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Needs Assessment for Promoting Transformational Change Towards Accessibility in Education and Competence Mobilization for e-Learning at the University of Rwanda

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Abstract

During the COVID-19 pandemic, higher education institutions worldwide encountered issues related to student dissatisfaction with online education. Several nations are poised to migrate to distance learning for technological and economic reasons. It becomes clear that current online learning should be applied under certain circumstances. The deployment of e-learning resources (ELR) has emerged as a strategy for addressing problems related to instructional design, technological packages, and easy access to education. In this context, Rwanda has used open and distance learning (ODL) to thrive in a continuously evolving educational environment. However, learners still have limited information about the use of e-learning platforms. To keep up with the changing nature of education, today's educators and students require ELR tools and information and communication technology (ICT) competencies. This research aimed to evaluate the needs, preparedness, and willingness of ODL professionals and learners at the University of Rwanda (UR) to enhance the use of ELR in the education and learning environment. In this research, a systematic questionnaire was considered for data collection purposes. The analyses were descriptive and consisted of either determining the proportion of answers to items in different segments of the questionnaire or determining the percentage of answers using various Likert scales and calculating the differences between scales. The results highlighted that several participants admitted to the University of Rwanda to having moderate knowledge of e-learning resources, and most of them regularly used text-based documents on e-learning platforms. Moreover, the participants demonstrated a need to avail internet connectivity and updated IT infrastructure, organize workshops and training, and conduct an awareness campaign on ELR and learning management system (LMS), It was also demonstrated that the ICT basic skills are needed to effectively implement e-learning at the University of Rwanda.

Keywords: Needs assessment**,** transformational change**,** accessibility in education**,** competence mobilization, and e-Learning at the University of Rwanda

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Furthermore, we wish to express our deep appreciation to the students, academic staff, and supporting staff who volunteered their time and insights to participate in the survey. Their valuable contributions have significantly enriched the data and findings of this study, shaping a more comprehensive understanding of the current landscape of e-learning in the University of Rwanda community.

In conclusion, our heartfelt thanks go to the University of Rwanda for granting us the opportunity to conduct this research. The university's cooperation and support were pivotal in the successful execution of this study. We acknowledge and appreciate the university's commitment to fostering research and advancements in education, allowing us to delve into the nuances of e-learning and contributing meaningful insights to the field that will be used for e-learning improvements at the University of Rwanda.

Table of Contents

Abstract 3
Acknowledgment 4
Project Description 6
Literature Review and Theoretical/Conceptual Framework 8
Methodology and Data Analysis 10
Results and Discussion 11
Research contribution and limitation 20
Conclusion and Recommendations 21
References 23
Appendix: Questionnaire 27

Project Description

A. Problem Statement

During the COVID-19 pandemic, higher learning institutions worldwide faced challenges with students' dissatisfaction with online education affecting more than 1000 million learners around the world (Biswas et al., 2021; Leal Filho et al., 2021). Also, several countries are set to shift to online learning for technical and economic reasons, (Leal Filho et al., 2022). However, students and instructors in developing and low-income countries, mostly in Sub-Sahara Africa including Rwanda are still encountering technological difficulties because of insufficient digitalization in education (Almahasees et al., 2021; Bao, 2020; Leal Filho et al., 2022).

Educational inequity was meant to be reduced with e-learning resources and technological packages. However, evidence demonstrates that the structure of learning fosters inequality by expanding the gap in educational achievement between learners from different socioeconomic backgrounds (Devkota, 2021; Jamil & Muschert, 2023; Khasawneh, 2021). Scientists, on the other hand, have long battled with the issue of providing an open educational environment with equal access. Alternatively, the research has shown that the integration of ICT tools in education is convenient and may reduce the time spent on developing educational resources (Joshi, Meza, Costa, Puricelli Perin, et al., 2013), delivering courses, training, and managing programs using the internet and other essential technological packages (Coman et al., 2020; Ghavifekr et al., 2014; Ghavifekr & Rosdy, 2015).

Asynchronous and synchronous online learning create collaborative partnerships between teachers and students, and they are commonly utilized to balance education with employment, families, and other responsibilities since they allow learners to access a learning environment at any time and download materials or send texts to instructors or peers to support e-learners in the growth of learning communities (Atmojo & Nugroho, 2020; Dagger et al., 2007).

Through inquiry and responding to questions in real-time via smartphones, tablets, or other technological tools, students and teachers may become more sociable and prevent frustration (Dagger et al., 2007; Hrastinski, 2008). In the field of instructional design and online pedagogy, instructors, companies, and institutions must be thoroughly aware of the advantages and drawbacks of using online learning materials for them to be successful and efficient (Clark & Mayer, 2023; Mayer, 2020).

Although the number of students accessing online teaching platform increased during the pandemic period, there is still a problem where some students and instructors cannot

access online resources for known and unknown reasons (Coman et al., 2020; Isaias et al., 2020). In addition to that, some newly recruited lecturers and admitted students also still have difficulties using the University of Rwanda e-Learning platform and other learning management systems (LMS) which may lead to a gap in resources available to students/lecturers and due to that it necessitates transformational change towards accessibility in education.

This study aimed to carry out a need assessment of potential transformational change and mobilization for e-learning at the University of Rwanda. Moreover, the study will potentially indicate their implications for teaching and learning among academic staff and students. It is perceived that the output of this research will serve as a long-term solution for the best practices of e-Learning at the University of Rwanda.

B. Context and Rationale

Since the launch of ELR at a UNESCO meeting in 2002, there has been a tremendous increase in teaching and learning. Experts examined several options to achieve the ideals of education for all and equitable access to educational opportunities in their entirety(Edke, 2022). An increase in distance education coupled with technological packages has had a considerable influence on education and teaching techniques in recent years, together with online education resources to increase access to quality education (Leach, 2005). It is clear that, unless the principles that guide academics in open and distance learning are defined, questions of "quality" and "equity" will continue to be obstacles to this kind of education (Das, 2010).

In today's rapidly changing world of higher education, "arrangements to allow individuals to study at the time, place, and pace that best matches their circumstances and needs" may be included in the area of open and distance education (Carlson & Fleisher, 2002; Das, 2010). Learners may progress at their speed and in a setting that is most convenient for them while using digital technologies and open educational resources.

By adopting novel teaching and learning strategies, such as online educational resources as a tool to enable successful outreach in higher education institutions in general, and ODL in particular, it is feasible to increase learning substantially more than the materials already available at face-to-face institutions, which have historically been limited by a lack of resources and other challenges related to accessibility, authoring, and creation of instructional materials, which are the foundation of instructional delivery (Butcher, 2015; Fengchun et al., 2016; Joshi, Meza, Costa, Perin, et al., 2013; Joshi, Meza, Costa, Puricelli Perin, et al., 2013). This research aimed to assess the need to promote transformational change towards accessibility in education and competence mobilization for e-learning.

C. Research questions

Structured offline and online questionnaires were used by students, supporting staff, and lecturers to collect the demographic characteristics of the respondents and to identify the hindrances to the use of e-Learning resources. The research questions include:

1. What is the level of understanding and use of online education resources among the participants?
2. What is the purpose of using online education resources? And how do the participants wishing to extend the knowledge gained?
3. What are the preferences of participants in terms of online educational resource tools, and how often do they utilize them?
4. What are the participants' degrees of agreement relevant to online education resource issues?
5. How prepared are the participants to attend seminars or training on online educational resources?

D. Objectives

The research objectives:

1. To assess the knowledge of the participants and their experience with online education resources.
2. To identify the participants' purpose for using online education resources and the extent of this use.
3. To determine the participants' motivation for using online education resources, as well as the level to which they do.
4. To determine the participants' degrees of agreement with topics concerning online education resources; and
5. To assess participants' preparedness for attending online education seminars or training.

Literature Review and Theoretical/Conceptual Framework

Education was first acknowledged as a basic human right in the Universal Declaration of Human Rights more than 70 years ago (Assembly, 1948), and remains so today. According to previous studies, just thirty-six percent of individuals who seek to participate in secondary education programs in Sub-Saharan Africa can locate seats in schools (Statistics, 2011). For example, in South Africa, 85,000 qualified candidates applied to one of the 11,000 places offered by the University of Johannesburg (Polgreen, 2012). Thirty million individuals aged 20 years or

younger throughout the world are eligible to attend university, but there are no seats for them. Research has shown that in 2020, this number is expected to rise by 100 million ((Varghese, 2013).

As outlined (Atkins et al., 2007) remarked “to accommodate the number of youngsters who would be able to join university by 2020, a specialty in the university would need to be established every week.” This remark concurs with Wright and Reju’s assertion (Wright & Reju, 2012) that education demand, particularly in sub-Saharan Africa, is much more than what current and planned academic institutions can satisfy. According to UNESCO (based on 2004 statistics), 3.8 million teachers would need to be hired in Africa alone by 2015 to accomplish the aim of universal primary education but African governments do not have the financial means to recruit that large number of instructors (Reynaert et al., 2009). For instance, between 1991 and 2006, the number of students enrolled in African higher education institutions increased by 16 percent, while education expenditures increased by just 6 percent. As a result, the demand for educational services exceeds what nations provide for education (Banya, 2015). Numerous governments are working hard to ensure that all people have access to education, a goal that is consistent with the Education for All (EFA) and Millennium Development Goals (MDG), both of which emphasize the issue.

Rwanda, like any other country, presently adopts open and virtual education and is expected to provide opportunities for individuals who are enthusiastic and able to pursue their education at higher educational levels. The primary goal of these initiatives is to guarantee that all citizens have fair access to suitable learning and life skills programs, to enhance all elements of educational quality, and to ensure excellence for all, so that recognized and measured learning outcomes, notably in literacy, numeracy, and vital life skills (Paxton, 2012). Rwanda's ever-increasing need for education cannot be addressed only via conventional face-to-face classroom training, the reason why the University of Rwanda has established e-learning platforms and adopted blended learning to complement face-to-face traditional teaching.

Even though OLR may have certain restrictions, such as the need to credit the creators, everyone has access to them. Students, teachers, and organizations regard them as potentially game-changing for the better (Schaffert & Geser, 2008). “There is the potential to cut costs, improve quality, and increase access to educational opportunities if untapped resources are utilized”(Atkins et al., 2007; dos Santos, 2019; Kawachi, 2014; Wright & Reju, 2012). However, depending on the types of learners, their ages, programs, and economic conditions may dictate the choice of e-learning methods. Additionally, the formats of e-learning content might influence how widely and actively e-learning platforms and resources are used.

The research was conducted at the University of Mysore, India, on students in the College of Education (one-year Bachelor of Education or B.Ed. degree program) for e-learning needs assessment showed that instructional theories and mobile technology scored lowest in the ranking of learning demands for e-learning components, whereas Internet tools and video streaming were the highest(Azimi, 2014).

Accessible material and interactive procedures included in OLR courses contribute to leveraging resources and promoting progressive change in learning and teaching since the information presented in OLR is sourced from reputable sources. Remarkably, one needs a good grasp of the difficulties faced by ODL practitioners in Rwanda to take advantage of this commendable trend of OLR. Unless Rwandan teachers/educators have acquired proper training, the country's educational system will not benefit from OLR-based teaching and learning.

Methodology and Data Analysis

The data for the study were gathered in 2022 through a structured questionnaire and used online and offline for the University of Rwanda community. An anonymous questionnaire was developed and filled in with Google Forms. The questionnaire was reviewed and shared with respondents in different departments/schools at the University of Rwanda. The analyses were descriptive and consisted of the proportion of answers to items in different segments of the questionnaire or determining the percentage of answers using various Likert scales and calculating the differences between those scales. A sample was taken from a population of academic staff, supporting staff, and students.

During this investigation, the sample size (n) was determined using the formula: $\frac{NZ_{\frac{a}{2}}^2}{Z_{\frac{a}{2}}^2+4(N-1)E^2}$, with a 95% confidence interval. where N represents the population size, $Z_{\frac{a}{2}}$ represents the quantile of the standard normal distribution, and E represents the precision error (margin of error). In this project, a precision error of E = 0.215 was applied. The total population size of the University of Rwanda was 31,261, encompassing academic staff, administrative staff, and students.

The sample was stratified into 247 academic staff, 109 supporting staff, and 1552 learners. Notably, the academic and supporting staff are likely involved in the development of course materials for distance learning. The selection of respondents from academic staff, supporting staff, and students was methodically based on various criteria, such as gender, age

group, work experience, and year of study, ensuring a comprehensive and representative sample for the research.

The respondents from academic staff, supporting staff, and students were chosen based on their gender, age group, work experience, and year of study respectively. The Statistical Package for the Social Sciences (SPSS) and R-4.3.2-win software played a pivotal role in the data analysis process. The subsequent interpretation hinges upon a dual approach that combines both descriptive and quantitative response analyses. This strategic combination allowed for comprehensive exploration and understanding of the data, ensuring a thorough examination of the patterns, trends, and statistical significance. Both software also facilitated a robust examination of the dataset, enabling the extraction of meaningful insights that were essential for drawing valid conclusions from the research findings.

Results and Discussion

The demographic results from the stratified samples included academic staff (13%), support staff (6%), and learners (81%). Based on gender, 50.35% of the participants were male and 49.65% female as per the result for each profession in Table 1 and Figure 1.

Table 1:

Distribution of the participants' professional by gender

Profession	Male	Female
Academic Staff	50.6%	49.4%
Administrative Staff	49.44%	50.56%
Students	51%	49%

Figure 1*. Distribution of the participants per age*

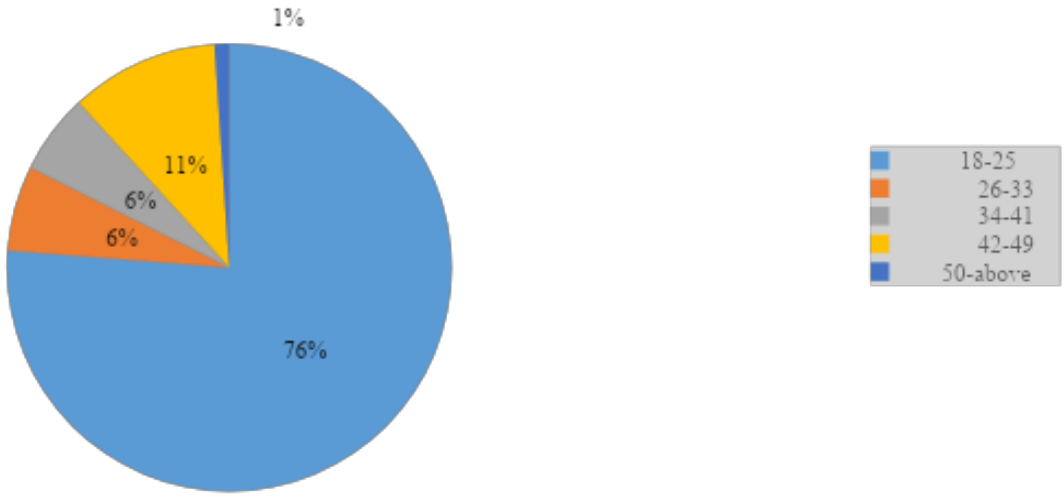


Table 2 summarizes the distribution of the participants by age. As can be seen from the table, the age of 18-25 represents most respondents, whereas the proportion of participants above 50 years old is approximately 1%. One can note this is because the UR population is mainly dominated by undergraduate students. Most of them were younger than 25 years of age. It can also be inferred that most of the staff leave university at approximately 50 years of age. It is worthwhile to indicate that significant efforts are required to obtain responses from this age group, as they seem to have less interest in responding to questions.

For the results of this study to be represented by the UR community view, we also considered the significance of the potential variability of responses with one's profession. The distribution of respondents by profession is presented in Table 2. One may be aware that students and academic staff are more likely to use online teaching resources than administrative staff. However, the administrative staff's view on the matter should not be overlooked because some attend evening and weekend programs. Second, some administrative staff are in charge of supporting teaching and learning on ICT. Thus, our results are dominated by students, 81.34%, while academic and administrative staff are 12.95% and 5.51%, respectively.

Table 2:

Distribution of the participants with respect to the profession

Profession	18-25	26-33	34-41	42-49	50-above	Total
Academic Staff	0.37%	1.26%	3.20%	7.23%	0.89%	12.95%
Administrative Staff	0.16%	0.21%	2.04%	3.14%	0.16%	5.71%
Students	75.26%	5.87%	0.10%	0.05%	0.05%	81.34%

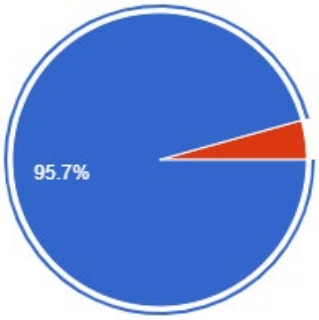
Total	75.79%	7.34%	5.35%	10.43%	1.10%	100.00%

In the study we also characterized the familiarity of respondents with online teaching and learning, see Figure 2 a-g. Figure 2 a) presents participants' responses on whether they have previously made use of e-learning resources. As can be seen, almost all respondents, 95.7%, had experience in online teaching or learning. This can be explained by the effort put in place at the University of Rwanda to facilitate online teaching and learning during the COVID-19 pandemic periods up to now. However further efforts might be needed as a significant number of respondents affirmed to have no experience with any e-Learning tools forms even after the COVID period which hindered their academic activities when face-to-face classes were not possible.

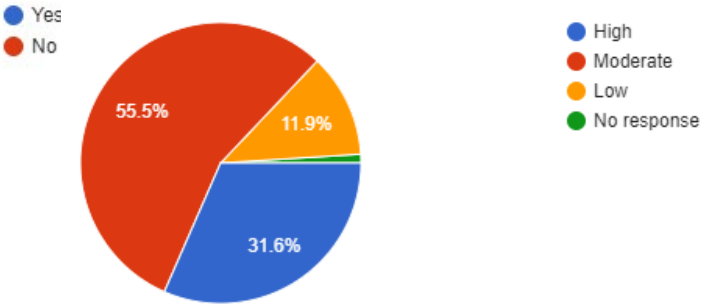
In Figure 2 b), the level of familiarity of respondents with e-Learning is indicated. Only 31.6% of the respondents were highly familiar with the use of online learning resources. 55.5% had only moderate familiarity, while approximately 12% had little experience with online learning and teaching tools. These findings suggest that knowledge of these facilities may be enhanced through regular training on the use of e-learning need to be enhanced. It was observed that all types of materials were accessed by a considerable number of university community members, as can be seen in Figure 2 c). Tests, graphs, and videos attracted 66.1%, 47.7%, and 49.4% of the participants, respectively. What seems not obvious is that even though most of the participants used different types of online materials, a very small portion (0.2 %) responded that they used all the formats of materials, that is, tests, graphs, and videos.

Figure 2*.*

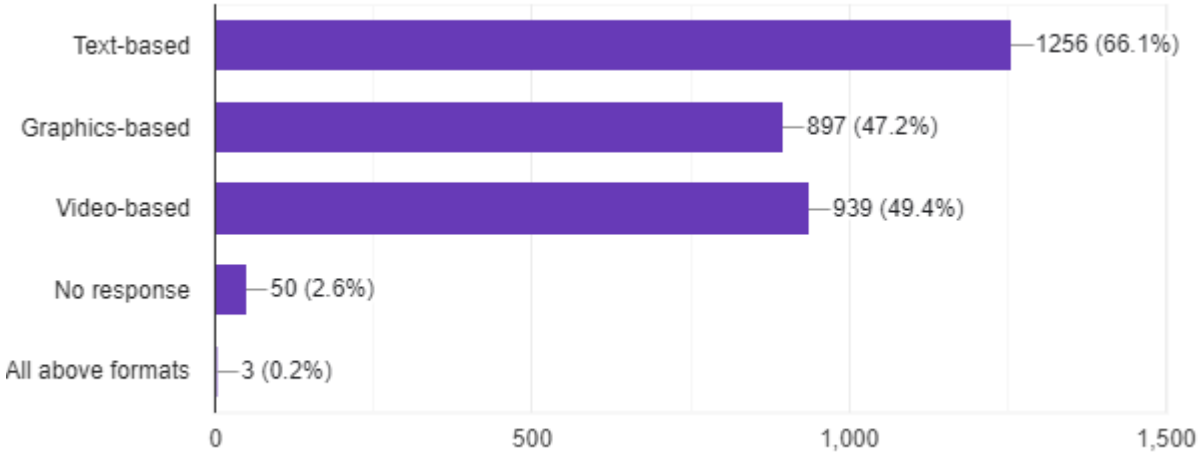
Participants' knowledge and experience of e-learning resources


95.7%

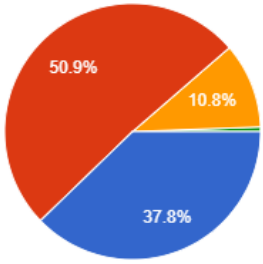
(a)


Yes
No
55.5%
11.9%
31.6%
High
Moderate
Low
No response

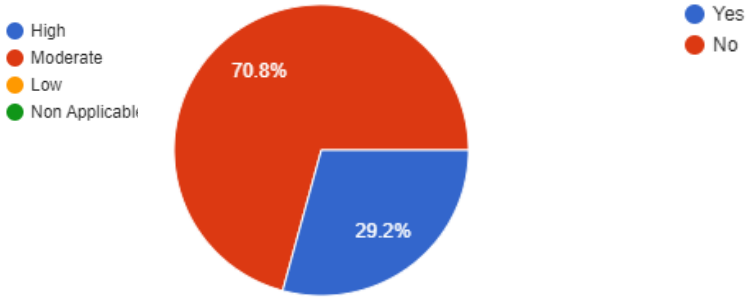
(b)


Text-based
Graphics-based
Video-based
No response
All above formats
1256 (66.1%)
897 (47.2%)
939 (49.4%)
50 (2.6%)
3 (0.2%)
0
500
1,000
1,500

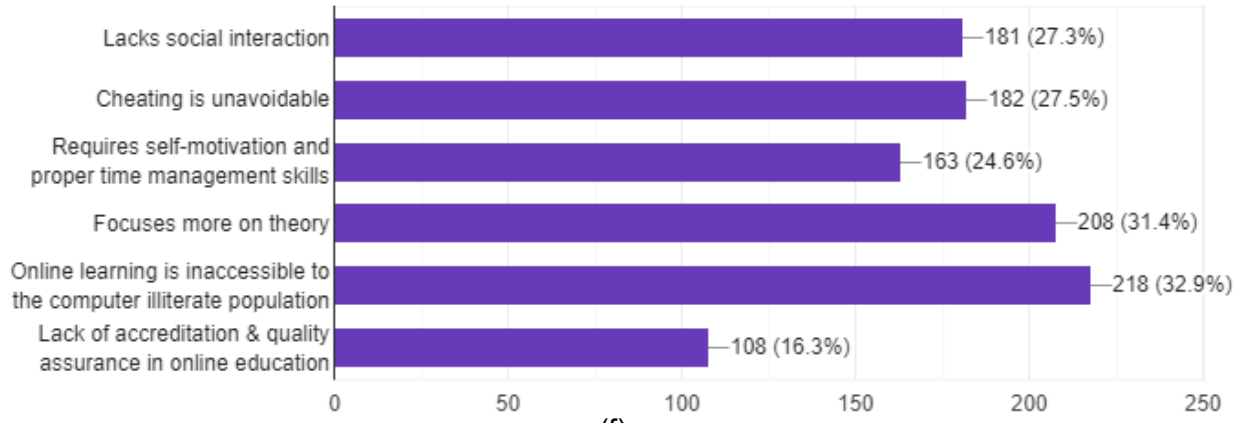
(c)


50.9%
10.8%
37.8%

(d)


High
Moderate
Low
Non Applicable
70.8%
29.2%
Yes
No

(e)



(f)

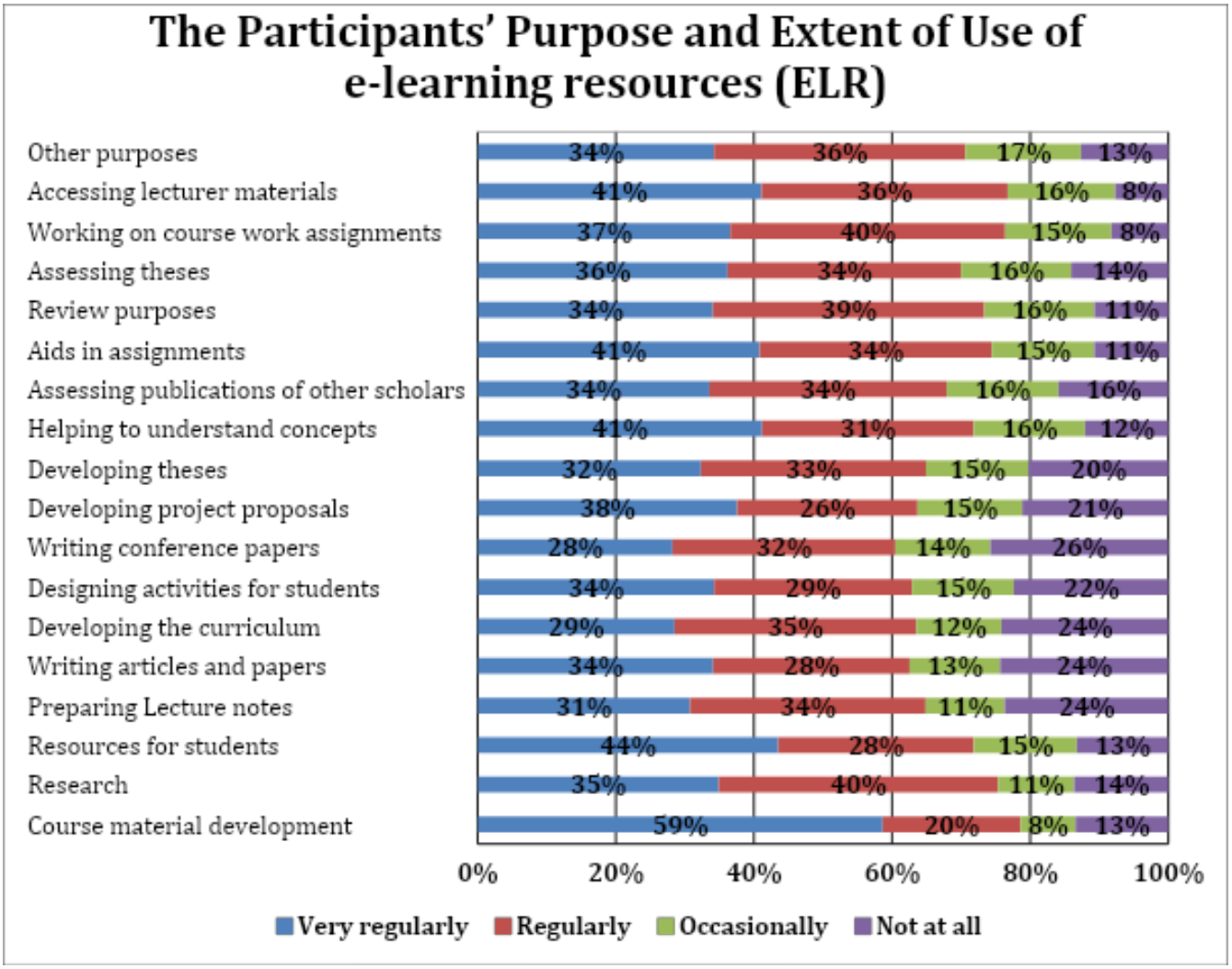
Figures 2 (d) and 2 (e) present the perceptions of the respondents on whether e-Learning positively or negatively affects the teaching and learning processes. Unexpectedly, most of the participants showed fear of harm (70.8%; see Figure 2 e), which could be due to the use of e-Learning rather than optimism about their benefits (Figure 2 d). It can be anticipated that fear is associated with the fact that e-learning is a newly established strategy and that thus far, control of the online learning process and assessment supervision is certainly not easy.

As can be seen from Figure 2 f, about a third of respondents feared that cheating, lack of interactions between teachers and learners, required too much self-motivation, lack of hands-on skills, and inaccessibility to computer illiterate people are likely to hinder the quality of learning when e-Learning is not coupled with face-to-face sessions. Sixteen-point-three percent of respondents showed concern that accrediting organs may not trust online-based courses. It can be inferred that the university community must be sensitized to online teaching and learning to alleviate these doubts.

To assess the participants' purpose and the extent to which they used e-learning resources (ELR), the question asked was "To what extent do you think the use of e-learning resources (ELR) could be used for the following purposes at the university? Figure 3 provides a representation of the responses received from the respondents in the form of percentages; where course material development and resources for students counted for 59%, helping to understand concepts counted 44%, and for aids in assignments, accessing lecturer materials, counted for both 41% to be accessed "very regularly" respectively. The findings indicated that the average degree to which ELR could be used for the 18 purposes (highlighted in this paper), ranges between "very regularly" and "regularly."

Therefore, it is essential to use adaptive e-learning management systems to provide room for a variety of e-learning resources (ELR) that educators and students may use for teaching and learning. The utilization of adaptive e-learning management systems can help enhance the adoption of different ELR tools as they can be found or accessed on the same platforms.

Figure 3.
Purpose and extent of use of e-Learning resources



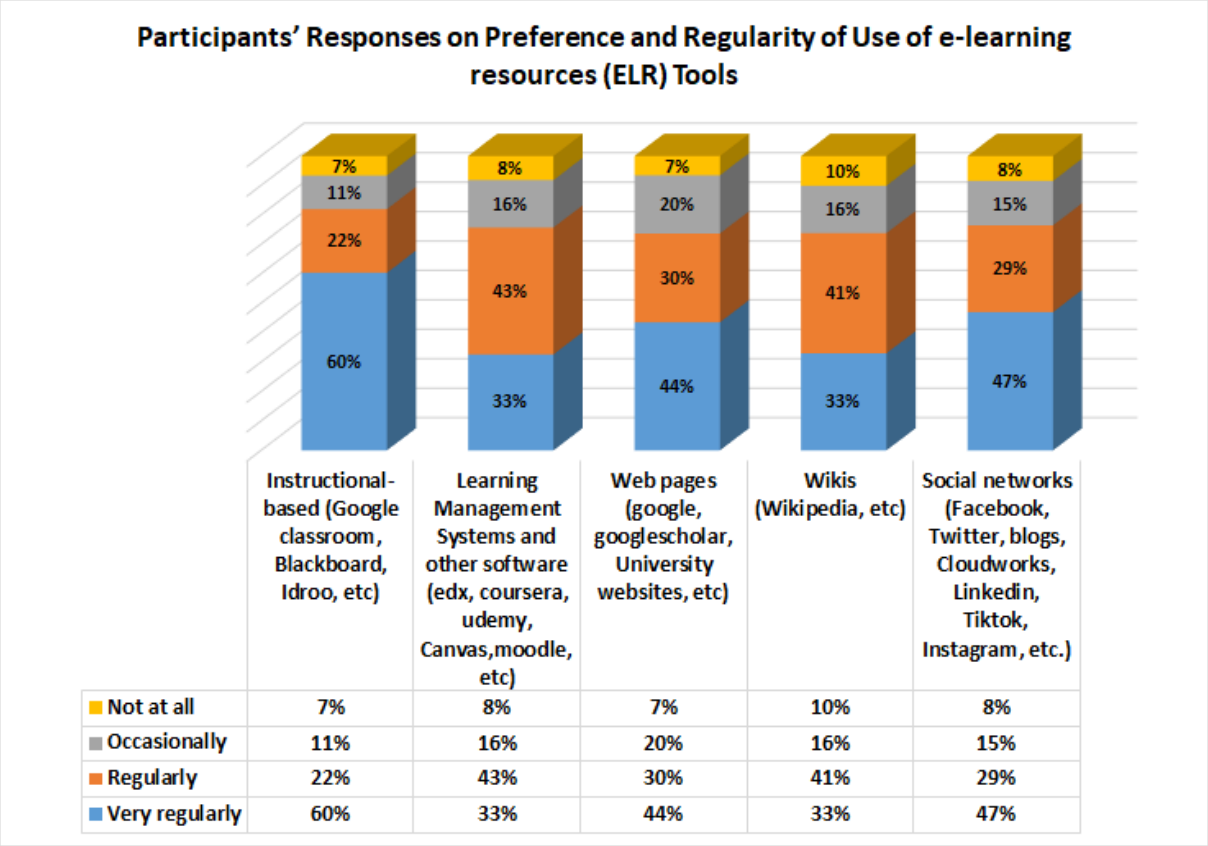
As part of the research, we investigated the participants' responses at the University of Rwanda about their preferences and the frequency with which they use e-learning resource (ELR) tools. As shown in Figure 4, the responses provided by participants were grouped into five separate categories. These groups were as follows: (1) instructor-based, (2) learning management systems and other software, (3) Wikis, and (4) social networks and web pages.

The findings presented under these categories indicate that the participants' responses on preference and regularity of use of e-learning resources (ELR) tools for instructional-based (Google Classroom, Blackboard, and Idroo); social networks (Facebook, Twitter, blogs, Cloud works, Linkedin, Tiktok, and Instagram, among others) and web pages (Google, Google Scholar, and other University websites) with 60%,47% and 44% “very regularly” respectively.

On another hand, the community of the University of Rwanda took part in an interview on the usage of e-learning resources accessible via LMS and other software (such as edX, Coursera, udemy, Canvas, and Moodle, amongst others) and attitudes about the usage of e-learning resources via wikis (such as Wikipedia, etc.) respondents revealed 43% and 41% to respectively be “regularly” in their responses. Since most respondents are laying in between “very regularly” and “regularly” It is a sign that this newly developed technology of making use of e-learning materials will be used to the greatest extent if it is implemented at the University of Rwanda. Therefore, successful lecturers should be more active in their students' e-learning experiences and monitor them more consistently. The community at the University of Rwanda must be made more aware of the digital technologies employed in e-learning.

It was proved that there is a pressing need to provide students with access to information technology (IT) devices such as tablets, e-readers, and laptops, which might enable them to use online resources more readily. Moodle should be linked to a large number of other interactive platforms, such as social media, Ispring, and H5P, to easily and conveniently provide open distance learning education. Internet bandwidth should be increased, and teachers should receive training on how to appropriately develop lesson plans and resources. Additionally, teachers should have access to more suitable lesson planning and resource tools.

***Figure 4**. Preference and frequency of use of ELR tools.*



The degree of agreement that the participants had with the important ELR concerns is shown in Figure 5. Because most respondents' levels of agreement on the supplied six statements fall somewhere between "agree" and "strongly agree," it was decided that all the questions and statements included in this portion of the questionnaire could be considered meaningful and important. This should not come as a surprise given that ELR is now the trend worldwide, and Rwanda cannot afford to fall behind. The lecturers and students who participated in the survey concluded that there was a need for active participation in meeting the requirements of ELR.

***Figure 5**. Level of agreement on ELR potential issues.*

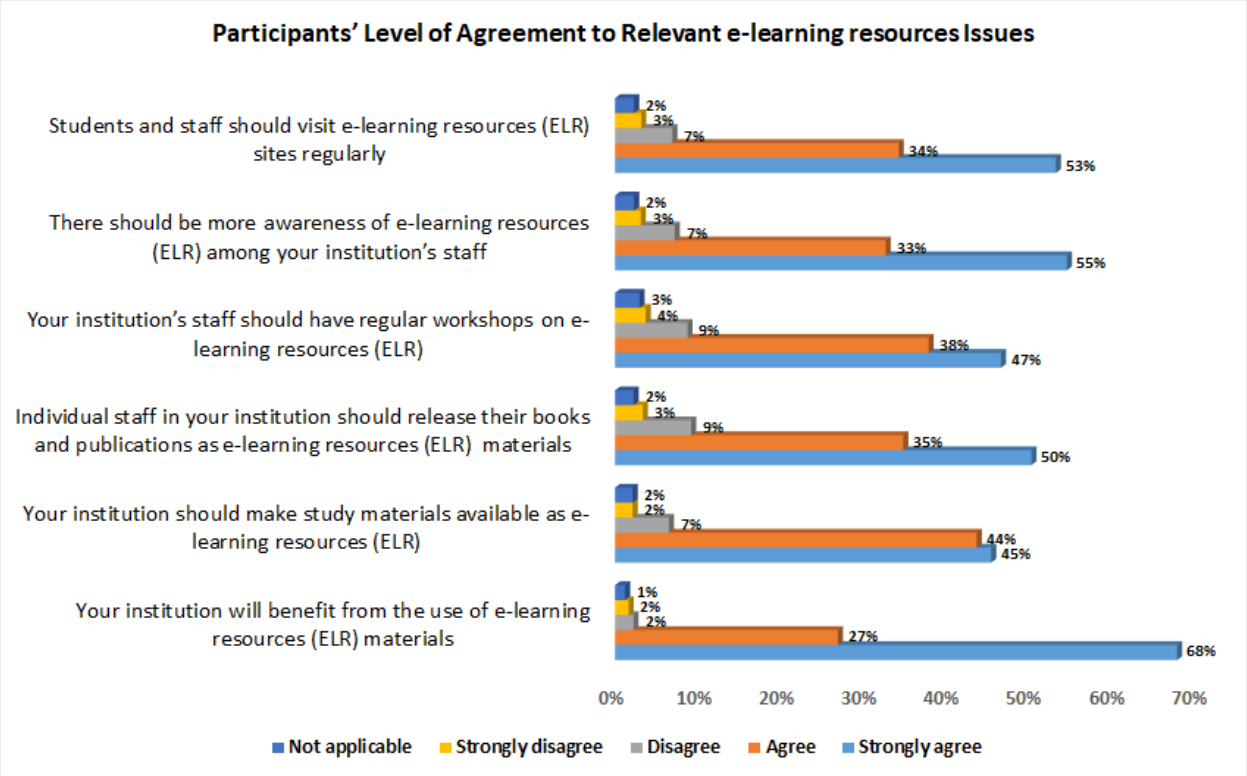
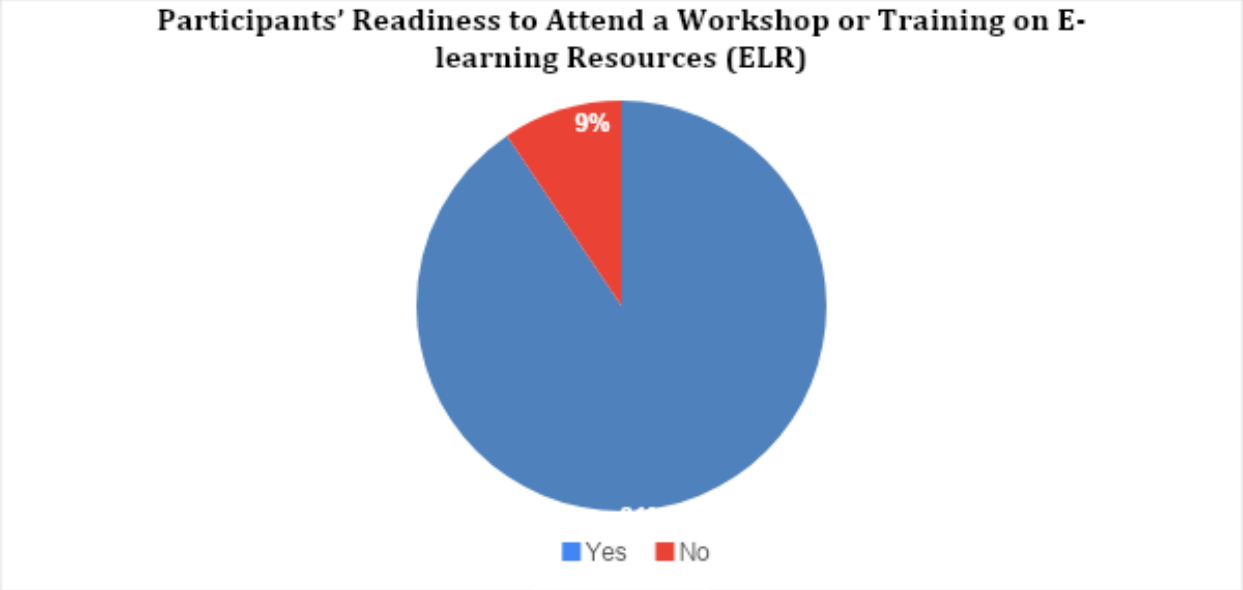


Figure 6 depicts the respondents' degree of preparedness to attend workshops or training on E-Learning Resources (ELR). Educators and learners at the University of Rwanda who use dual-mode teaching (both traditional and open and online learning) expressed a keen interest in understanding what e-learning resources may provide; they expressed 91% eagerness and readiness to accept ELR training. This necessitates immediate follow-up action through workshops and seminars to further educate lecturers and learners in Rwanda on this topic and to actualize this need as a global issue. This will go a long way toward improving teaching and learning in changing environments, and the rise in ICT has repositioned and strengthened open-distance learning using ELR.

.

***Figure 6**. Readiness to attend a workshop on ELR.*



Research contributions and limitations

To realize Rwanda's vision of transforming into a knowledge-based economy, it is crucial to improve the quality of education. This may involve actively engaging teachers in professional development, including comprehensive training programs, to enhance their professional competence, ensuring that both instructors and learners possess the necessary knowledge, skills, and attitudes to effectively address complex challenges using (ELR) and a variety of (LMS). The integration of these innovative technologies is vital to facilitate seamless accessibility in education.

The findings of this study suggest that participants have a relatively good understanding of ELRs; however, there is a gap in their efficient utilization. The LMS currently employed at the University of Rwanda requires further improvement to enhance its adaptability to various ELRs, making it more accessible to both lecturers and students. This research underscores the necessity of organizing workshops, training sessions, and awareness campaigns focusing on ELRs, LMS, availing technological packages and infrastructure, and the essential ICT skills required for successful e-learning implementation. Technological Barriers: Some students were unable to participate because of a lack of electronic devices, such as laptops, tablets, or computers, as well as slow internet connections. This limitation highlights the existing digital divide and emphasizes the need for initiatives to address this gap.

Incomplete Survey Responses: A portion of the respondents provided irrelevant answers to open-ended questions, leaving certain aspects of the research unanswered. This underscores the importance of refining the survey instruments and ensuring clarity in question formulation for future studies. Limited Engagement from Senior Staff: Despite expectations, older administrative and academic staff members exhibited low engagement in responding to the questionnaire. This suggests a potential resistance to change or a lack of familiarity with modern e-learning tools. Strategies for overcoming this resistance should be explored in future implementation plans.

This study provides valuable insights into the current state of e-learning readiness at the University of Rwanda. While participants exhibited a good understanding of ELRs, this study identified areas for improvement in their utilization of these resources. The limitations highlighted underscore the challenges that need to be addressed for more comprehensive and inclusive implementation of e-learning initiatives. Moving forward, targeted interventions, additional training, and technological support are essential to bridge gaps and ensure the successful integration of ELRs and LMS in the pursuit of Rwanda's knowledge-based economy aspirations.

Conclusion and Recommendations

E-learning has been particularly important in recent times as a response to the COVID-19 pandemic. However, familiarity with the use of ELR was likely to be limited to lecturers, supporting staff, and students, which led to discontinuity in its use. Thus, this research aimed to assess familiarity, frequency of use, and preference among many available ELRs, and the potential drawbacks of ELRs given the UR community. The study used structured questions shared with a sample of respondents, and their answers were analyzed. The results showed that even though many respondents admitted to having moderate knowledge of e-learning resources, most of them only used text-based documents on e-learning platforms. The results also show that respondents regularly used different types of e-learning platforms in their academic activities. However, respondents showed concerns that relying much on online learning may jeopardize the quality of education, as hands-on skills are an important learning attribute that is difficult to achieve through online learning only.

As a result, this paper recommends the implementation of continuous training programs for all educators, addressing ELR fundamentals, and essential ICT skills for efficient ELR implementation is needed.

Conducting workshops and seminars specifically tailored for working professionals to enhance their proficiency in utilizing e-learning resources.

ELR training programs should be purposefully integrated into the curriculum to ensure the acquisition of vital digital skills alongside their academic pursuits.

Devise innovative approaches, simulations, or practical components within the digital environment to mitigate concerns about the potential compromise of hands-on skills in online learning.

Prioritizing Internet and IT infrastructure and their accessibility and maintenance for effective e-learning by ensuring the continuous connectivity and alignment of technological resources with the evolving demands of modern education.

Similar studies should be extended to schools, private universities, and secondary schools to provide a more comprehensive understanding of perceptions at the national level. This expansion will serve as a valuable reference for future studies of online learning across different educational levels.

Declarations and Ethics Approval

Ethical permission was granted at the University of Rwanda's College of Agriculture, Animal Sciences and Veterinary Medicine's Research Screening and Ethical Clearance Committee, also known as "RSEC-C" (Ref:002/2022/DRI on 24/05/2022). The Research Screening and Ethical Clearance Committee's norms and regulations were adhered to throughout this study, and each procedure was carried out accordingly.

Competing Interests

According to what has been disclosed, the authors have no conflicts of interest with the execution of this work.

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Appendix: Questionnaire

A needs assessment for promoting transformational change towards accessibility in education and competence mobilization for e-learning

Introduction

Dear respondent,
"Everyone has the right to education" (United Nations, 1948, Article 26); this right was enshrined in the Universal Declaration of Human Rights over sixty years ago. The University of Rwanda with different partners, are doing their best to contribute to the success use of technology in teaching and Learning.

In this regards, we are conducting a needs assessment for promoting transformational change towards accessibility in education and competence mobilization for e-learning.

As a potential respondent, we value your participation in this need assessment and we assure you that your responses will be kept with utmost confidentiality and will only be used for the present needs assessment purposes.

You will be answering by ticking the option that suits best with you or your opinion

* Required

SECTION 1. Identification of the respondent

1. Q1. What is your gender? *

   Mark only one oval.

   - ◯ Female
   - ◯ Male

2. Q2. What is your age range? *

Mark only one oval.

- ◯ 18-25
- ◯ 26-33
- ◯ 34-41
- ◯ 42-49
- ◯ 50 and above

3. Q3. What is your highest level of educational?

Mark only one oval.

- ◯ PhD
- ◯ Masters
- ◯ Bachelor
- ◯ Diploma
- ◯ Secondary school certificate

4. Q4. What is your Profession/ Function/Position? *

Mark only one oval.

- ◯ Academic staff
- ◯ Administrative Staff
- ◯ Student (in below, specify the level).....

5. Q5. If you are a staff, how many years of work experience do you have?

Mark only one oval.

- 1-5
- 6-10
- 11-15
- 16-20
- 21-above
- Non-applicable

6. Q6. If you are an Undergraduate student, what is your level of studies?

Mark only one oval.

- Level 1
- Level 2
- Level 3
- Level 4
- Level 5

7. Q7. If you are a Postgraduate student, what is your program?

Mark only one oval.

- Postgraduate Diploma
- Masters Program
- PhD

8. Q8. What is your College? *

Mark only one oval.

- College of Arts and Social Sciences (CASS)
- College of Agriculture, Animal Sciences and Veterinary Medicine (CAVM)
- College of Business and Economics (CBE)
- College of Medicine and Health Sciences (CMHS)
- College of Education (CE)
- College of Science and Technology (CST)

9. Q9. What is your Campus?

Mark only one oval.

- Busogo
- Gikondo
- Huye
- Nyagatare
- Nyarugenge
- Remera
- Rukara
- Rusizi
- Rwamagana

10. Q10. What Special Needs / Disability do you have? *

Mark only one oval.

- ◯ Physical Disability / Physical challenges
- ◯ Visual Impairment / Visual difficulties
- ◯ Hearing impairment / Hearing difficulties
- ◯ Speech/communication difficulties
- ◯ Chronic Illness/Allergy
- ◯ Mental health challenges
- ◯ None
- ◯ Other: _____

SECTION 2: **Participants' Knowledge and Experience of e-learning resources (ELR)**

11. 2.1 Have you used e-learning resources (ELR) before

Mark only one oval.

- ◯ Yes
- ◯ No

12. 2.2 How familiar are you with e-learning resources (ELR)?

Mark only one oval.

- ◯ High
- ◯ Moderate
- ◯ Low
- ◯ No response

13. 2.3 Which e-learning material format do you prefer?

Check all that apply.

- [ ] Text-based
- [ ] Graphics-based
- [ ] Video-based
- [ ] No response

14. 2.4 What is your experience in using e-learning resources (ELR) in teaching and learning?

Mark only one oval.

- ◯ Excellent
- ◯ Very good
- ◯ Good
- ◯ Average
- ◯ Below average
- ◯ Poor
- ◯ Not at all
- ◯ No response

15. 2.5 In your opinion, how beneficial is eLearning in higher education institutions for students and instructors?

Mark only one oval.

- ◯ High
- ◯ Moderate
- ◯ Low
- ◯ Non Applicable

16. ***2.6 In your opinion, can eLearning be harmful/disadvantageous to students and instructors***

Mark only one oval.

- ◯ Yes
- ◯ No

17. ***2.7 If your answer Yes at 2.6 , which one of the following do you consider a major harm?***

Check all that apply.

- ☐ Lacks social interaction
- ☐ Cheating is unavoidable
- ☐ Requires self-motivation and proper time management skills
- ☐ Focuses more on theory
- ☐ Online learning is inaccessible to the computer illiterate population
- ☐ Lack of accreditation & quality assurance in online education

Section 3. **The Participants' Purpose and Extent of Use of e-learning resources (ELR)**

18. 3.1 How often do you use e-learning resources (ELR) for the following purposes?

Mark only one oval per row.

	Very regularly	Regularly	Occasionally	Not at all
Course material development	◯	◯	◯	◯
Research	◯	◯	◯	◯
Resources for students	◯	◯	◯	◯
Preparing Lecture notes	◯	◯	◯	◯
Writing articles and papers	◯	◯	◯	◯
Developing the curriculum	◯	◯	◯	◯
Designing activities for students	◯	◯	◯	◯
Writing conference papers	◯	◯	◯	◯
Developing project proposals	◯	◯	◯	◯
Developing theses	◯	◯	◯	◯
Helping to understand concepts	◯	◯	◯	◯
Assessing publications	◯	◯	◯	◯

of other scholars				
Aids in assignments				
Review purposes				
Assessing theses				
Working on course work assignments				
Accessing lecturer materials				
Other puroposes				

Section 4. Participants' Responses on Preference and Regularity of Use of e-learning resources (ELR) Tools

19. 4.1 How often do you use these following e-learning tools?

Mark only one oval per row.

	Very regularly	Regularly	Occasionally	Not at all
Instructional-based (Google classroom, Blackboard, Idroo, etc)	◯	◯	◯	◯
Learning Management Systems and other software (edx, coursera, udemy, Canvas,moodle,etc)	◯	◯	◯	◯
Web pages (google, googlescholar, University websites, etc)	◯	◯	◯	◯
Wikis (Wikipedia, etc)	◯	◯	◯	◯
Social networks (Facebook, Twitter, blogs, Cloudworks, Linkedin, Tiktok, Instagram, etc.)	◯	◯	◯	◯

Participants' Level of Agreement to Relevant e-learning resources Issues

20. **4.2 How do you agree with the following statements?**

Mark only one oval per row.

	Strongly agree	Agree	Disagree	Strongly disagree	Not applicable
Your institution will benefit from the use of e-learning resources (ELR) materials	◯	◯	◯	◯	◯
Your institution should make study materials available as e-learning resources (ELR)	◯	◯	◯	◯	◯
Individual staff in your institution should release their books and publications as e-learning resources (ELR) materials	◯	◯	◯	◯	◯
Your institution's staff should have regular workshops on e-learning resources (ELR)	◯	◯	◯	◯	◯

There should be more awareness of e-learning resources (ELR) among your institution's staff	◯	◯	◯	◯	◯
Students and staff should visit e-learning resources (ELR) sites regularly	◯	◯	◯	◯	◯

Participants' Readiness to Attend a Workshop or Training on e-learning resources (ELR)

21. 4.3 Would you like to attend a workshop or training on on e-learning resources (ELR)? *

Mark only one oval.

◯ Yes
◯ No

22. 4.4 If Yes, what do you want to be trained on?

_____

23. 4.5. If you have any additional recommendation to improve e-Learning at the University of Rwanda, kindly feel free to write them below.

On behalf of the research team, we thank you very much for your time to participate in this survey!

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