content for teaching and learning. The purpose of this study was to investigate the extent and intent of adoption of OER practices and tools in secondary schools in Mauritius within a sustainable and innovative teaching and learning model. The main objective was to investigate whether the inclusion of OER in teaching could help maintain quality instruction and sustain a viable economic model for learners. Moreover, this study assessed the readiness and attitudes of secondary educators in their intention to adopt OER. A survey was carried out among 271 secondary school educators to determine the influential factors in the intention to adopt OER in teaching. Factor and regression analysis were carried out to estimate the significance of each independent variable. The findings of this study reported that Productivity, Interactivity, Infrastructure and Constraining Factors were among the factors that had a significant effect on teachers' adoption of OER in their teaching process. Combined with other findings as reported in the literature, this study also helps to enlighten policymakers about teachers' intention in adopting OER in secondary schools in Mauritius and how they add value to the teaching and learning processes. The Cabinet of Ministers in Mauritius approved the National policy on OER in December 2022.

Keywords: OER, ICT, teachers, digital content, technologies, communication, UTAUT.

Introduction

ICTs in teaching and learning have brought important changes in the contemporary education context, where teachers have to adapt on one hand and address students' needs on the other (Joshi & Poudel, 2019; Grigoryan, 2020). At present, it can be observed that there is a growing and wide interest in ICTs to open access to education, academic content, and knowledge through Open Educational Resources (OER) (UNESCO, 2012; Kanwar, 2015). OER are essentially learning objects, which may be of different granularity (Santally & Senteni, 2005). They are designed to be freely and easily accessible to anyone. The accessibility of OER is particularly important where access to educational resources is limited (Krelja Kurelovic, 2016). OER can provide access to high-quality educational materials for learners who might otherwise have limited opportunities to learn. This includes learners in developing countries, remote areas, and marginalised communities (Oates & Hashimi, 2016). The open and accessible nature of OER helps to contribute to the teaching and learning process by supporting an improved quality of teaching as well as improving students' learning outcomes (Oates & Hashimi, 2016).

However, while learning objects are not necessarily 'open', OER are released mainly under open licences (for example, Creative Commons) and are available freely for educators and practitioners to adapt, use, reuse and re-contextualise at all levels of education, with a view to widen access to education. They can also be adapted to meet learners' needs in diverse ways (Weller et al., 2015). Moreover, given that they are openly licensed, educators can modify the OER to fit the specific needs of their students, including their cultural and linguistic differences. This allows educators to create content that is more relevant and engaging to their students to facilitate their learning (Trust et al., 2022). In addition, OER are designed to promote sharing among the educators' community. Educators are encouraged to share the OER they create and use with other educators and learners. This enables a global network of educators to collaborate and share best practices, which ultimately benefits both educators and students. The open and collaborative nature of OER helps to build a community of educators who can work together to create high-quality educational resources that are accessible to all.

The Massachusetts Institute of Technology (MIT) launched the Open Courseware (OCW) initiative in 2001, with the aim to offer and release a significant number of its courses as educational resources freely and openly on the internet. However, the licensing initially adopted was seen as a barrier for re-use and adoption in the academic sphere and the OCW initiative subsequently adopted the Creative Commons Licence in 2004 (Barrett et al., 2009). Similar initiatives for developing and using OER were being promoted by the Commonwealth of Learning, UNESCO, and the Open University (UK) via the OpenLearn platform (UNESCO, 2012; Butcher, 2015).

In the Mauritian context, one of the government's strategic objectives has long been to transform Mauritius into a cyber-island. For the education sector, this implies the integration of ICTs at all levels and the setting of policies that align the education systems to contemporary trends and practices. This includes the adoption and creation of OER for inclusive and equitable education. While the use of OER is growing in popularity among educators, its implementation from a pedagogical, economical, and institutional perspective, has been slow to formalise as it generally works in isolation and not really within well-established policy frameworks (Petrides et al., 2008; Littlejohn & Hood, 2017). For example, in Kenya, the uptake and reuse of OER in secondary and primary schools continues to be very low (Orwenjo & Erastus, 2018). As OER is still a relatively new concept, many educators and institutions are still learning about its potential benefits and challenges. Its implementation involves a paradigm shift in traditional educational practices, and there are a number of challenges that need to be addressed before adoption can take place (Orwenjo & Erastus, 2018). One of the main challenges is the lack of awareness and understanding of OER among educators, institutions, and policy makers (Miao et al., 2016). Many educators may not be aware of the potential of OER, and institutions may not have the expertise or educational structure to support the implementation of OER (Khanna & Basak, 2013). Policy makers become hesitant to support OER because of concerns, as identified by UNESCO (2010), about quality assurance mechanisms, copyright, sustainability strategies and the potential impact on traditional textbook publishers. Furthermore, there seems to have been significant development in many countries, which have either established OER strategies or adopted OER guidelines or even just become involved in the OER movement (UNESCO, 2019). However, while OER has the potential to expand access to education, it also remains uncertain as to whether there is adequate

availability of technology and infrastructure to support OER in low- and middle-income countries. For example, in many underdeveloped areas, internet access is limited or non-existent and this can contribute to a first-level digital divide among teachers (Hassler & Jackson, 2010). Similarly, Tang and Bao (2020) also explained how the second-level digital divide in education, such as the necessary digital literacy skills, can also contribute to a lack of efficiency in using and adapting OER by teachers in underdeveloped areas and, as such, this could limit the potential impact of OER on teaching and learning outcomes.

The Government of Mauritius approved in December 2022, the National Policy on Open Educational Resources. The objectives of the policy are as follows:

- Encourage and embed a culture of OER adoption and integration, including revision, remixing, repurposing, and reuse;
- Establish a framework to provide access and allow sharing of educational materials produced by public funds; and
- Share privately produced open educational materials through the issue of appropriate licenses.
- Furthermore, the policy stipulates that an online National OER policy would be set up to host and provide access to OER.

In this research, the aims were to investigate whether the inclusion of OER in the teaching and learning processes could help to maintain a good quality level, sustain a viable economic model with a reduction of cost for learners, increase access, and achieve the intended learning outcomes without any negative impact on the learners' experience.

Literature Review

OER were considered an innovative concept that would play an important role in 'ensuring wide access to quality higher education in developing countries and full participation of universities in these countries in the rapidly evolving world higher education system' (UNESCO, 2002, p. 24). Open Educational Resources were defined as resources that can be used and adapted by a community of educational practitioners and other users essentially for non-commercial purposes (UNESCO, 2002, p. 24; Rodríguez et al., 2017). OECD (2007, p. 30) defined OER as "digitized materials available freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research". OER as an educational initiative opened access to education whether at the primary, secondary, college or professional level (Prasad & Rao, 2016). In Mauritius, the Ministry of Education, Tertiary Education, Science and Technology has pledged for the development of a policy to promote a culture of using OER to increase and widen access to education at all levels. The goal is to ensure "inclusive and quality education for all and promoting lifelong learning" (Dookun-Luchoomun, IOREN International Conference Speech, 2015, n.p.). Moreover, it is also argued that adapting OER to the national educational landscape in Mauritian education could address the rate of failure and illiteracy at the primary level and promote the integration of ICT in the education system (Auckloo, 2014).

While the use of OER in secondary schools is not new, it has become more widespread in recent years due to advances in technology and changes in the way education is delivered (Tlili et al., 2021). The growth of digital resources and online platforms has made it easier for educators to access and share OER, and many schools are now actively promoting the use of OER as a way to

reduce costs, increase access, and improve learning outcomes for students. The study by Robinson et al. (2014), which investigated the use of OER in science subjects in secondary schools, explained that the adoption of OER would be appropriate for cost savings and educational achievement. Similarly, Wiley et al. (2012) conducted a study over two years, with middle and high school science teachers, and they also supported the cost savings element as well as the impact on the learning of students.

The adoption of OER in teaching in secondary education provides numerous potentials, including equitable access to education (Ngimwa & Wilson, 2012), personalised instruction (Hilton, 2016), reduction of educational cost for institutions and students (Hilton et al., 2014) and the empowerment of teachers' creativity (Mishra, 2012). However, there are also some challenges associated with using OER, such as technical expertise, quality control, and copyright issues (Tlili et al., 2021). Hence, to ensure successful implementation of OER in secondary schools, it is important for the teachers to receive professional development opportunities to support them in this transition.

The Ministry of Education and Human Resources in Mauritius has engaged in an initiative to release all textbooks for primary and lower secondary education free on the internet. This effort culminated in the official approval and endorsement of the National OER policy by the Government in December 2022. Furthermore, tablets have been distributed to students in primary and secondary schools in the context of curriculum digitisation. It has, however, been reported that the use of tablets has not been fully exploited in the classroom for the benefit of teaching and learning (Hurreeram & Bahadur, 2019; Jugee & Santally, 2016). This can create opportunities to reduce government expenditure, thus, providing the opportunity for the state to invest in other potentially more effective educational interventions. For secondary schools, the cost of curricular resources is usually passed on to students. It has been argued that those textbooks cost one fourth as much as tuition at public four-year institutions (Wiley et al., 2012). Therefore, with OER, it is often advocated that a more democratic and expanded access to education for all people could be provided, in line with the sustainable development agenda. As such, there should be a substantial savings on costs for the students without impacting negatively on their learning (Allen, 2010; Hilton & Wiley, 2011). However, simply by eliminating barriers such as costs, OER cannot possibly make knowledge more easily accessible (Luo et al., 2020). Some researchers postulate that with the adoption and use of OER, both formal and informal students could benefit from the flexibility of access to learning at no or low cost and such potential could contribute to both formal and informal education (Bossu & Tynan, 2011; Panke, 2011). On the other hand, Kanwar et al. (2010) reported that ease of accessing learning is not applicable to teachers and students in developing nations, where the constraints are not specifically due to physical access but also exist in terms of social, political and cultural values that restrict access. This is mostly significant to people who come from socio-economically deprived backgrounds or to school districts with limited curricula. Due to students' needs and the requirements of customised education resources, there can be some considerable limitations that arise as a substantial challenge to the implementation of OER (Kanwar et al., 2010). Therefore, lowering the cost of education does not necessarily make it more accessible.

Moreover, the development of OER also brings advantages to educational institutions, educators, and traditional and non-traditional learners (Zaid & Alabi, 2020). At the institutional level, leaders and policy makers can pilot programmes that lead to financial benefits to students (Weller et al.,

2015). They can also decide on the quality assurance mechanisms with respect to OER and the ways to facilitate access to students, especially those with disabilities (Bossu & Tynan, 2011). Similarly, educators can benefit by developing a pool of resources that can be used to review and adapt existing learning content. OER also supports open pedagogy development and application and encourages educators to collaborate and share teaching resources (Beetham et al., 2012). Researchers have mentioned that OER can assist educators to decrease teaching preparation time and allow more effort towards allowing students to engage with a better learning experience (Johnson et al., 2010; Willems & Bossu, 2012). The development of OER can also help educators to improve the quality of their teaching practices (Kanwar, 2015). However, one of the key difficulties faced by educators in the use and repurposing of OER is the absence of understanding with respect to copyright and intellectual property issues (Bossu & Tynan, 2011; Nikoi et al., 2011). It is important to understand that when the content is released openly or under any kind of license, certain aspects related to intellectual property rights remain a concern (Santally, 2011; Hylén, 2021). Consequently, the sustainability of OER activities in the long term can become a constraint to the host institution, especially as the nature and promise of OER is continually evolving in the landscape of teaching and learning (Smith & Wang, 2007). The use of OER was also found to improve students' performance, satisfaction and engagement (Weller et al., 2015). Similarly, Hilton (2016) postulated on the efficacy and use of OER, that both students and educators benefit in terms of reduced costs, improved learning outcomes and learning experience.

Technology Acceptance Model

The technology acceptance model is a useful framework for understanding users' attitudes and behaviours towards technology, and it has been widely applied in various research and practical settings. Percy and Belle (2012) investigated the factors that would influence teachers' attitudes in adopting OER in their teaching process. The study was carried out in Africa and the sample consisted of teachers from East, West and Southern Africa and a survey was used to gather information. A modified version of the UTAUT model was used to identify the impact of certain factors on an educator's intention to adopt OER. The result indicated that 'Performance Expectancy' and 'Effort Expectancy' had a positive influence on an educator's 'Behavioural Intention' to adopt and use OER, and 'Effort Expectancy' had a robust influence on the actual use of OER while 'Facilitating Conditions' was statistically insignificant. Moreover, the researchers laid emphasis on performance expectancy by indicating that OER could empower educators to accomplish teaching activities more rapidly and flexibly or even help them to build their teaching viability.

Mtebe and Raisamo (2014) studied the challenges and teachers' behaviour in adopting OER in Higher Education in Tanzania. The latter used the UTAUT model to stimulate educators' intention to adopt and utilise OER in their teaching processes. A sample size of 104 teachers was chosen randomly from five Higher Learning institutions in Tanzania. It was found that 'Effort Expectancy' had a significant positive effect on teachers' intention to adopt OER, while 'Performance Expectancy', 'Facilitating Conditions', and 'Social Influence' did not have a significant effect. Similary, Kandiero (2015) conducted a study with 45 full-time educators, examining their behaviour in adopting OER in Zimbabwe. The findings demonstrated that effort and performance expectancy had a positive influence on their intention to adopt and utilise OER. On the other hand, social influence and the facilitating conditions were not significantly correlated to their behavioural intentions towards OER.

Padhi (2018) examined the factors that could influence teachers' behaviour in adopting OER in India. The author focused on the UTAUT model, with data collected through surveys from 22 Indian universities. From this study it could be noted that the constructs 'Performance Expectancy' and 'Effort Expectancy' were positively significant and the constructs 'Social Influence' and 'Facilitating Conditions' were both insignificant. Thus, the result indicated that the variables 'Performance Expectancy' and 'Effort Expectancy' positively influenced teachers' behaviour in adopting OER in their teaching process.

Research Context and Methodology

The main purpose of this study was to investigate the factors influencing teachers' intention to adopt OER in their teaching and learning process. The research questions were addressed through a survey among secondary school educators to determine the influential factors in the adoption of OER, thus, using mainly a quantitative approach. The research design was based on the theoretical framework proposed by Venkatesh et al. (2003) and focused on the data-gathering methods used as shown in Figure 1 below:

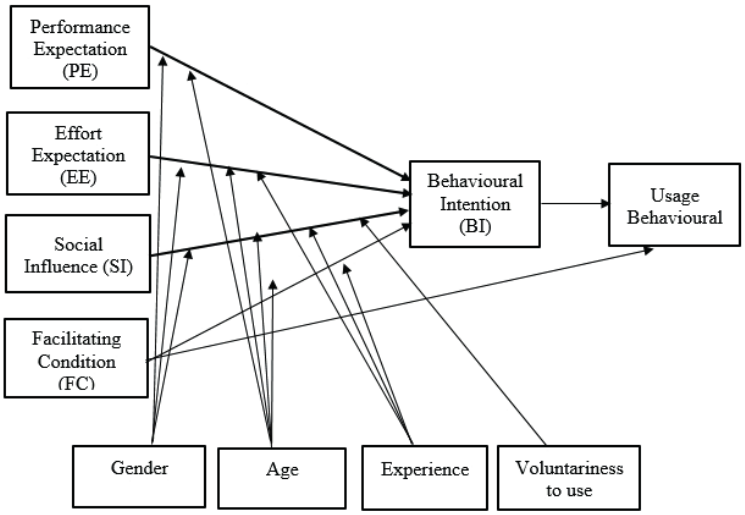

Figure 1: The UTAUT Model (Venkatesh et al., 2003).

Most studies that adopted the UTAUT (Unified Theory of Acceptance and Use Technology) model have either extended the model by including new factors, or reduced existing factors to suit a specific context of the research study. Similarly, this analysis extended the model to suit the context of OER adoption in the secondary schools of Mauritius as shown in the Figure 2 below:

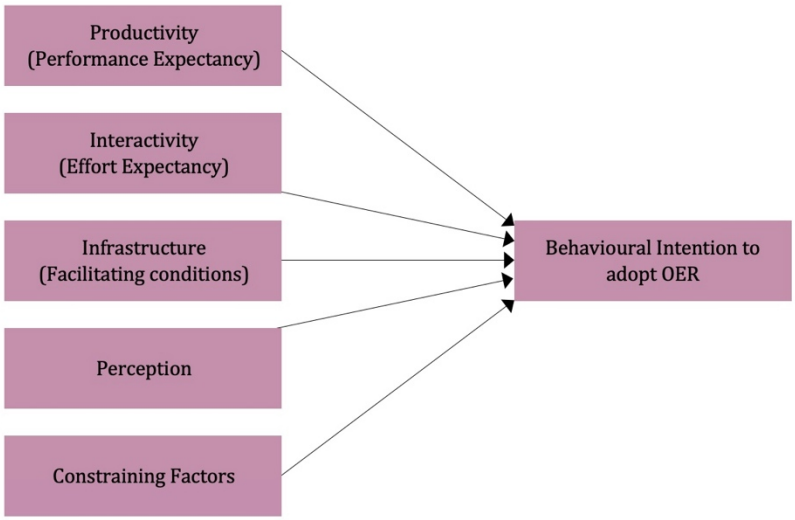

Figure 2: Research Model.

The UTAUT model was used as it provides a comprehensive framework to understand user behaviour with regards to various technologies and the model proposes that user acceptance and use of technology are influenced by five key factors:

1. Performance expectancy refers to the degree to which individuals believe that using a particular technology will them to perform their tasks more efficiently. As such, Productivity is seen as a type of performance expectancy, where the individual believes that using the technology will increase his ir her productivity to complete tasks quickly and accurately.
2. Effort expectancy refers to the degree to which an individual believes that using a particular technology will be easy and require minimal effort. Interactivity is considered as a type of effort expectancy, as the level of interactivity of a technology influences the perceived ease of use by the user.
3. Facilitating conditions are the necessary resources that can be used to support the use and acceptance of a particular technology. Infrastructure is a facilitating condition as it ensures the availability of infrastructural resources to support user acceptance and use of technology.
4. Perceptions are all those benefits and potential advantages that an individual perceives will be gained upon using the technology.
5. Constraining factors are all those challenges and barriers that impede the use of technology.

Research Questions

To achieve the objectives of this study, as highlighted in the introductory section, the following research questions were addressed:

1. What are the attitudes of the secondary educators with respect to the behavioural intention to adopt OER?
2. What are the facilitating conditions that secondary schools provide to educators to support the behavioural intention to adopt OER?
3. What are the constraints that educators might face in their behavioural intention to adopt OER at the secondary level?

The following hypotheses, which are consistent with the research questions, have been proposed:

- H_1: Perception is positively correlated with the behavioural intention to adopt OER
- H_2: Productivity is positively correlated with the behavioural intention to adopt OER
- H_3: Interactivity is positively correlated with the behavioural intention to adopt OER
- H_4: Infrastructure is positively correlated with the behavioural intention to adopt OER
- H_5: Constraining Factor is positively correlated with the behavioural intention to adopt OER

While H_1, H_2 and H_3 were the associated hypotheses with the RQ1, H_4 was associated with RQ2 and H_5 was associated with RQ3.

Data Subjects

For this study, the data subjects were educators (of all genders) in secondary schools for the year 2018. To estimate the required sample size while achieving representativeness, the margin of error and the level of confidence had to be agreed upon as these are important factors to take into account to obtain accurate estimates. The sample size of this study was calculated based upon Education Statistics (2017) and the number of educators enrolled in 2017 were 9,181. Therefore, the formula to achieve the required sample size is:

$$n = \frac{0.25\ x\ 9181}{0.25 + (9181)(0.05/1.96)^2} = 368$$

The 368 survey questionnaires were distributed to secondary school educators around Mauritius. However, only 271 were returned and were used for analysis. The questions in the survey were formulated such that they addressed the research objectives of the study. The educators were selected based on qualifications, knowledge, and experience in IT for delivery of classes. The educators with experience in IT were those who held a qualification in IT-related fields, that could confirm their expertise in IT. Their knowledge in IT was related to their use of IT tools in their teaching practice. Based on the number of questionnaires that was administered, the response rate was 73.6%, which was satisfactory. The remaining 26% non-response rate was mainly attributed to time constraint, lack of knowledge on OER and lack of interest. However, 271 survey responses from the educators, which represented 73.6%, were acquainted with and knowledgeable about OER. In terms of gender distribution, it can be found that the larger share of the respondents in the surveyed sample were female teachers, amounting to a figure of 51.3%, while 48.7% constituted male teachers, as shown in Figure 3. Among the respondents who participated in the

survey, it can be observed that most of them belonged to the age group of 20-25 years (27.3%), followed by 22.9% who were aged between 36-40 years, 21.4 % for the age group above 40 years,15.1% for the age group 31-35 years and 13.3% were 26-30 years, as illustrated in Figure 4. Figure 5 shows that the highest number of years of experience of the educators were from 11-15 years, with a percentage of 29.9 %, while 28.8 % represent educators with experience from 5-10 years. The least amount of experience was above 15 years, representing 16.2% of the sample.

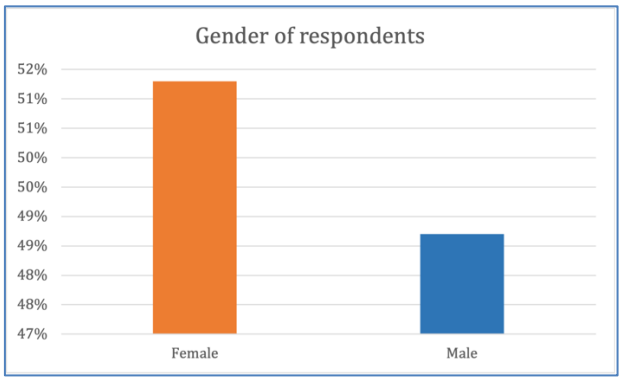

Figure 3: Gender of respondents.

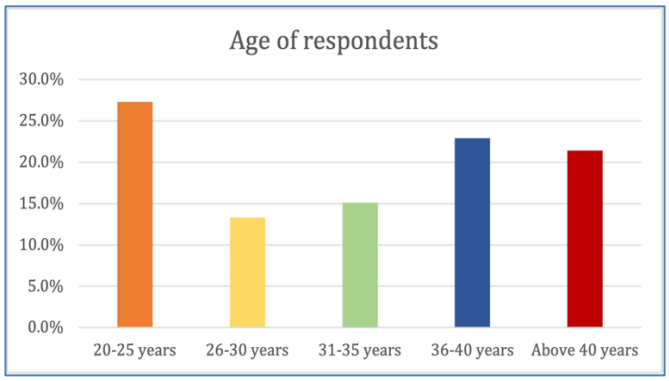

Figure 4: Range of age of respondents.

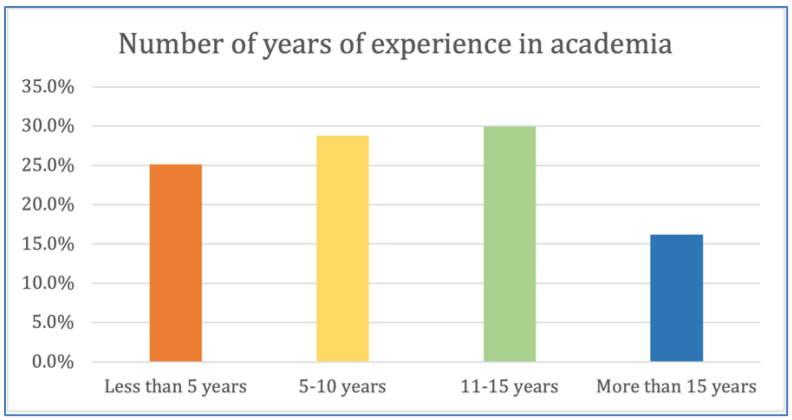

Figure 5: Number of years of experience in academia.

Data Analysis

IBM SPSS 23 was used to carry out reliability tests, descriptive statistics, factor analysis and probit regression, which helped in the interpretation of results. Factor analysis was used to reduce the variables into a set of independent factors and probit regression was conducted to estimate the significance of each independent variable with the adoption of OER. From the survey questionnaire that was administered, it is good to note that the secondary educators were dealing with lower secondary students, who were from Grades 7 to 9. These classes were conducted using the traditional face-to-face approach. The following information was gathered from the educators' point of view:

[1] Subject areas that will more likely use OERs in teaching

- Science: 38%
- ICT: 31%

[2] Subject areas that will less likely use OER in teaching

- Accounting: 30.3%
- Others: 24%
- Mathematics: 21.4%

[3] Factors that are valued most when teaching with OER

- Productivity: 35.8%
- Interactivity: 30.6%
- Accessibility: 23.6%
- Other: 10%

[4] ICT techniques that are being used in teaching and learning in schools

- Web technologies: 82.3%
- Software applications: 12.5%
- Other: 5.2%

The statement that schools in Mauritius possess all the conditions to benefit from implementing OERs in teaching was supported by 50.9% of the secondary educators, while 49.1% do not seem to agree with this statement. That secondary schools are ready to adopt the use of OER in teaching was supported by 60.9%, while 39.1% do not seem to agree. The educator population agree (87.5%) with the fact that OERs should be used in teaching, while 12.5% do not seem to agree. During this process of gathering information from the survey questionnaires, a reliability test was carried out to estimate the internal consistency of items in the questionnaire and to assess to what degree people were reliable while responding to these items. This ensured reliability of the findings. As shown by Table 1 below, the adequate estimation of alpha is estimated at 0.700 and higher and since the subsequent alpha score is 0.791, 0.860, 0.865, 0.858 and 0.877, which surpasses the base level, this demonstrates reliability among the data collected.

Table 1: Reliability Test.

	Construct	Cronbach alpha (α)
1	Perception	0.791
2	Productivity	0.860
3	Interactivity	0.865
4	Infrastructure	0.858
5	Constraining Factors	0.877

Validity Test

The UTAUT framework was used as a basis for assessing the validity of the instrument developed to measure the educators' behaviour in their intention to adopt technology. We have developed

items from the instrument that are directly aligned with the UTAUT constructs, and these are performance expectancy, effort expectancy, facilitating conditions, perceptions and constraining factors.

Findings

To provide a broader picture of the data being analysed, some basic descriptive statistics were carried out to give a better insight prior to dealing with the specific research questions. The detailed tables are included in the Appendix to this paper. In line with the hypotheses that were formulated in the study, the items which are questions in the standardised questionnaire that were administered (found in the Appendix) were classified under five main clusters and these are displayed follows:

Cluster 1: Perception

The questions which are related with the Perception cluster were as follows:

Qu 1: How far do you agree that educators will have a positive attitude towards the use of OER in teaching?

Qu 2: How far do you agree that secondary schools will readily adopt OER in their education system?

Qu 3: OER allow educators to upload assignments/test papers/ homework?

Qu 4: If given a choice I prefer uploading notes/videos and other teaching materials?

Qu 5: OER permits me to organise subject material into a logical structure?

Qu 6: OER directly improves the quality of the teaching experience?

Qu 7: OER are not as good as purchased textbooks?

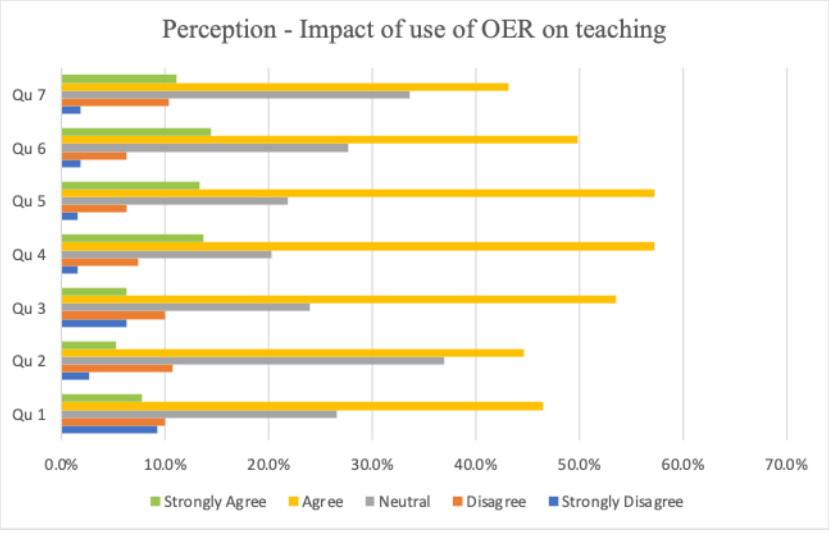

Figure 6: Perception cluster: Educators' perception towards the behavioural intention to adopt OER.

From the 'Perception' cluster, which is about the educators' perception towards the behavioural intention to adopt OER, it can be observed that more than 50% of the educators' population agreed they have a positive attitude towards integrating OER into teaching.

Cluster 2: Productivity

The questions which are related with the Productivity cluster were as follows:

Qu 1: To what extent do you believe that the introduction of OER will be a positive learning experience for students at secondary level?

Qu 2: How far do you agree with the concept that adoption of OER will be related to productivity?

Qu 3: How far do you agree that OER will have a positive influence in education at the secondary level?

Qu 4: How far do you agree that OER will motivate students to adopt a positive learning attitude towards secondary education?

Qu 5: How far do you agree that OER will be a key aspect in developing lifelong learning competencies among different users in secondary schools?

Qu 6: How far do you agree that OER will be an effective means of teaching?

Qu 7: How far do you agree with the concept that OER will be a key aspect in promoting research and development?

Qu 8: How far do you agree that OER will be an encouraging factor to improve admission rates in secondary schools?

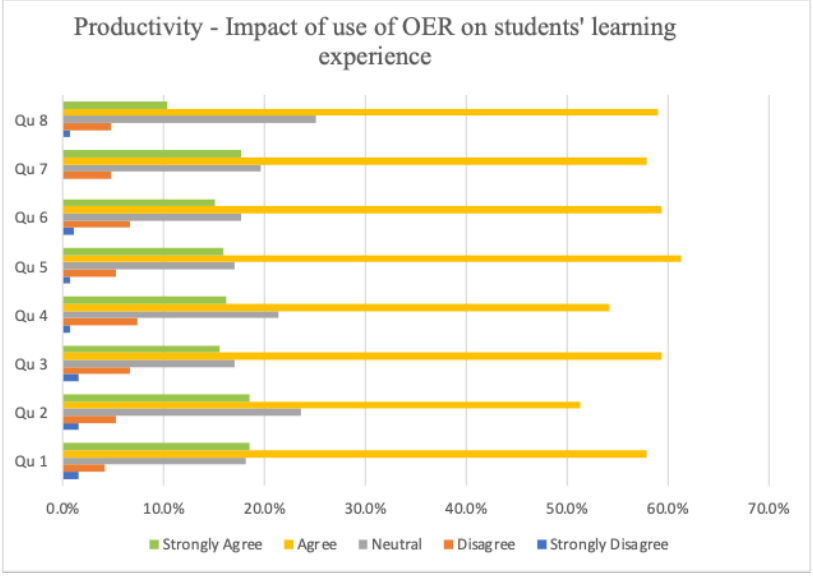

Figure 7: Productivity cluster: Impact of using OER on students' learning experience.

From the 'Productivity' cluster, where the view was to understand the impact of using OER in teaching, it can be observed that according to educators, the adoption of OER will enhance students' learning experience and their competencies and promote research and development.

Cluster 3: Interactivity

The questions which are related with the Interactivity cluster were as follows:

Qu 1: How far do you agree that OER will be an interactive role in promoting secondary education?

Qu 2: I would describe using OER as interesting?
Qu 3: How far do you agree that OER will help my students learn more about a subject?
Qu 4: How far do you agree that OER will improve my students' satisfaction with a subject?
Qu 5: How far do you agree that OER will improve my students' grades?
Qu 6: How far do you agree that OER will improve my students' evaluation of a subject?
Qu 7: To help my students better learn the material, I will incorporate ICT tools in the classroom.

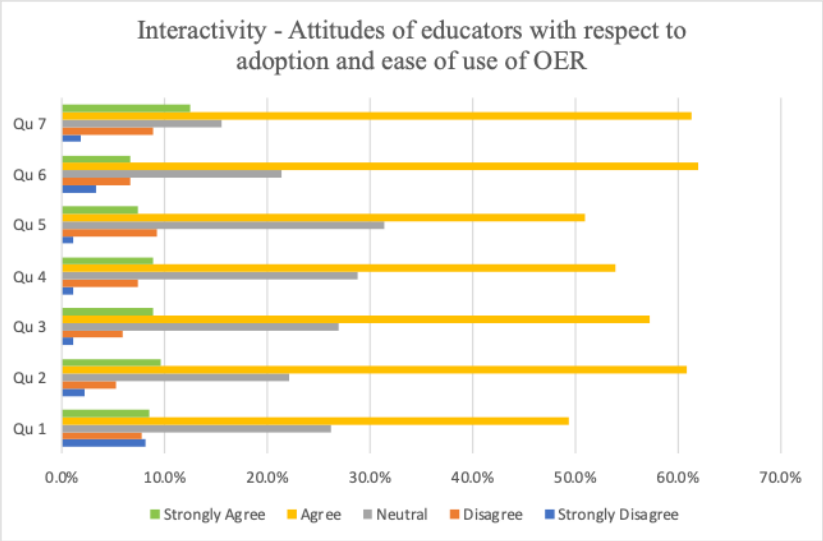

Figure 8: Interactivity cluster: Attitudes of educators with respect to the behavioural intention to adopt OERs in teaching.

From the 'Interactivity' cluster, which looks at the attitudes of educators with respect to ease of use of OER in teaching, it can be observed that more than 50% of the educators' population agreed that OERs could help to promote secondary education and improve students' grades. This is because when the students get opportunities for interaction and engagement with the learning materials, such as through the use of multimedia elements and collaborative activities, they are more likely to benefit from them, which can lead to improved academic performance.

Cluster 4: Infrastructure

The questions which are related with the Infrastructure cluster were as follows:

Qu 1: How far do you agree that secondary schools have an adequate technical support for ICT?
Qu 2: How far do you agree that secondary schools have adequate instructional support for ICT?
Qu 3: How far do you agree that secondary schools will not have adequate resources to invest in broadband, hardware and software?

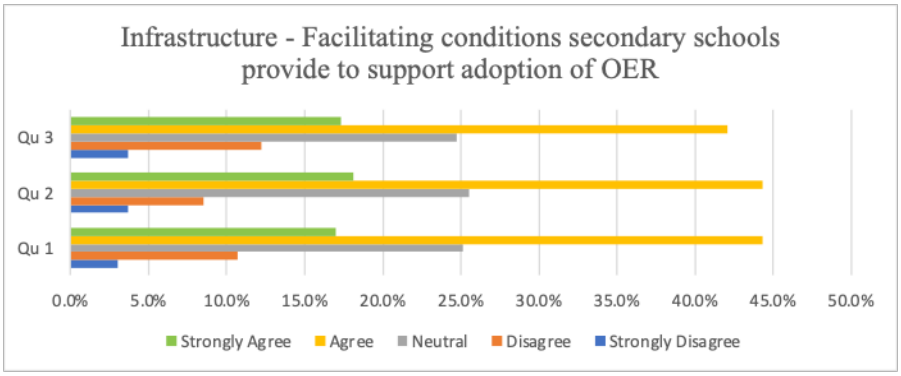

Figure 9: Infrastructure cluster: Facilitating conditions to support the behavioural intention to adopt OERs.

From the 'Infrastructure' cluster, which gives an indication of the facilitating conditions schools have to support the adoption of OER, it was observed, from the educators' perspective, that the majority of them agreed that schools lack the ICT infrastructure to adopt OER. The schools do have adequate support in terms of technology and pedagogy but not in terms of infrastructure, which encompasses issues with broadband, hardware and software, respectively.

Cluster 5: Constraining Factors

The questions which are related with the Constraining factors cluster were as follows:

Qu 1: Lack of necessary resources to access OER?

Qu 2: Lack of broadband and other technical innovations?

Qu 3: Lack of necessary knowledge to use and integrate OER into the subject?

Qu 4: Lack of effective communication about the scope and capabilities of OER?

Qu 5: Lack of skills to select appropriate OER and reuse or remix them?

Qu 6: Lack of awareness among academics of copyright issues?

Qu 7: Lack of Quality assurance about the availability of digital resources?

Qu 8: Lack of time to produce shareable materials?

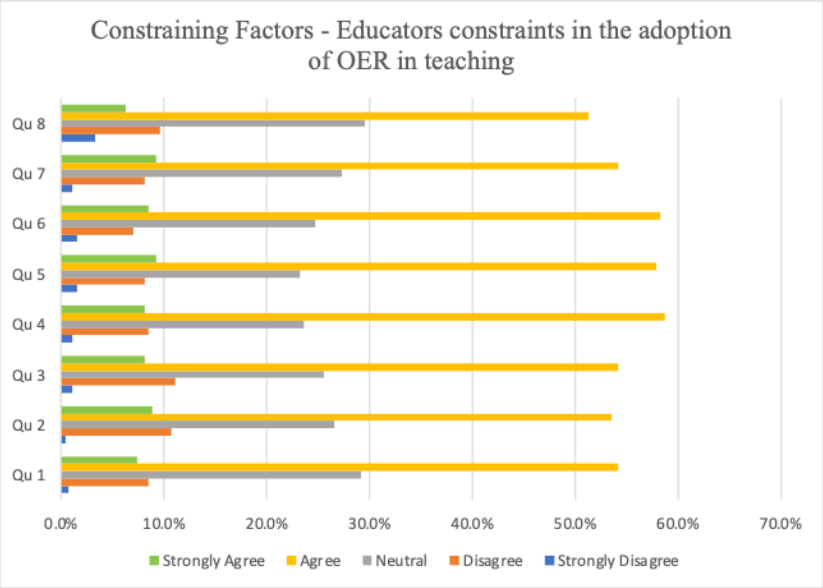

Figure 10: Constraining Factors cluster: Constraints during the behavioural intention to adopt OER in teaching.

Finally, from the 'Constraining Factors' cluster, which depicts the constraints educators might face during the use of OER in teaching. It can be observed that all of them agreed that there can be issues that are related to a lack of technical innovation and access to existing OER. There can also be a lack of awareness on copyright issues and intellectual property rights. However, they agreed that these also signal that these drawbacks have to be reviewed so as to ease the adoption of OER in teaching.

Factor Analysis

Factor analysis was utilised in the examination of the response patterns for the statements in the survey. Questions that were highly correlated regarding the response pattern were gathered under a particular factor. The premise to utilise factor analysis was that since this study, which was comprised of various factors, there might exist a higher relationship between them which could have rendered the interpretation complex. Thus, factor analysis, which is a data reduction tool, was used so as to expel any repetitive factors and cluster those having a similar difference into independent groups. Consequently, in this study, factors were extracted through principal component analysis with rotation method Oblimin with Kaiser Normalisation. The rotation method was utilised to detect large loadings and limit these incidences. The component matrix was taken into consideration for those statements that were extracted under only one component, and the pattern matrix was analysed for those that were extracted under more than one component. The latter was chosen for ease of interpretation.

KMO and Bartlett's Test

To represent the feasibility of factor analysis, the KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity were carried out for every extraction as they appeared in the subsequent parts. The KMO Measure confirms whether the factors were sufficiently large enough to be correlated and a minimum value of 0.5 was required to continue with factor analysis, while the Bartlett Test indicates if there is a relation between the factors and a level of significance less than 0.5 signs for the viability of factor analysis.

Extraction under Factor 1

Table 2: KMO and Bartlett's Test for Factor 1.

Extraction under Factor 1

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.748
Bartlett's Test of Sphericity	Approx. Chi-Square	633.936
	df	15
	Sig.	.000

As per the outcomes, since KMO has a minimum value of 0.748 and Bartlett's test has a level of significance less than 0.5, the two designated tests confirmed the feasibility of the data reduction on the group.

Table 3: Pattern Matrix for Factor 1.

	Component/ Perceived Benefits	
	1	2
How far do you agree that the academics will have a positive attitude towards the use of OER in the teaching and learning processes?	-.098	.838
How far do you agree that secondary schools will readily adopt OER in their education system?	-.014	.798
OER permits me to upload assignments/test papers/ homework?	.179	.633
If given a choice I prefer uploading notes/videos and other teaching materials?	.886	.067
OER permits me to organise subject material into a logical structure?	.926	.008
OER directly improve the quality of teaching experience?	.876	-.052

The above table shows that three items were extracted under Component 1, while three items were extracted under Component 2. A high correlation can be noted among the items making them highly representative for the factor.

Extraction under Factor 2

Table 4: KMO and Bartlett's Test for Factor 2.

Extraction under factor 2

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.860
Bartlett's Test of Sphericity	Approx. Chi-Square	909.364
	df	28
	Sig.	.000

By observing the above outcomes, it can be seen that the KMO value for the eight set of variables amounts to 0.860, which is sufficiently high while for the Bartlett's test, it demonstrated significance less than 0.5, in this way showing factor analysis can be done.

Table 5: Pattern Matrix for Factor 2.

	Component/Productivity	
	1	2
To what extent do you believe that the introduction of OER will be a positive learning experience for students at secondary level?	.852	-.112
How far do you agree with the concept that adoption of OER will be related to productivity?	.894	-.102
How far do you agree that OER will have a positive influence in education at the secondary level?	.819	.018
How far do you agree that OER will motivate students to adopt a positive learning attitude towards secondary education?	.713	.091
How far do you agree that OER will be a key aspect in developing lifelong learning competences among different users in secondary schools?	.555	.382
How far do you agree that OER will be an effective means of teaching?	.479	.470
How far do you agree with the concept that OER will be a key aspect in promoting research and development?	.211	.716
How far do you agree that OER will be an encouraging factor to improve admission rates in secondary schools?	-.156	.849

With reference to the output structure matrix, six variables were extracted under Component 1 while two components were extracted under Component 2. Regarding the loading pattern, all the variables were found to varying effect on the component.

Extraction under Factor 3

Table 6: KMO and Bartlett's Test for Factor 3.

Extraction under factor 3

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.852
Bartlett's Test of Sphericity	Approx. Chi-Square	881.960
	df	21
	Sig.	.000

The KMO value equating to 0.852 and the Bartlett's test of sphericity with a level of significance less than 0.5, shows that the variables can be reduced into Factor 3.

Table 7: Component Matrix for Factor 3.

	Component/Interactivity
	1
How far do you agree that OER will be an interactive role in promoting secondary education?	.655
How far do you agree that OER will help my students learn more about a subject?	.799
I would describe using OER as interesting?	.829
How far do you agree that OER will improve my students' satisfaction with a subject?	.804
How far do you agree that OER will improve my students' grades?	.740
How far do you agree that OER will improve my students' evaluation of a subject?	.721
To help my students better learn the material, I will incorporate ICT tools in the classroom.	.702

With reference to the output component matrix, seven variables were extracted under Factor 3. Concerning the loading pattern, all the variables were found to varying effect on the component.

Extraction under Factor 4

Table 8: KMO and Bartlett's Test for Factor 4.

Extraction under factor 4

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.695
Bartlett's Test of Sphericity	Approx. Chi-Square	408.048
	df	3
	Sig.	.000

The outcomes indicate a fairly high KMO value and a significant value of 0.000, with regards to the Bartlett's test that entails the viability to perform factor analysis on the three sets of variables as they appeared in the following part.

Table 9: Component Matrix for Factor 4.

	Component/ Infrastructure
	1
How far do you agree that secondary school have an adequate technical support for ICT?	.900
How far do you agree that secondary school have an adequate instructional support for ICT?	.921
How far do you agree that secondary schools will not have adequate resources to invest in broadband, hardware and software?	.827

Three variables were extracted under the factor 'Infrastructure' with varying magnitudes of factor loadings. All three items displayed robust association with the component.

Extraction under Factor 5

Table 10: KMO and Bartlett's Test for Factor 5.

Extraction under factor 5

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.839
Bartlett's Test of Sphericity	Approx. Chi-Square	1119.172
	df	28
	Sig.	.000

The measure of sampling adequacy shows an adequate value of 0.839 and the Bartlett's test indicates a significant value of 0.000 resulting in the application of data reduction.

Table 11: Pattern Matrix for Factor 5.

	Component/Constraining Factors	
	1	2
Lack of necessary resources to access OER?	-.148	-.936
Lack of broadband and other technical innovations?	-.013	-.872
Lack of necessary knowledge to use and integrate OER into the subject?	.306	-.665
Lack of effective communication about the scope and capabilities of OER?	.513	-.423
Lack of skills to select appropriate OER and reuse or remix them?	.519	-.462
Lack of awareness among academics of copyright issues?	.764	-.097
Lack of Quality assurance about the availability of digital resources?	.912	.107
Lack of time to produce shareable materials?	.805	.075

Table 11 shows that five items were extracted under Component 1 and three items were extracted under Component 2. The results point to that the statements being strongly correlated.

Summary of the Components Extracted

To sum up, two clusters which were 'Interactivity' and 'Infrastructure', were extracted under one component and three other clusters, which were 'Perception', 'Productivity' and 'Constraining Factors' were extracted under two components. In order to be in line with the research model the items under Component 2 were eventually rejected for the subsequent analysis.

Multivariate regression analysis was used to test and to give solid confirmation of the hypotheses. This eventually provided an insight about the clusters that will help teachers with the adoption of OER in teaching. More specifically, a probability model was utilised to test for the significance of the hypotheses as demonstrated hereinafter by regressing the extracted elements with the dependent variable. Probit regression was employed as the dependent variable is dummy. Adoption, termed as the dependent variable, was measured dichotomously, that is on the basis of two outcomes; the variable takes a value 0 if teachers are ready to adopt OER in their teaching and learning, or a value of 1 if they don't want to adopt OER in teaching and learning processes, while the independent variables constitute Perception, Productivity, Interactivity, Infrastructure and Constraining Factor.

Results from Probit Regression

Table 12: Model Fitting Information.

Results from Probit Regression

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	204.695			
Final	136.850	67.846	5	.000

Table 13: Pseudo R-Square.

Cox and Snell	.221
Nagelkerke	.418
McFadden	.331

It can be noted from Pseudo R^2 table that the Nagelkerke's R^2 is 0.418, the Cox & Snell's R^2 is 0.221 and the McFadden R^2 is 0.331.

Table 14: Probit Estimates.

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Adoption = .00]	-1.508	.138	119.916	1	.000	-1.778	-1.238
Location	Perceived Benefits	-.083	.154	.294	1	.588	-.385	.218
	Productivity	.461	.161	8.200	1	.004*	.146	.777
	Interactivity	.352	.124	8.019	1	.005*	.108	.596
	Infrastructure	.264	.122	4.662	1	.031*	.024	.504
	Constraining Factors	.336	.107	9.783	1	.002*	.125	.547

Table 15 depicts the regression results of the variables and at a level of significance of 0.05, and it indicates that out of the five variables examined only four of them were found to significantly affect the adoption of OER.

Summary of the Tested Hypotheses

Table 15: Summary of Hypothesis Testing.

Hypothesis	Results	Conclusion
H1: Perceived benefits is positively correlated with the adoption of OER	Not Significant (coefficient= -0.083, sig=0.588)	Not Supported
H2: Productivity is positively correlated with the adoption of OER	Significant (coefficient=0.461, sig=0.004)	Supported
H3: Interactivity is positively correlated with the adoption of Open Education Resources	Significant (coefficient=0.352, sig=0.005)	Supported
H4: Infrastructure is positively correlated with the adoption of OER	Significant (coefficient=0.264, sig=0.031)	Supported
H5: Constraining factors is positively correlated with the adoption of OER	Significant (coefficient=0.336, sig=0.002)	Supported

Discussion

It can be deduced that the perception of teachers and their peers towards OER was not a significant factor to determine their intention to adopt OER in the teaching and learning process. On the other hand, it can be observed that there is a significant positive relationship between 'Adoption of OERs' and 'Productivity'. The coefficient of 'Productivity' is 0.461 which shows that an increase of 1 unit in 'Productivity' will increase 'Adoption' by 0.461 unit. 'Productivity' was utilised to determine how much a teacher trusted that a specific innovation would help them in performing better in their activity and, as per the results, it can be noted that OER are perceived to add both value and quality to the educators' teaching, thus enhancing their overall job performance, which is in line with the arguments of Dutta (2016). Moreover, OER is a useful tool that will empower educators to accomplish teaching activities more rapidly and flexibly, or even help them to build their teaching viability. The result can be considered to be coherent as the result of 'Productivity' is in line with the studies of Venkatesh et al. (2003), Percy and Belle (2012), Dulle and Minishi-Majanja (2011) and Mtebe and Raisamo (2014).

The hypothesis 'Interactivity' was found to be positively significant with a coefficient of 0.352. Therefore, the more teachers interact with OER, the easier it will be to incorporate it into their teaching process. Additionally, the variable was used to determine teachers' degree of ease regarding the utilisation of OER. The findings suggest that instructors believe OER will be easy to use and free of effort. This result aligns with the finding of the study carried out by Venkatesh et al., (2003) and Percy and Belle (2012). On the contrary, this outcome is not in line with the study of Mtebe and Raisamo (2014) who investigated the factors in adopting OER in Tanzania.

The fourth hypothesis, 'Infrastructure' was found to be positively significant with a coefficient of 0.364. The outcome can be marked to be rational since the expectation from 'Infrastructure' is to bring more facilities and innovation into the teaching process, which will give rise to 'Adoption'. In addition, the variable was utilised to determine the degree to which a teacher believes that the institution possesses adequate technical infrastructure to support the utilisation of OER. Therefore, the OER adoption rate may eventually increase with an improved and modern technological infrastructure. This result is in line with the study of Venkatesh et al. (2003).

Lastly, it could be noted that the variable Constraining Factor was positively significant with Adoption. An increase of 1 unit of Constraining Factor will result in an increase of 0.336 unit of Adoption. The result is quite incoherent as the relationship should have been negative. The more

institutions overcome the challenges and constraints, the easier it will be for the teachers to incorporate OER in their teaching process. This element further demonstrates, in line with the finding of Kandiero (2015) with respect to social influence, that in the Mauritian context the constraining factor plays a significant role in shaping the behavioural attitude towards OER adoption. Indeed, the perception of peers towards each teacher is an important cultural aspect to be taken into account. It remains to be further investigated whether this finding is mainly linked to an Afro-Indian context or can be generalised to other cultures as well. The cultural dimension could be another element to further investigate, and that could help improve the contextual applications of the UTAUT model in other studies of a similar nature.

The findings have implications at policy level with respect to the education landscape in Mauritius. The government have invested heavily in ICTs in schools over the past decade. However, as highlighted by researchers, there have been challenges in terms of the digitisation of curriculum and the use of ICTs for teaching and learning, including the deployment of tablets in the primary and secondary schooling sectors. This is also reflected in the perceptions of the respondents, where more than 50% were not of the view that there was appropriate technical and instructional support for the integration of ICTs in schools. Having recourse to Open Educational Resources can accelerate the curriculum digitisation process, as existing OERs can be used and repurposed to fit into the local context and be rapidly deployed on tablets. The findings demonstrate a generally positive attitude of educators towards OER, and with the right tools, support, and incentives, they may be able to improve the learning experience of their learners in the classrooms. This study provides a starting point for the authorities to reflect on the implementation of the national OER policy and the enabling environment needed in the teaching and learning landscape of schools and universities. From the study, it is clear that the success of the national OER policy will depend on key elements which are central to its acceptance and adoption by teachers. The authorities have to invest further in the improvement of infrastructure, and the capacity-building of teachers. Furthermore, there is a need to review the curriculum design and development process for proper integration of OER, including guidelines for educators on how to access, use and reuse OER from the national OER repository. There is a need for incentives to bring a paradigm shift to the minds of educators as well so that they also become creators of local and contextually relevant OER rather than just consumers.

Limitations of the Study

There are two main limitations of this study. The first limitation is linked to the assumption that the respondents are familiar and proficient in OER related concepts and definitions. While the term itself has been widely popularised, many practitioners are not necessarily aware and conversant with OER concepts and practices. This element may bring some bias or inaccuracy in terms of their responses.

The second limitation of the study is in terms of the generalisability of the findings. While the research approach and method may be replicated especially in developing island states using education systems similar to or inspired by Commonwealth models, the findings are nevertheless intrinsically linked to existing government policy related to Open Educational Resources as well as the teacher training models in place. Therefore, some caution has to be exercised in terms of generalising the findings of this research. Some countries may be more committed towards OER and have in place national OER policies and well-elaborated action plans, while others may be in the early phases of OER adoption.

Conclusion

The purpose of this study was to identify the factors that would influence teachers' behavioural intention to adopt OER in their teaching and learning processes, respectively. A survey was carried out among 271 teachers and, as per the findings, it can be concluded that among the factors analysed, it was eventually the factors Perception, Productivity, Interactivity, Infrastructure and Constraining Factor, which were found to positively induce teachers' adoption of OER in their teaching process. Additionally, the study revealed than more than 50% of teachers want to adopt OER in their teaching and learning processes. The findings reveal key implications for a successful implementation of the national OER policy, namely, investment in infrastructure, capacity-building of educators, review of curriculum design and development, incentives, and strategies to bring a paradigm shift for educators to become creators and consumers of OER through a decentralised and participative approach to curriculum digitisation.

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APPENDIX

1. **Perception**

Table A1: Perception towards OER

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	How far do you agree that the academics will have a positive attitude towards the use of OER in the teaching and learning processes?	9.2%	10.0%	26.6%	46.5%	7.7%
2	How far do you agree that secondary schools will readily adopt OER in their education system?	2.6%	10.7%	36.9%	44.6%	5.2%
3	OER permits me to upload assignments/test papers/ homework?	6.3%	10.0%	24.0%	53.5%	6.3%
4	If given a choice I prefer uploading notes/videos and other teaching materials?	1.5%	7.4%	20.3%	57.2%	13.7%
5	OER permits me to organise subject material into a logical structure?	1.5%	6.3%	21.8%	57.2%	13.3%
6	OER directly improve the quality of teaching experience?	1.8%	6.3%	27.7%	49.8%	14.4%
7	OER are not as good as purchased textbooks?	1.8%	10.3%	33.6%	43.2%	11.1%

2. **Productivity**

Table A2: Productivity with OER

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	To what extent do you believe that the introduction of OER will be a positive learning experience for students at secondary level?	1.5%	4.1%	18.1%	57.9%	18.5%
2	How far do you agree with the concept that adoption of OER will be related to productivity?	1.5%	5.2%	23.6%	51.3%	18.5%
3	How far do you agree that OER will have a positive influence in education at the secondary level?	1.5%	6.6%	17.0%	59.4%	15.5%
4	How far do you agree that OER will motivate students to adopt a positive learning attitude towards secondary education?	0.7%	7.4%	21.4%	54.2%	16.2%
5	How far do you agree that OER will be a key aspect in developing lifelong learning competences among different users in secondary schools?	0.7%	5.2%	17.0%	61.3%	15.9%
6	How far do you agree that OER will be an effective means of teaching?	1.1%	6.6%	17.7%	59.4%	15.1%
7	How far do you agree with the concept that OER will be a key aspect in promoting research and development?	-	4.8%	19.6%	57.9%	17.7%
8	How far do you agree that OER will be an encouraging factor to improve admission rates in secondary schools?	0.7%	4.8%	25.1%	59.0%	10.3%

3. Interactivity

Table A3: Interactivity with OER

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	How far do you agree that OER will be an interactive role in promoting secondary education?	8.1%	7.7%	26.2%	49.4%	8.5%
2	I would describe using OER as interesting?	2.2%	5.2%	22.1%	60.9%	9.6%
3	How far do you agree that OER will help my students learn more about a subject?	1.1%	5.9%	26.9%	57.2%	8.9%
4	How far do you agree that OER will improve my students' satisfaction with a subject?	1.1%	7.4%	28.8%	53.9%	8.9%
5	How far do you agree that OER will improve my students' grades?	1.1%	9.2%	31.4%	50.9%	7.4%
6	How far do you agree that OER will improve my students' evaluation of a subject?	3.3%	6.6%	21.4%	62.0%	6.6%
7	To help my students better learn the material, I will incorporate ICT tools in the classroom.	1.8%	8.9%	15.5%	61.3%	12.5%

4. Infrastructure

Table A4: Infrastructure to support OER

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	How far do you agree that secondary school have an adequate technical support for ICT?	3.0%	10.7%	25.1%	44.3%	17.0%
2	How far do you agree that secondary school have an adequate instructional support for ICT?	3.7%	8.5%	25.5%	44.3%	18.1%
3	How far do you agree that secondary schools will not have adequate resources to invest in broadband, hardware and software?	3.7%	12.2%	24.7%	42.1%	17.3%

5. Constraining Factors

Table A5: Constraining Factor of OER

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Lack of necessary resources to access OER?	0.7%	8.5%	29.2%	54.2%	7.4%
2	Lack of broadband and other technical innovations?	0.4%	10.7%	26.6%	53.5%	8.9%
3	Lack of necessary knowledge to use and integrate OER into the subject?	1.1%	11.1%	25.5%	54.2%	8.1%
4	Lack of effective communication about the scope and capabilities of OER?	1.1%	8.5%	23.6%	58.7%	8.1%
5	Lack of skills to select appropriate OER and reuse or remix them?	1.5%	8.1%	23.2%	57.9%	9.2%

6	Lack of awareness among academics of copyright issues?	1.5%	7.0%	24.7%	58.3%	8.5%
7	Lack of Quality assurance about the availability of digital resources?	1.1%	8.1%	27.3%	54.2%	9.2%
8	Lack of time to produce shareable materials?	3.3%	9.6%	29.5%	51.3%	6.3%

Profile of the Participants

Out of 271 educators who participated in the survey, 51.3% were females and 48.7% were males. They were also of different age groups whose range are as follow:

- 20-25 years: 27.3%
- 26-30 years: 13.3%
- 1-35 years: 15.1%
- 36-40 years: 22.9%
- Above 40 years: 21.4%

The participants also counted different number of years of experience in teaching, that can be represented as follows:

- Less than 5 years: 25.1%
- 5-10 years: 28.8%
- 11-15 years: 29.9%
- Above 15 years: 16.2%

Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors:

Dr. Yousra Banoor Rajabalee is an eLearning specialist. She specialises in educational technologies and computer-based instructional design. She is a Lecturer in Education Technology at the Mauritius Institute of Education and a Member of the Pole of Research on Innovative Pedagogies, Technologies and Practices in Education at the University of Mauritius. Email: y.rajabalee@mie.ac.mu

Dr. Bhavish Jugurnath is currently a Senior Lecturer at the University of Mauritius. For the last two years his research has pursued Excellence in Research and Innovation, and he has completed a book publication *Global microfinance*, which is currently in press by World Scientific Publishing (USA). He has published several papers exploring these topics from different perspectives, and is currently working on consolidating this work and developing it into a book project. He has also been involved in innovative and interdisciplinary research exploration and has been successful in publishing fifteen refereed journal articles. Email: b.jugurnath@uom.ac.mu

Dr. Mohammad Issack Santally is currently a Professor in Education Technology, and the Pro-Vice-Chancellor (Academia), at the University of Mauritius. He is an active researcher in the field of Education Technology and e-Learning and has been involved in a number of regional consultancies for institutions such as the Commonwealth of Learning, COMESA and SADC. Email: m.santally@uom.ac.mu

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