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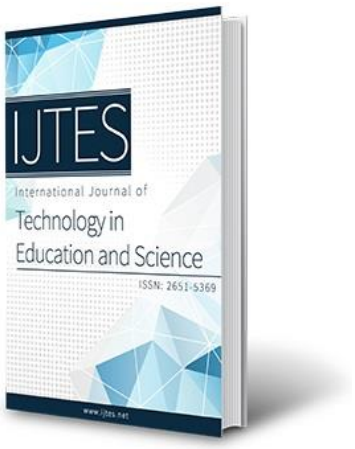

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Abstract

The increasing development in smart and mobile technologies supports transformation of learning environment into a smart learning environment to meet diverse learners' needs. Learning in an online environment requires motivation and skills to succeed. Self-regulated learning has been identified as one of the strategies for supporting students in an online learning environment. However, despite these innovations, there is a scarcity of well exploratory works to understand if students have skills, experiences, and technology resources for implementing a self-regulated smart learning environment. This study attempts to fill the gaps by investigating these experiences and technology resources. The study used mixed-method to investigate the readiness of 157 undergraduate students. The quantitative data used an online self-regulated learning questionnaire (OSLQ), and the qualitative data used focus group discussions. The quantitative data were analyzed using descriptive statistics and correlations, and the qualitative data used a thematic method to understand students' experiences. The investigations show that students understood the self-regulated learning process and its' role in their academic success. Moreover, they have access to mobile internet services and smart devices, mostly an android operating system. More so, goal setting, time management, and self-evaluation are among the top-level skills readiness, and there is a relationship between previous online learning experiences and these skills. Future research could investigate facilitators' readiness to develop a self-regulated smart learning environment for engaging online learning experiences and skills development.

Introduction

The increasing development in smart and mobile technologies transforms the learning environment into a smart learning environment that can support diverse learners' needs (Yot-Dominguez & Marcelo, 2018; Zhu, Yu & Riezebos, 2016). It provides opportunities for interactions amongst students and lecturers and offers personalized and inclusive learning experiences. The current challenges of the Covid-19 pandemic and related issues are pushing for distance and online learning to support educational processes (Alqabbani, Almuwais, Benajiba & Almoayad, 2021; Bao, 2020). Online learning provides flexibility and accessibility for open education resources and can be supported by smart and mobile technologies to enhance educational processes (Sands & Yadav, 2020; Chumbley, Haynes, Hainline & Sorensen, 2018; Alanazi & Brown, 2010).

Today, many educational institutions opted for distance and online learning courses in response to the Covid-19 pandemic, societal needs and to make education accessible to everyone (Akuretiya & Meddage, 2021; Egielewa, Idogho, Iyalomhe, & Cirella, 2021). Learners can access learning resources anytime using their smart devices that support learning, i.e., smartphones and tablets, or in a smart classroom using interactive whiteboards and smart projection systems. They can interact with their facilitators via collaborative and visualization tools.

However, learning in an online environment is complex and heavily depends on students' strategies to be self-motivated and actively engaged in the learning process (Gambo & Shakir, 2019; Lim, Jalil, Maa'rof, & Saad, 2020; Fakinlede, 2015; Sahdan, Masek & Abidin, 2017). Students are expected to have a certain level of skills to be engaged in an active learning process to achieve learning goals (Akuretiya & Meddage, 2021; Gambo & Shakir, 2019; Pérez-Álvarez, Maldonado-Mahauad & Pérez-Sanagustín, 2018; Zimmerman, 2002). Research studies have shown that the self-regulated learning process can be considered as one of the approaches that can support and improve learners' success in an online learning environment (Sand & Yadav, 2020; Pérez-Álvarez, Maldonado-Mahauad & Pérez-Sanagustín, 2018). This pedagogical learning process can be integrated into a smart learning environment to support skills and knowledge development among learners.

Previously, this progressive research developed a self-regulated smart learning environment (Gambo & Shakir, 2021a**)** that supports an online learning process through skills and competency development. There is a need to investigate potential users' readiness regarding skills and technology resources for effective implementation. Several studies investigated students' online learning readiness and impacts, such as Alqabbani, Almuwais, Benajiba and Almoayad (2021); Akuretiya and Meddage (2021); Egielewa, Idogho, Iyalomhe, and Cirella (2021); Widodo, Wibowo and Wagiran (2020). However, the current challenges of the Covid-19 pandemic and related issues required innovative support with skills for students to be engaged and motivated for online learning success (Khan, Nabi, Khojah & Tahir, 2021; Ranganathan, Singh, Kumar, Sharma, Chua, Ahmad & Harikrishnan, 2021; Yen, Ozkeskin, Tankari, Tu, Harati, & Sujo-Montes, 2021). Furthermore, several studies on self-regulated-based learning environments have been done; however, there is a scarcity of well-exploratory studies that investigated potential user's readiness in terms of skills, experiences, and availability of technology resources (Egielewa, Idogho, Iyalomhe, & Cirella, 2021; Valverde-Berrocoso, Garrido-Arroyo, Burgos-Videla & Morales-Cevallos 2020; Chumbley, Haynes, Hainline & Sorensen, 2018). The self-regulated-based learning environment is becoming a research interest in the face of global health challenges as the need for skills-based courses, and lifelong learning processes are increasing (Egielewa, Idogho, Iyalomhe, & Cirella, 2021; Chumbley, Haynes, Hainline & Sorensen, 2018). Thus, the general research question is: are students ready for a self-regulated smart learning environment? Addressing this question will provide insights into sustainable implementation strategies and policies regarding a self-regulate-based learning environment to support online learning and skills development with the following sub-research questions:

i. What is the level of students' self-regulated learning skills readiness?
ii. What is the relationship between students' online learning experiences and self-regulated learning skills?
iii. Do students understand self-regulated learning and its' role in their learning process?
iv. Do students have a smart device, and what types of operating systems do the devices have?
v. Do students have access to mobile internet services, and how do they rate the services?

Overview of Self-Regulated Smart Learning Environment

The innovation of smart and mobile technology is transforming an online learning environment into a smart learning environment that can provide opportunities for personalized and inclusive learning experiences. A smart learning environment is a technology-supported learning environment that adapts and provides appropriate support in the right place and time based on individual needs, which could be determined by analyzing their behaviour and results (Talan, 202; Gros, 2016; Zhu *et al*., 2016). A smart learning environment aims to provide students with self-learning, self-motivated, and personalized opportunities, allowing them to attend classes at their speed and access personalized learning content tailored to their specific needs (Kim et al., 2014). A smart learning environment is a sophisticated digital environment that is aware of the learning context, recognizes the learner's characteristics, provides adaptive learning opportunities and convenient interactive resources, automatically monitors a learning process, and analyses the learning outcomes. Its objective is to promote learners' access to simple, engaging, and productive learning (Mused, Sariah, & Hartono, 2022; Gros, 2016).

Self-regulated learning (SRL) is self-generated thoughts, emotions, and actions coupled with plans and targeted progress toward personal goals, which are generally meant to provide an iterative approach (Zimmerman, 2002). Self-regulated learning has long been recognized as essential for student success in academic life (Wiggins & Hoff, 2021; Mallatilaugher & Gardner, 2018; Sand & others, 2017). It has three learning processes, i.e., forethought (this where students can set learning goals and other cognitive information); performance (this is where students can use different learning resources, tools, collaborations, etc.), and self-evaluation (this where students reflect on learning progress through quizzes, assessment, summaries, etc.) (Zimmerman, 2002). These learning processes can be integrated into a smart learning environment to provide competency and skill development to support students' learning processes (Gambo & Shakir, 2019; Silva, 2020; Sahdan, Masek & Abidin, 2017). Thus, integrating a self-regulated learning process into a smart learning environment as the pedagogical learning process was considered the self-regulated smart learning environment (Gambo & Shakir, 2019). This new online learning paradigm can provide opportunities to support the learning process and develop skills and competency (Talan, 202; Gambo & Shakir, 2021b).

Online Learning Skills

The increasing deployment of skill-based courses in a massive open online system provides opportunities for more learners to access learning resources. Thus, there is a need to develop an innovation into an online learning environment to support learning. The online learning environments can be developed to support the self-regulated learning process and provide opportunities for developing skills for online learning success (Korkmaz & Toraman, 2020; Gambo & Shakir, 2019; Zimmerman, 2002).

Several factors have been identified in the literature that influences dropout and lack of success in online course completions, such as "*motivation," "lack of skills," "engagement," "learning" experiences, "academic background," "relevant experiences," "relevant skills," and "psychological attributes."* (Adams, Chuah, Sumintono & Mohamed, 2021; Hsu, 2020; Gafaro & Yildiz, 2020; Chumbley, Haynes, Hainline & Sorensen,

2018; Sahdan, Masek & Abidin, 2017). However, students' relevant experiences and skills have been identified as keys that predict course completion and success in online courses (Lim, Jalil, Maa'rof, & Saad, 2020; Koumachi, 2019; Chumbley, Haynes, Hainline & Sorensen, 2018; Alanazi & Brown 2010). Self-regulated learning skills such as goal setting, task strategy, time management, help-seeking, and self-evaluation are essential for success in the online learning process (Hsu, 2020; Gafaro & Yildiz, 2020; Chumbley, Haynes, Hainline & Sorensen, 2018; Barnard, Paton & Lan, 2008). These skills can be developed in a self-regulated smart learning environment for inclusive learning experiences and are discussed below:

Goal Setting: An online course has objectives within the context at the beginning of a learning course. However, a student can set a goal and have a clear vision to achieve it (Barnard, Paton & Lan, 2008).

*Task Strategies: T*he facilitator provides online course content in different formats to facilitate various tasks, assessments, and quizzes within a time frame. It is the responsibility of an online learner to make plans and changes to meet different timeline functions (Barnard, Paton & Lan, 2008).

*Time Management: O*nline learning requires learners to manage their time and plan to meet each activity or task. The facilitator can allocate time for each activity, and the learner is expected to plan on meeting these deadlines. A learner can use their smart device to learn anywhere at any time without restriction to location or have interactive learning in a smart classroom (Barnard, Paton & Lan, 2008).

*Help-Seeking: L*earners can use learning facilities and resources in the online learning environment to reach out to others about information and collaboration with peers in the same course. The successful learner takes this advantage to collaborate widely with others, which might not be effective in a physical classroom. Supplementary resources, comments, and more insight could support and motivate online learners using help-seeking facilities in an online learning environment (Barnard, Paton & Lan, 2008).

Self-Evaluation: This allows learners to assess their strengths and weakness. These are quizzes and online assessments that learners can use to evaluate their learning strengths, helping them plan on improvement (Barnard, Paton & Lan, 2008).

The understanding and availability of these skills, experiences, and technology resources can facilitate a sustainable implementation of a self-regulated smart learning environment to support an online learning process, improving the academic success rate and online learning motivation and engagement towards academic success.

Related Works

Several studies on students' online learning readiness are available in the literature; however, this study focuses on related works that qualitatively investigated online self-regulated-based learning environments for supporting students' online learning experiences. For example, Yen, Ozkeskin, Tankari, Tu, Harati, & Sujo-Montes (2021) investigated whether self-regulated learning skills can predict accelerated online learning success using a survey

among forty-five undergraduate students before implementing an online learning platform during the Covid-19 pandemic. According to the study's findings, five SRL skills can predict success in online accelerated learning experiences. The study recommended that instructors identify and educate students who possess relevant SRL skills before attempting accelerated instructions to ensure a pleasant learning experience.

Similarly, Naujoks, Bedenlier, Gläser-Zikuda, Kammerl, Kopp, Ziegler, and Händel (2021) investigated whether students' readiness for online learning influences their self-regulated learning within remote emergency teaching. The survey result among six hundred and sixty-two students revealed that students' digital readiness had influenced their self-regulated learning. The study called for more studies on the influence of other contextual factors on the self-regulated learning process to support the development of an online self-regulated-based learning environment. Silva (2020) investigated self-regulated skills using motivated strategies for learning questionnaires (MSLQ) among twenty-seven students for open and distance education to reduce dropouts and understand how to support them for an effective and motivated learning process. The study adopted KWL ("What I Know, What I Want to Know, What I Learned"). The findings show that KWL improved self-regulated skills among the respondents to support open and distance education.

Alkhasawnh and Alqahtani (2019) explored the effects of using an online course among seventy undergraduate students focused on self-regulated learning techniques to improve students' self-regulation and academic outcomes. Two types of online courses with the same concept were used to teach the students. The independent result has shown that the online course supported by the SRL strategy substantially influences learning performances. Similarly, Chumbley, Haynes, Hainline and Sorensen (2018) investigated self-regulated learning skills readiness among a hundred students. The research used the online self-regulated learning questionnaire (OSLQ). The findings show that students have the highest degree of self-regulation within the dimension of environmental structuring and goal setting. The lowest level of self-regulation of learning was in the task strategies. Female students had a higher level of self-regulated learning while there was little difference in ethnicity. Low correlations were observed between student interaction with online courses and perceived online self-regulated levels of their learning process. The research called for further work on hybrid dual enrollment courses to explore students' self-monitor learning process.

Moreover, Sahdan, Masek and Abidin (2017) examined postgraduate students' ability to conduct self-regulated learning using a longitudinal analysis of eight-six postgraduate students. The findings show that students adopted self-regulated learning for different subjects and stages. Furthermore, the findings show a strong predictor for educators to change teaching and learn from a teacher-centered to a student-centered orientation, impacting students' learning skills and competency.

Similarly, Barak, Hussein-Farraj and Dori (2016) used a mixed-method to identify the self-regulation learning skills required for the online learning process. The research involved twenty-two undergraduate students learning the same course but in different settings: online and on-campus. Findings showed that online students were more aware of mastery learning and information processing techniques than on-campus peers. Online students were more conscious of the value of preparing, monitoring, and reviewing than off-campus students.

The related works show differences in the findings for a sustainable implementation of a self-regulated-based learning environment. Such differences in results indicated that students' SRL preparation for an online learning environment implementation is examining and provided further studies. The findings show a scarcity of well-exploratory studies examining students' SRL skills and technology resources readiness to support strategic implementation. This research, therefore, attempted to examine not only the skills but also experiences and technology resources from the perspectives of a complementary mixed-method design approach for interpreting the participant's responses to enhance the generalization of the results for appropriate conclusions which are lacking in the related studies (Silva, 2020; Alkhasawnh & Alqahtani, 2019; Chumbley, Haynes, Hainline & Sorensen, 2018).

Method

Research Instruments

This study used a mixed-method design to explore students' readiness for a self-regulated smart learning environment to understand the research problem. The purpose of the exploratory analysis is to articulate problems more clearly, explain definitions, gather interpretations, obtain perspective, remove unrealistic ideas, and establish hypotheses. Surveys, workshops, focus groups, and case studies are commonly in exploratory research (Sileyew, 2020; Sim, Saunders, Waterfield & Kingstone, 2018; Creswell, 2012). The mixed-method can be applied where one method is limited in understanding and answering the problem at hand. It is a systematic and rigorous approach to address the study's purpose and express the respondents' voices and views to understand the issues at hand better (Almalki, 2016; Yin, 1994; Creswell & Clark, 2017). It utilizes qualitative and quantitative data and triangulates data from different sources to improve the research result's reliability and generalization (Sim, Saunders, Waterfield & Kingstone 2018; Creswell, 2012; Yin, 2004). The quantitative used an online self-regulated learning questionnaire (OSLQ) (Barnard, Paton & Lan, 2008) based on a 22-item scale item that uses a 5-point Likert-type response format that ranged from "strongly disagree" (1) to "strongly agree" (5) (Erickson, Soukup & McGurn, 2015). The qualitative methods used focused group discussions to investigate students' experiences and the availability of technology resources for the self-regulated smart learning environment implementation.

The supervisory research team reviewed the instruments for face validity, and the Ethical Review Committee approved the research instruments before commencing the study. Furthermore, the survey and focus group questions were subjected to a potential user's pilot test to validate the research instruments (Sileyew, 2020; Bolarinwa, 2015). The combined outcomes of the two methods provided the conclusion, decision, and plan on the types and nature of self-regulated smart learning environments that will support learning skills for an improved experience.

Research Participants and Sampling Process

The study was conducted among the final year undergraduate students at the Department of Computer Science, Adamawa State University, Mubi (ADSU)-Nigeria. This contextual setting investigated technology resources and

online learning experiences to support the implementation of a self-regulated smart learning environment. Thus, a single case has been introduced to investigate the phenomenon (Žukauskas, Vveinhard & Andriukaitiene 2018; Sim, Saunders, Waterfield & Kingstone 2018). There are 265 enrolled final year students in the Department of Computer Science during the 2018/2019 academic year.

The link to the survey instrument was sent to them via email and invited for the focus group discussions. We followed the modified Cochran Formula for a small sample size at 95% confidence with a half-response rate to determine the sample size (Sileyew, 2020; Sim, Saunders, Waterfield & Kingstone, 2018; Daniel, 1999; Cochran, 1977). Thus, based on the computation, 157 sample participants are adequate to validate the survey. Furthermore, we followed the literature that indicated that a qualitative study's typical sample size could range from 5 to 50 for a large population and from 2 to 30 for a small community (Guest, Namey & McKenna, 2017; Andrew & Henry, 2015). Based on these recommendations, we invited 8 participants for the focus group discussions.

Data Analysis

The online survey data were analyzed using version the SPSS version 25. The mean value and the standard deviations were computed. Cronbach's Alpha Reliability Coefficient was used to determine the internal reliability. The use of correlation determines the relationship between SRL skills and students' online learning experience (Gjermeni, 2016; Henson & Roberts, 2006; Creswell, 2013). The data on open-ended questions (qualitative) were analyzed using thematic analysis, which involves analysis: familiarization with datasets, generation of initial codes, theme search, theme examination, and refining themes (Braun & Clarke, 2006). The QSR NVivo 12 was used to manage the quality of the data. The interpretation of the focus group discussion was presented to the participants to minimize bias and reduce multiple different realities (Kaplan and Duchon, 1988). This process would provide a clearer understanding of the truth and the expression of the participants.

Results

First, the online survey addressed the first two research questions (i & ii), and open-ended questions-focused group discussions addressed the last three questions (iii, iv & v). The results of the analyses were present as follows:

Demographic Profile of Respondents

Table 1 shows that 62.4% were male students, while 37.6% were female students, which shows that most of the respondents are male. Furthermore, 40% of the respondents were 18-25 years of age, 38.2% were within 26-30% of age, 5.6% were with 36-40, 13.4% were with 31-35, and only 2.5 % are 41 and above age. The finding means that most of the respondents were still in productive age, and they can take advantage of smart devices to support their learning process. On the availability and ownership of a smart device, 98.7% said they have a smart device, 0.6 % said they don't have it, and 0.0% preferred not to say. This means that it will be easier to implement an application that can take advantage of smart device characteristics.

The results show that most respondents have a smart device to support their online learning and social collaboration, helping online self-regulated learning experiences. On the experiences using a smart device for online learning, 1.9 % said they have less than one year, 14% said they have 1-2 years, 45.25% said they had 3-5 years, 29.0% said they had 6-10 years, and only 9.6% said they have more than 11 years and above. The findings show that most respondents have considerable experience in using a smart device to support self-learning. On the level of self-regulated learning experiences, 0.6% said they were very low, 8.9% are low, 53.3% were medium, 28.7% were high, and 8.3% said they have very higher experiences. The findings show that most respondents have good self-regulated online learning experiences to support their online learning process.

Table 1. Demographic Profile of Respondents

Demographics	Respondents	Percentage (%)
Gender		
Male	98	62.40
Female	59	37.60
Age		
18-25	63	40.0
26-30	60	38.30
31-35	9	5.60
36-40	21	13.40
41 & above	4	2.50
Experiences in using a Smart Device for Online Learning (Year(S))		
Less 1	3	1.90
1-2	22	14.00
3-5	71	45.00
6-10	46	29.00
11 & above	15	9.60
Level of Self-Regulated Learning Experiences		
Very low	1	0.60
Low	14	8.90
Medium	84	53.30
High	45	28.70
Very high	13	8.30

Scale Validation and Measurement

The results of the Cronbach's Alpha coefficient for the sub-scales are all above 0.70. Therefore, the instruments measured were reliable and sufficiently measured each sub-scales, as shown in Table 2.

Table 2. Internal Reliability of Online Self-regulated Learning Subscales

Sub-Scales	Cronbach's Alpha Coefficient
Goal Setting	0.877
Task Strategies	0.843
Time Management	0.807
Help-Seeking	0.856
Self-Evaluation	0.873

Level of Self-Regulated Learning (SRL) Skill Readiness

Table 3 shows the goal setting, task strategies, time management, help-seeking, and self-evaluation have mean values of 19.05, 15. 16. 15.47, 20.25, and 15.95, respectively, with their average mean of 17.18. It suggested that the participants' self-regulated learning skills are high, taking into consideration their average mean. Most respondents agreed that help-seeking is essential in their self-regulated learning process; this follows by goal setting and task strategies.

The findings are similar to Alanazi and Brown (2010), which found similar sub-scales among students' top skills readiness. However, it differs from Chumbley, Haynes, Hainline and Sorensen's (2018) findings, which found goal settings and task strategies to be higher in the skills readiness among students. The findings mean that students' ability to set goals, plan, and monitor the learning process can help achieve academic goals. Furthermore, SRL skills are not the same across respondents, and there is a level of variation, with help-seeking being the highest and task strategies being the least.

Table 3. Means and Standard Deviations of Self-regulated Learning Subscales

Constructs	Mean	Standard deviation	Minimum	Maximum
Goal Setting	19.05	4.01	5	25
Task Strategies	15.16	3.38	4	20
Time Management	15.47	3.09	4	20
Help-Seeking	20.25	3.04	5	25
Self-Evaluation	15.95	3.28	4	20

Correlations of Online learning Experiences and Self-regulated Learning Skills

Table 4 presents the correlation between online learning experiences and self-regulated learning processes. The result shows that the online learning experience is associated with goal setting ($\beta = 0.271$). The findings mean that students' ability in online learning can help in setting and achieving a goal. Moreover, there is a correlation between students' online learning experiences and task strategy ($\beta = 0.185$). The results further explain why online learning experiences are associated with goal setting as the kind of learning content used can help students achieve their learning goals. Lastly, help-seeking was related to self-regulated learning experiences ($\beta = 0.108$).

These findings are similar to Alanazi & Brown (2010), which found goal settings, task strategies, and help-seeking related to online learning experiences; however, they differ in self-evaluation. The results show a relationship between respondents' online learning experiences and goal setting, task strategy, and help-seeking. This result supports the level of SRL readiness, where goal setting and help-seeking are among the top respondents' skills readiness.

Table 4. Correlations of Online learning Experiences and Self-regulated Learning Subscales

Sub-Scale	1	2	3	4	5	6
1. Online learning experience	----		-			
2. Goal setting	0.271**	---				
3. Task strategy	0.185**	0.423**	---			
4. Time management	0.067	0.411**	0.540**	----		
5. Help-seeking	0.108**	0.521**	0.521**	0.539**	----	
6. Self-evaluation	0.053	0.379**	0.366**	0.528**	0.514**	----

Note: **p<0.05

The next stage in the data analysis is the analysis of the open-ended focused group discussions. The focus group discussions revealed themes that provide insights into the students' readiness for a self-regulated smart learning environment implementation, which are analyzed and discussed to address research questions iii, iv & v.

Understanding Self-Regulated Learning and Importance in the Learning Process

The focus group discussions show that respondents have a good understanding of self-regulated learning experiences, and they believed that it could help them in their academic success. Self-regulated learning's primary reason is the flexibility of learning strategies, self-monitoring, and self-responsibility for learning outcomes. To control or monitor one's learning is another outcome of self-regulated learning as the learner considers it a task simultaneously with learning itself. The respondents reflected that a sense of responsibility about their learning was high in understanding the self-regulated learning process. It doesn't require an external force to monitor, and they are intrinsically motivated. Another interesting observation that came out of this analysis that respondents think is that the learning received by their initiatives lasts for a more extended period than the imposed learning..."*My understanding of self-regulated learning is the ability in which the learner control or monitor its learning process. So, it is important as it makes a learner to be motivated whenever I am online. It also helped in developing learning strategies of a learner to achieve a particular goal".*

Smart Device, Operating System, and Usage

In this modern age of updated technology and gadgets, respondents showed good interest in having them not for the learning process but also for free communication, fun, and socialization. Almost everyone had a smart device like handsets and laptops with the most updated specifications and programs. As far as operating systems are

concerned, three major operating systems emerged: Android, MAC, and Windows. Seven respondents had smart devices operating on the android system, while one used the MAC and Windows operating systems. The usage of smart devices is full of variety as respondents learn things by pdf, video tutorials, emails, group conversations, learning apps. Respondents also highlighted the importance of video conferencing for learning activities. "*I have a* smart device that *has an Android OS. I normally do with my smart device to communicate, call, send short message texts, video conferencing, and download some learning applications. I have so many tutors in my handheld device, which helps me apply a knowledge I acquired."* This statement confirms the respondent's characteristics, showing that most respondents have smart devices and have experience using them to support their online learning experiences. These results further revealed that most respondents have Android-based smart devices for learning, communication, and social interaction.

Access and Quality of Mobile Internet Services

Access to the mobile internet is no more an issue in this networking era. Almost everyone has wireless devices with wireless internet services through WIFI in schools and their residential places. 3G and 4G are abundantly available by cellular companies simultaneously with other features, making accessibility to the internet through smart learning devices easier. The benefits of mobile internet are unimaginable. One can freely get in touch with any online tutorial on YouTube at any time and place, so the chances of missing out on some live online programs are gone to zero. Five of the respondents rated their internet services high, and only three said it was low who hope to improve its coverage. From these opinions, it is clear that most respondents have access to mobile internet on their smart device that can support their online learning. Furthermore, the respondents have experiences in collaboration and help-seeking, which can help their self-regulated learning experiences. The findings confirm that a self-regulated-based learning environment can support active and inclusive learning experiences.

Discussion

The study's findings indicate that students understand the self-regulated learning process and its' role in their learning process. In comparison, the result reveals that students have access to mobile internet providers, most of which are smart apps running on android apps. More so, goal setting, time management, and self-assessment are at the highest level of skills readiness, and there is a relationship between online learning experiences and SRL skills. The more experienced students take online courses, the better they appear to be prepared to regulate their learning to be successful learners (Sileyew, 2020; Sim, Saunders, Waterfield & Kingstone, 2018).

Therefore, students with no or little self-regulated learning experiences might be at a disadvantage if no support or training was provided to them on using SRL skills sufficiently as needed. More so, higher education institutions should be encouraged to create a mandatory training course to certify students to enroll in online classes upon completing the training (Chumbley, Haynes, Hainline & Sorensen, 2018). In such training courses, students should be exposed to different tools available in their online platforms and the skills and strategies that can be used to support their online learning. Instructors are another essential aspect of assessing online learners to become better self-regulators. As the study results revealed, students who are more experienced in online education are

better at setting their own goals, self-evaluating their learning by checking their work quality, and seeking help from others when needed. Online courses could present initial low-stakes opportunities for students to use such skills by modifying their activities from an individual activity.

These skills would allow peers to work collaboratively to achieve better learning experiences. Furthermore, students can better understand the time needed to accomplish their tasks and use different strategies to obtain their goals. Furthermore, with the current challenges of the Covid-19 pandemic that require learning in isolation and mitigating future challenges on the educational process, there is a need to develop an online learning environment that provides the opportunity for competency and skill development (Karakose et al., 2021a, 2021b). This study provides insights into self-regulated smart learning environment issues to guide strategic implementation and training to support students' online learning process.

Conclusion

The online learning process is a complex paradigm that comes with challenges, learners need to have skills, experiences, and self-motivation to engage in the active learning process. The self-regulated learning process has been identified as one strategy for developing these skills and experiences to support the online learning process. However, there is a lack of well-exploratory research that provides a comprehensive understanding of potential users' readiness in terms of skills, experiences, and technology to support the sustainable implementation of the self-regulate-based learning environment. This study investigated these issues to make recommendations and generalizations for sustainable future implementation. These findings have shown that potential users are ready for a self-regulating smart learning environment regarding the availability of skills, experiences, and technologies. More specifically, this study's findings provide insights into the relationships of online experiences and goal setting, help-seeking, and task strategy. Developing a learning environment that supports skills and academic success requires new pedagogical frameworks and faculties and students' training, which requires financial obligations and changeover implementation.

Recommendations

The penetration of emerging technologies in developing countries is appropriate for applying application technology in educational institutions and other associated organizations. However, developing nations are lagging in bridging the digital divide. Thus, based on the results, this study makes the following recommendations:

i. This study calls for the increase in respondents which might reveal more insights into a self-regulated smart learning environment and generalization of findings.

ii. Expanding wireless network and a subsidized scheme, for example, administrators may plan seminars to assist teachers with best practices in designing course structure and curriculum to increase student learning outcomes and engagement by using a self-regulating smart learning setting, especially in the face of the Covid-19 pandemic.

iii. Educational institutions should also ensure that the software they adopt is easy to access, accurate, and useful to improve students' learning experience; and adequate resources and preparation should also be

offered, not just for teachers but also for students, which would increase student engagement.

iv. A new curriculum needs to be created to fulfill the demands and ambitions of a new generation of emerging learners. The use of a self-regulated smart learning environment is an investment in growth, rollout, and training. This study calls educational leaders to resolve concerns relevant to the effective use of such technologies in an educational institution

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